California Department of Parks and Recreation
Carnegie State Vehicular Recreation Area
Resource Management Area Program

Draft Environmental Impact Report

SCH No. 2023020424

Appendices

January 2026

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California Department of Parks and Recreation
Carnegie State Vehicular Recreation Area
Resource Management Area Program EIR

Appendix A: Notice of Preparation and Responses

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State of California • Natural Resources Agency

Gavin Newsom, *Governor*

DEPARTMENT OF PARKS AND RECREATION
Off-Highway Motor Vehicle Recreation Division
715 P Street
Sacramento, California 95814

Armando Quintero, *Director*

NOTICE OF PREPARATION

Date: February 14, 2023

To: California State Clearinghouse, Responsible and Trustee Agencies, federal agencies, local jurisdictions, and interested individuals and organizations

Subject: Notice of Preparation (NOP) of the Carnegie State Vehicular Recreation Area (SVRA) Resource Management Areas Program Environmental Impact Report (EIR)

Lead Agency: California Department of Parks and Recreation (DPR)

Project Location: Carnegie SVRA located at 18600 Corral Hollow Road in eastern Alameda and western San Joaquin counties approximately 15 miles east of Livermore and 12 miles west of Tracy. See attached project location map (Figure 1).

Project Description: DPR proposes to implement sediment and erosion controls at Carnegie SVRA through establishment of new Resource Management Areas (RMAs) within the park. A brief description of the project, including its location and probable environmental effects, is attached.

The purpose of this NOP is to invite comment on the scope and content of the environmental review. Agencies should comment on the elements of potential environmental effects that are relevant to their statutory responsibilities in connection with the proposed project.

Pursuant to California Environmental Quality Act (CEQA) Guidelines 15082(b), you have 30 days from the date of receipt of this NOP to respond. **Responses must be received by 5 pm, March 20, 2023**. Please send your written responses to Gina Benigno, Senior Environmental Scientist, Specialist, as follows:

By email: Gina.Benigno@parks.ca.gov. Please include "Carnegie SVRA RMA Program EIR" in the subject line.

By mail: Gina Benigno, Senior Environmental Scientist, Specialist
California State Parks Diablo Range District
15751 Tesla Road, Livermore, CA 94550

Agency responses should include the name of a contact person at the agency.

Signature: *Clinton Elsholz*
DocuSigned by:
DB5FF6A6A92248B...

Date: 2/15/2023

Title: District Superintendent (Acting)

CALIFORNIA DEPARTMENT OF PARKS AND RECREATION
CARNEGIE SVRA RESOURCE MANAGEMENT AREAS PROGRAM
PROJECT DESCRIPTION

Project Site Description

Carnegie State Vehicular Recreation Area (SVRA) is a 1,575-acre off-highway vehicle (OHV) park in in eastern Alameda and western San Joaquin counties (Figure 1) overseen by the Off-Highway Motor Vehicle Recreation (OHMVR) Division and operated by the Diablo Range District of California Department of Parks and Recreation (DPR). Carnegie SVRA has been operated as an OHV park since it was purchased by DPR and became a unit of the State Parks System. The park offers numerous off-road opportunities for motorcycles, all-terrain vehicles (ATVs), 4x4s, and recreational off-highway vehicles (ROVs or side-by-sides). Carnegie SVRA has more than 1,300 acres of riding area and over 80 miles of trails. OHV recreation within the park is divided into open riding areas, trails only riding areas, and trails only riding areas within fenced Resource Management Areas (RMAs), which are areas that have been rehabilitated in recent years. Roughly half of the 1,575-acre total park acreage is managed as RMAs (Figure 2).

The proposed project involves implementation of resource management activities, described below, within the existing Carnegie SVRA. Proposed project activities would not occur on the adjoining state park property (also known as the Alameda and Tesla Expansion Area).

Proposed Project

DPR proposes to progressively establish new RMAs and provide ongoing sustainable OHV recreation management within the new and existing RMAs. The proposed project consists of implementing activities that disperse storm water runoff, prevent accelerated erosion, and manage the existing trail system. Sediment loss and erosion control measures include reducing the number of trails, increasing vegetation, building sustainable trails, and enforcing trails-only riding. A brief description of the project activities associated with the new RMAs and the subsequent maintenance of the new and existing RMAs is presented below.

- Perimeter Fencing. Install and maintain fencing to establish RMA boundaries and isolate treatment areas from public access. Field fencing, a type of utility wire fencing with broad grid spacing, would be installed 6 to 8 inches off the ground with an H brace installed every 100 feet, to allow wildlife passage.
- Signage. Install signage at approved route/trail entrances along with signs carrying a public message explaining why certain areas are closed and how to get involved.
- Landform Grading. Grade area to restore natural slope gradient of impacted areas. Apply replacement soils as needed to achieve grade and prevent erosion.
- Access Routes. Create temporary roads to provide access for heavy equipment for bringing in soil, crews, wattles, tree trimming, etc. Temporary roads will be obliterated as the equipment is withdrawn.
- New Trail Construction. Construct new trails in stable, resilient soils to replace unsustainable trail routes.
- Erosion Control. Apply erosion control measures (e.g., hydroseeding, wattles) on bare slopes and install hard water crossing pavers on trail sections where drainage sheet flows across a trail.
- Revegetation. Establish vegetation on impacted areas through hydroseeding and/or hand planting.

- Inspections and Evaluations. Conduct visual inspections, including using drones to look for signs of off-trail riding and any damaged areas needing repair. Evaluate trail surface conditions using a Trail Evaluation Form.
- Off-Trail Rehabilitation. Cover disturbed area and install barriers. Place straw on new disturbance areas where vehicle has gone off a designated trail. Install metal H bars and drift fencing across non-designated trails to block access and stop use.
- Habitat Improvement. Improve habitat values through new native species plantings and removal of exotic or invasive species.
- Drainage System Maintenance. Remove accumulated sediment from culverts and watershed sediment basins.
- Routine Trail Maintenance. Assess and maintain trail conditions including trail surfaces, trail width, and drainage controls.

Probable Environmental Effects

The Carnegie SVRA Resource Management Areas Program EIR is expected to address potential environmental effects in the following resource areas: aesthetics, air quality, biological resources, cultural resources, energy, geology/soils, greenhouse gases, hydrology/water quality, land use, recreation, and tribal cultural resources.

Several areas of potential concern are likely to be found less than significant given the type of project, the absence of a resource, or the nature of the project site (e.g., agriculture/forestry, hazards/hazardous materials, mineral resources, noise, population/housing, public services, transportation, utilities, and wildfire). Further refinement of the scope of the technical issues to be addressed in the EIR will occur during the CEQA process, including input received in response to this NOP.
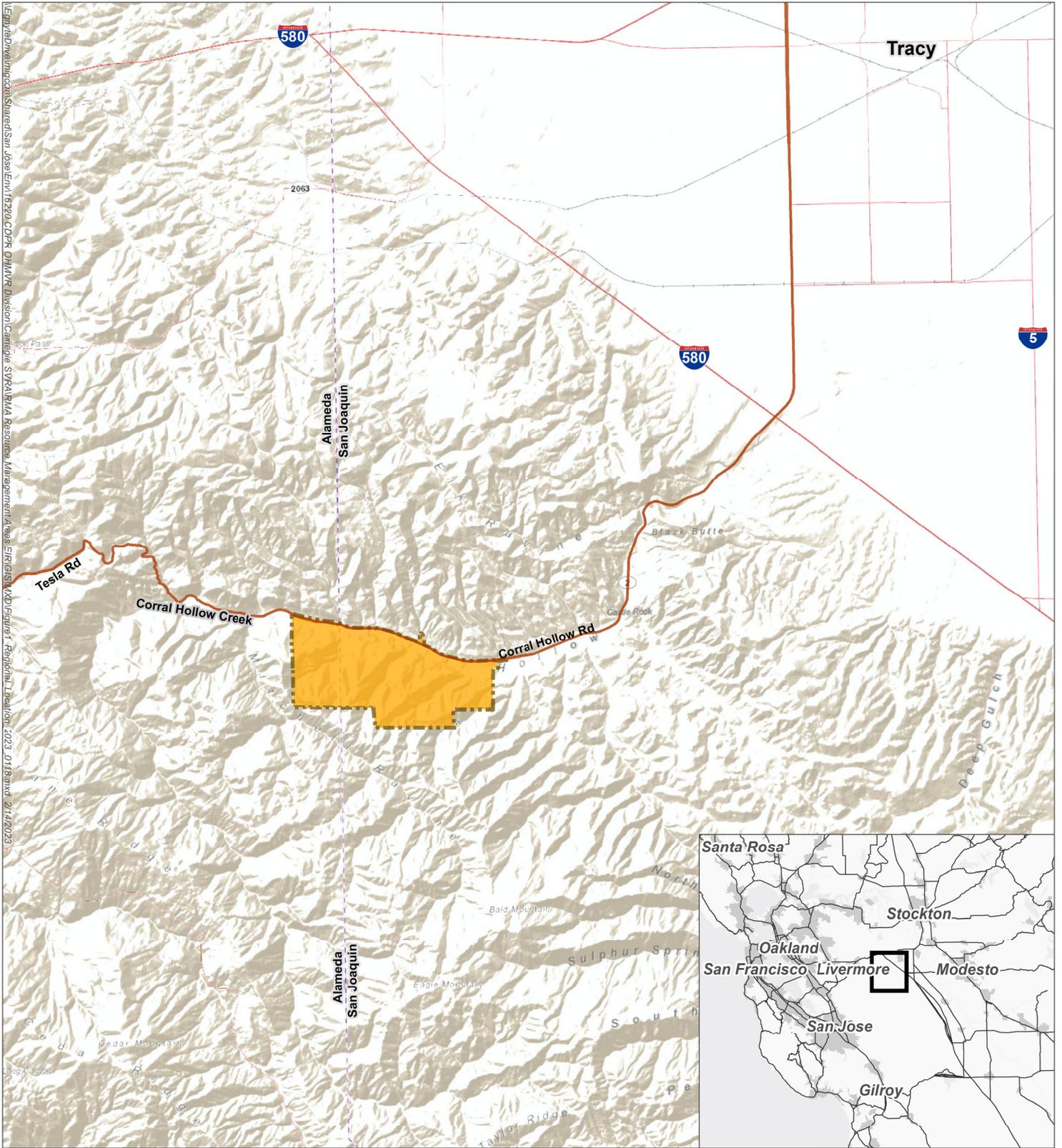
Source: ESRI 2023

Carnegie SVRA Project Site

County Line

Miles
0   0.75   1.5   3

Figure 1 Regional Location

Carnegie State Vehicular Recreation Area RMA Program EIR

Tesla Road

Corral Hollow Creek

Corral Hollow Road
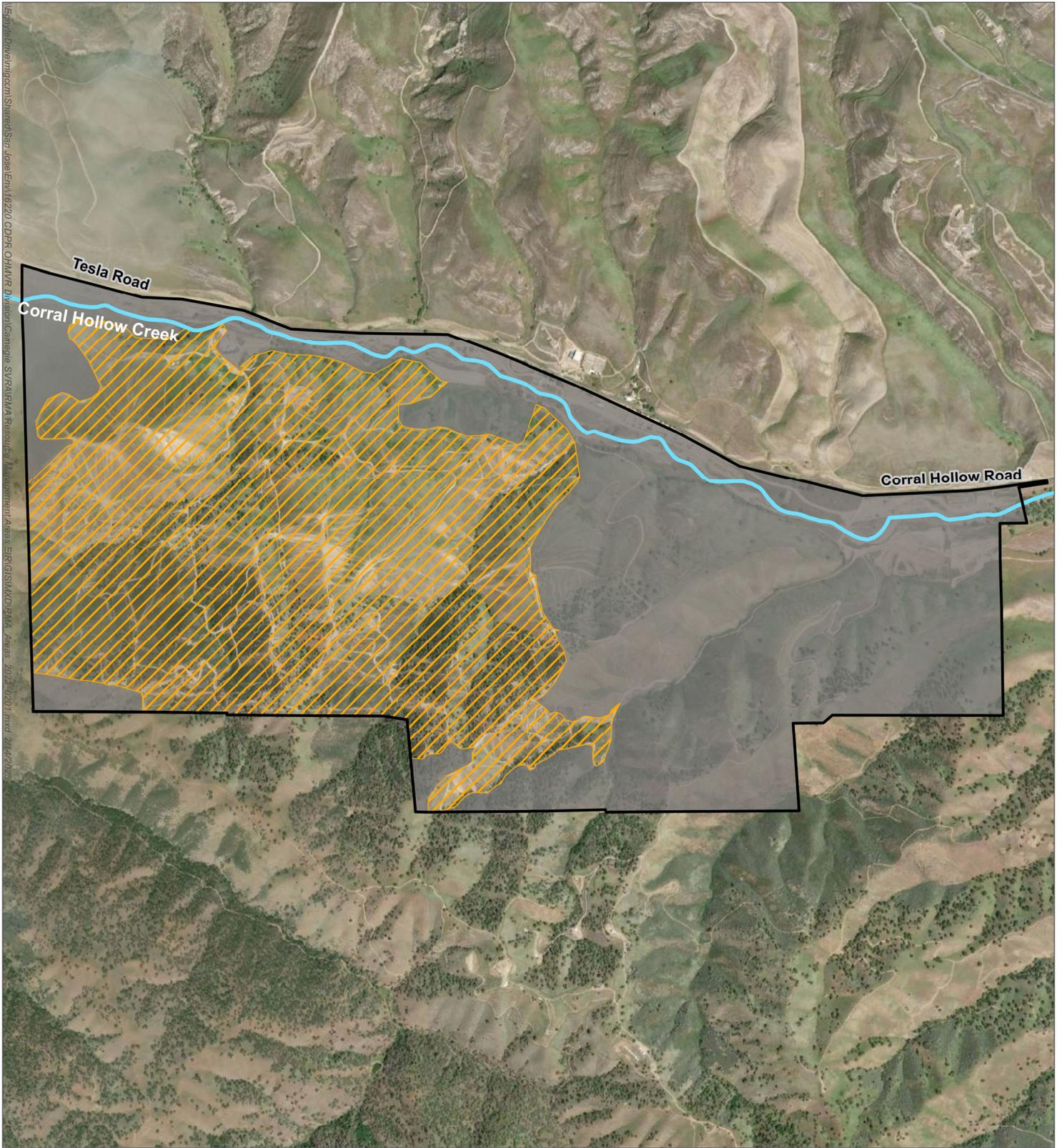
Carnegie RMA Project Boundary

Existing RMA

New RMA

0   0.25   0.5   1   Miles

Figure 2 New and Existing Resource Management Areas

Carnegie State Vehicular Recreation Area RMA Program EIR

MIG

Central Valley Regional Water Quality Control Board

20 March 2023

Gina Benigno
California Department of Parks and Recreation,
Diablo Range District
15751 Tesla Drive
Livermore, CA 94550
Gina.Benigno@parks.ca.gov

COMMENTS TO REQUEST FOR REVIEW FOR THE NOTICE OF PREPARATION FOR THE DRAFT ENVIRONMENTAL IMPACT REPORT, CARNEGIE SVRA RMA PROGRAM, SCH#2023020424, ALAMEDA AND SAN JOAQUIN COUNTIES

Pursuant to the State Clearinghouse's 16 February 2023 request, the Central Valley Regional Water Quality Control Board (Central Valley Water Board) has reviewed the *Request for Review for the Notice of Preparation for the Draft Environmental Impact Report* for the Carnegie SVRA RMA Program, located in Alameda and San Joaquin Counties.

Our agency is delegated with the responsibility of protecting the quality of surface and groundwaters of the state; therefore, our comments will address concerns surrounding those issues.

I.   Regulatory Setting

Basin Plan
The Central Valley Water Board is required to formulate and adopt Basin Plans for all areas within the Central Valley region under Section 13240 of the Porter-Cologne Water Quality Control Act. Each Basin Plan must contain water quality objectives to ensure the reasonable protection of beneficial uses, as well as a program of implementation for achieving water quality objectives with the Basin Plans. Federal regulations require each state to adopt water quality standards to protect the public health or welfare, enhance the quality of water and serve the purposes of the Clean Water Act. In California, the beneficial uses, water quality objectives, and the Antidegradation Policy are the State's water quality standards. Water quality standards are also contained in the National Toxics Rule, 40 CFR Section 131.36, and the California Toxics Rule, 40 CFR Section 131.38.

The Basin Plan is subject to modification as necessary, considering applicable laws, policies, technologies, water quality conditions and priorities. The original Basin Plans were adopted in 1975, and have been updated and revised periodically as required, using Basin Plan amendments. Once the Central Valley Water Board has

adopted a Basin Plan amendment in noticed public hearings, it must be approved by the State Water Resources Control Board (State Water Board), Office of Administrative Law (OAL) and in some cases, the United States Environmental Protection Agency (USEPA). Basin Plan amendments only become effective after they have been approved by the OAL and in some cases, the USEPA. Every three (3) years, a review of the Basin Plan is completed that assesses the appropriateness of existing standards and evaluates and prioritizes Basin Planning issues. For more information on the *Water Quality Control Plan for the Sacramento and San Joaquin River Basins*, please visit our website:
http://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/

Antidegradation Considerations

All wastewater discharges must comply with the Antidegradation Policy (State Water Board Resolution 68-16) and the Antidegradation Implementation Policy contained in the Basin Plan. The Antidegradation Implementation Policy is available on page 74 at:
https://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/sacsjr_2018 05.pdf

In part it states:

Any discharge of waste to high quality waters must apply best practicable treatment or control not only to prevent a condition of pollution or nuisance from occurring, but also to maintain the highest water quality possible consistent with the maximum benefit to the people of the State.

This information must be presented as an analysis of the impacts and potential impacts of the discharge on water quality, as measured by background concentrations and applicable water quality objectives.

The antidegradation analysis is a mandatory element in the National Pollutant Discharge Elimination System and land discharge Waste Discharge Requirements (WDRs) permitting processes. The environmental review document should evaluate potential impacts to both surface and groundwater quality.

II. Permitting Requirements

Construction Storm Water General Permit

Dischargers whose project disturb one or more acres of soil or where projects disturb less than one acre but are part of a larger common plan of development that in total disturbs one or more acres, are required to obtain coverage under the General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit), Construction General Permit Order No. 2009-0009-DWQ. Construction activity subject to this permit includes clearing, grading, grubbing, disturbances to the ground, such as stockpiling, or excavation, but does not include regular maintenance activities performed to restore the original line, grade, or capacity of the facility. The Construction General Permit requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP). For more information on the Construction General Permit, visit the State Water Resources Control Board website at:

http://www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.shtml

<u>Clean Water Act Section 404 Permit</u>
If the project will involve the discharge of dredged or fill material in navigable waters or wetlands, a permit pursuant to Section 404 of the Clean Water Act may be needed from the United States Army Corps of Engineers (USACE). If a Section 404 permit is required by the USACE, the Central Valley Water Board will review the permit application to ensure that discharge will not violate water quality standards. If the project requires surface water drainage realignment, the applicant is advised to contact the Department of Fish and Game for information on Streambed Alteration Permit requirements. If you have any questions regarding the Clean Water Act Section 404 permits, please contact the Regulatory Division of the Sacramento District of USACE at (916) 557-5250.

<u>Clean Water Act Section 401 Permit – Water Quality Certification</u>
If an USACE permit (e.g., Non-Reporting Nationwide Permit, Nationwide Permit, Letter of Permission, Individual Permit, Regional General Permit, Programmatic General Permit), or any other federal permit (e.g., Section 10 of the Rivers and Harbors Act or Section 9 from the United States Coast Guard), is required for this project due to the disturbance of waters of the United States (such as streams and wetlands), then a Water Quality Certification must be obtained from the Central Valley Water Board prior to initiation of project activities. There are no waivers for 401 Water Quality Certifications. For more information on the Water Quality Certification, visit the Central Valley Water Board website at:
https://www.waterboards.ca.gov/centralvalley/water_issues/water_quality_certification/

<u>Waste Discharge Requirements – Discharges to Waters of the State</u>
If USACE determines that only non-jurisdictional waters of the State (i.e., "non-federal" waters of the State) are present in the proposed project area, the proposed project may require a Waste Discharge Requirement (WDR) permit to be issued by Central Valley Water Board. Under the California Porter-Cologne Water Quality Control Act, discharges to all waters of the State, including all wetlands and other waters of the State including, but not limited to, isolated wetlands, are subject to State regulation.   For more information on the Waste Discharges to Surface Water NPDES Program and WDR processes, visit the Central Valley Water Board website at:https://www.waterboards.ca.gov/centralvalley/water_issues/waste_to_surface_water/

Projects involving excavation or fill activities impacting less than 0.2 acre or 400 linear feet of non-jurisdictional waters of the state and projects involving dredging activities impacting less than 50 cubic yards of non-jurisdictional waters of the state may be eligible for coverage under the State Water Resources Control Board Water Quality Order No. 2004-0004-DWQ (General Order 2004-0004). For more information on the General Order 2004-0004, visit the State Water Resources Control Board website at:

https://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2004/wqo/wqo2004-0004.pdf

<u>Dewatering Permit</u>

If the proposed project includes construction or groundwater dewatering to be discharged to land, the proponent may apply for coverage under State Water Board General Water Quality Order (Low Threat General Order) 2003-0003 or the Central Valley Water Board's Waiver of Report of Waste Discharge and Waste Discharge Requirements (Low Threat Waiver) R5-2018-0085. Small temporary construction dewatering projects are projects that discharge groundwater to land from excavation activities or dewatering of underground utility vaults. Dischargers seeking coverage under the General Order or Waiver must file a Notice of Intent with the Central Valley Water Board prior to beginning discharge.

For more information regarding the Low Threat General Order and the application process, visit the Central Valley Water Board website at: http://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2003/wqo/wqo2003-0003.pdf

For more information regarding the Low Threat Waiver and the application process, visit the Central Valley Water Board website at: https://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/waivers/r5-2018-0085.pdf

<u>Limited Threat General NPDES Permit</u>

If the proposed project includes construction dewatering and it is necessary to discharge the groundwater to waters of the United States, the proposed project will require coverage under a National Pollutant Discharge Elimination System (NPDES) permit. Dewatering discharges are typically considered a low or limited threat to water quality and may be covered under the General Order for *Limited Threat Discharges to Surface Water* (Limited Threat General Order). A complete Notice of Intent must be submitted to the Central Valley Water Board to obtain coverage under the Limited Threat General Order. For more information regarding the Limited Threat General Order and the application process, visit the Central Valley Water Board website at: https://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/general_orders/r5-2016-0076-01.pdf

<u>NPDES Permit</u>

If the proposed project discharges waste that could affect the quality of surface waters of the State, other than into a community sewer system, the proposed project will require coverage under a National Pollutant Discharge Elimination System (NPDES) permit. A complete Report of Waste Discharge must be submitted with the Central Valley Water Board to obtain a NPDES Permit. For more information regarding the NPDES Permit and the application process, visit the Central Valley Water Board website at: https://www.waterboards.ca.gov/centralvalley/help/permit/

If you have questions regarding these comments, please contact me at (916) 464-4684 or Peter.Minkel2@waterboards.ca.gov.

Peter Minkel

Peter Minkel
Engineering Geologist

cc: State Clearinghouse unit, Governor's Office of Planning and Research, Sacramento

NATIVE AMERICAN HERITAGE COMMISSION

Governor's Office of Planning & Research

February 17, 2023   **FEB 17 2023**

STATE CLEARING HOUSE

Gina Benigno
California Department of Parks and Recreation, Diablo Range District
15751 Tesla Drive
Livermore, CA 94550

Re: 2023020424, Carnegie State Vehicular Recreation Area (SVRA) Resource Management Areas Program Project, Alameda and San Joaquin Counties

Dear Ms. Benigno:

The Native American Heritage Commission (NAHC) has received the Notice of Preparation (NOP), Draft Environmental Impact Report (DEIR) or Early Consultation for the project referenced above. The California Environmental Quality Act (CEQA) (Pub. Resources Code §21000 et seq.), specifically Public Resources Code §21084.1, states that a project that may cause a substantial adverse change in the significance of a historical resource, is a project that may have a significant effect on the environment. (Pub. Resources Code § 21084.1; Cal. Code Regs., tit.14, §15064.5 (b) (CEQA Guidelines §15064.5 (b)). If there is substantial evidence, in light of the whole record before a lead agency, that a project may have a significant effect on the environment, an Environmental Impact Report (EIR) shall be prepared. (Pub. Resources Code §21080 (d); Cal. Code Regs., tit. 14, § 5064 subd.(a)(1) (CEQA Guidelines §15064 (a)(1)). In order to determine whether a project will cause a substantial adverse change in the significance of a historical resource, a lead agency will need to determine whether there are historical resources within the area of potential effect (APE).

CEQA was amended significantly in 2014. Assembly Bill 52 (Gatto, Chapter 532, Statutes of 2014) (AB 52) amended CEQA to create a separate category of cultural resources, "tribal cultural resources" (Pub. Resources Code §21074) and provides that a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment. (Pub. Resources Code §21084.2). Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource. (Pub. Resources Code §21084.3 (a)). **AB 52 applies to any project for which a notice of preparation, a notice of negative declaration, or a mitigated negative declaration is filed on or after July 1, 2015.** If your project involves the adoption of or amendment to a general plan or a specific plan, or the designation or proposed designation of open space, on or after March 1, 2005, it may also be subject to Senate Bill 18 (Burton, Chapter 905, Statutes of 2004) (SB 18). **Both SB 18 and AB 52 have tribal consultation requirements**. If your project is also subject to the federal National Environmental Policy Act (42 U.S.C. § 4321 et seq.) (NEPA), the tribal consultation requirements of Section 106 of the National Historic Preservation Act of 1966 (154 U.S.C. 300101, 36 C.F.R. §800 et seq.) may also apply.

The NAHC recommends consultation with California Native American tribes that are traditionally and culturally affiliated with the geographic area of your proposed project as early as possible in order to avoid inadvertent discoveries of Native American human remains and best protect tribal cultural resources. Below is a brief summary of portions of AB 52 and SB 18 as well as the NAHC's recommendations for conducting cultural resources assessments.

Consult your legal counsel about compliance with AB 52 and SB 18 as well as compliance with any other applicable laws.

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Luiseño

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COMMISSIONER
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AB 52 has added to CEQA the additional requirements listed below, along with many other requirements:

1. Fourteen Day Period to Provide Notice of Completion of an Application/Decision to Undertake a Project: Within fourteen (14) days of determining that an application for a project is complete or of a decision by a public agency to undertake a project, a lead agency shall provide formal notification to a designated contact of, or tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, to be accomplished by at least one written notice that includes:

    a. A brief description of the project.

    b. The lead agency contact information.

    c. Notification that the California Native American tribe has 30 days to request consultation. (Pub. Resources Code §21080.3.1 (d)).

    d. A "California Native American tribe" is defined as a Native American tribe located in California that is on the contact list maintained by the NAHC for the purposes of Chapter 905 of Statutes of 2004 (SB 18). (Pub. Resources Code §21073).

2. Begin Consultation Within 30 Days of Receiving a Tribe's Request for Consultation and Before Releasing a Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report: A lead agency shall begin the consultation process within 30 days of receiving a request for consultation from a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project. (Pub. Resources Code §21080.3.1, subds. (d) and (e)) and prior to the release of a negative declaration, mitigated negative declaration or Environmental Impact Report. (Pub. Resources Code §21080.3.1(b)).

    a. For purposes of AB 52, "consultation shall have the same meaning as provided in Gov. Code §65352.4 (SB 18). (Pub. Resources Code §21080.3.1 (b)).

3. Mandatory Topics of Consultation If Requested by a Tribe: The following topics of consultation, if a tribe requests to discuss them, are mandatory topics of consultation:

    a. Alternatives to the project.

    b. Recommended mitigation measures.

    c. Significant effects. (Pub. Resources Code §21080.3.2 (a)).

4. Discretionary Topics of Consultation: The following topics are discretionary topics of consultation:

    a. Type of environmental review necessary.

    b. Significance of the tribal cultural resources.

    c. Significance of the project's impacts on tribal cultural resources.

    d. If necessary, project alternatives or appropriate measures for preservation or mitigation that the tribe may recommend to the lead agency. (Pub. Resources Code §21080.3.2 (a)).

5. Confidentiality of Information Submitted by a Tribe During the Environmental Review Process: With some exceptions, any information, including but not limited to, the location, description, and use of tribal cultural resources submitted by a California Native American tribe during the environmental review process shall not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public, consistent with Government Code §6254 (r) and §6254.10. Any information submitted by a California Native American tribe during the consultation or environmental review process shall be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public. (Pub. Resources Code §21082.3 (c)(1)).

6. Discussion of Impacts to Tribal Cultural Resources in the Environmental Document: If a project may have a significant impact on a tribal cultural resource, the lead agency's environmental document shall discuss both of the following:

    a. Whether the proposed project has a significant impact on an identified tribal cultural resource.

    b. Whether feasible alternatives or mitigation measures, including those measures that may be agreed to pursuant to Public Resources Code §21082.3, subdivision (a), avoid or substantially lessen the impact on the identified tribal cultural resource. (Pub. Resources Code §21082.3 (b)).

7. <u>Conclusion of Consultation</u>: Consultation with a tribe shall be considered concluded when either of the following occurs:

    a. The parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or

    b. A party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached. (Pub. Resources Code §21080.3.2 (b)).

8. <u>Recommending Mitigation Measures Agreed Upon in Consultation in the Environmental Document</u>: Any mitigation measures agreed upon in the consultation conducted pursuant to Public Resources Code §21080.3.2 shall be recommended for inclusion in the environmental document and in an adopted mitigation monitoring and reporting program, if determined to avoid or lessen the impact pursuant to Public Resources Code §21082.3, subdivision (b), paragraph 2, and shall be fully enforceable. (Pub. Resources Code §21082.3 (a)).

9. <u>Required Consideration of Feasible Mitigation</u>: If mitigation measures recommended by the staff of the lead agency as a result of the consultation process are not included in the environmental document or if there are no agreed upon mitigation measures at the conclusion of consultation, or if consultation does not occur, and if substantial evidence demonstrates that a project will cause a significant effect to a tribal cultural resource, the lead agency shall consider feasible mitigation pursuant to Public Resources Code §21084.3 (b). (Pub. Resources Code §21082.3 (e)).

10. <u>Examples of Mitigation Measures That, If Feasible, May Be Considered to Avoid or Minimize Significant Adverse Impacts to Tribal Cultural Resources</u>:

    a. Avoidance and preservation of the resources in place, including, but not limited to**:**

        i. Planning and construction to avoid the resources and protect the cultural and natural context.

        ii. Planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.

    b. Treating the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:

        i. Protecting the cultural character and integrity of the resource.

        ii. Protecting the traditional use of the resource.

        iii. Protecting the confidentiality of the resource.

    c. Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.

    d. Protecting the resource. (Pub. Resource Code §21084.3 (b)).

    e. Please note that a federally recognized California Native American tribe or a non-federally recognized California Native American tribe that is on the contact list maintained by the NAHC to protect a California prehistoric, archaeological, cultural, spiritual, or ceremonial place may acquire and hold conservation easements if the conservation easement is voluntarily conveyed. (Civ. Code §815.3 (c)).

    f. Please note that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated. (Pub. Resources Code §5097.991).

11. <u>Prerequisites for Certifying an Environmental Impact Report or Adopting a Mitigated Negative Declaration or Negative Declaration with a Significant Impact on an Identified Tribal Cultural Resource</u>: An Environmental Impact Report may not be certified, nor may a mitigated negative declaration or a negative declaration be adopted unless one of the following occurs:

    a. The consultation process between the tribes and the lead agency has occurred as provided in Public Resources Code §21080.3.1 and §21080.3.2 and concluded pursuant to Public Resources Code §21080.3.2.

    b. The tribe that requested consultation failed to provide comments to the lead agency or otherwise failed to engage in the consultation process.

    c. The lead agency provided notice of the project to the tribe in compliance with Public Resources Code §21080.3.1 (d) and the tribe failed to request consultation within 30 days. (Pub. Resources Code §21082.3 (d)).

The NAHC's PowerPoint presentation titled, "Tribal Consultation Under AB 52: Requirements and Best Practices" may be found online at: <u>http://nahc.ca.gov/wp-content/uploads/2015/10/AB52TribalConsultation_CalEPAPDF.pdf</u>

SB 18

SB 18 applies to local governments and requires local governments to contact, provide notice to, refer plans to, and consult with tribes prior to the adoption or amendment of a general plan or a specific plan, or the designation of open space. (Gov. Code §65352.3). Local governments should consult the Governor's Office of Planning and Research's "Tribal Consultation Guidelines," which can be found online at: https://www.opr.ca.gov/docs/09_14_05_Updated_Guidelines_922.pdf.

Some of SB 18's provisions include:

1.   Tribal Consultation: If a local government considers a proposal to adopt or amend a general plan or a specific plan, or to designate open space it is required to contact the appropriate tribes identified by the NAHC by requesting a "Tribal Consultation List." If a tribe, once contacted, requests consultation the local government must consult with the tribe on the plan proposal. **A tribe has 90 days from the date of receipt of notification to request consultation unless a shorter timeframe has been agreed to by the tribe.** (Gov. Code §65352.3 (a)(2)).

2.   No Statutory Time Limit on SB 18 Tribal Consultation. There is no statutory time limit on SB 18 tribal consultation.

3.   Confidentiality: Consistent with the guidelines developed and adopted by the Office of Planning and Research pursuant to Gov. Code §65040.2, the city or county shall protect the confidentiality of the information concerning the specific identity, location, character, and use of places, features and objects described in Public Resources Code §5097.9 and §5097.993 that are within the city's or county's jurisdiction. (Gov. Code §65352.3 (b)).

4.   Conclusion of SB 18 Tribal Consultation: Consultation should be concluded at the point in which:
   a.   The parties to the consultation come to a mutual agreement concerning the appropriate measures for preservation or mitigation; or
   b.   Either the local government or the tribe, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached concerning the appropriate measures of preservation or mitigation. (Tribal Consultation Guidelines, Governor's Office of Planning and Research (2005) at p. 18).

Agencies should be aware that neither AB 52 nor SB 18 precludes agencies from initiating tribal consultation with tribes that are traditionally and culturally affiliated with their jurisdictions before the timeframes provided in AB 52 and SB 18. For that reason, we urge you to continue to request Native American Tribal Contact Lists and "Sacred Lands File" searches from the NAHC. The request forms can be found online at: http://nahc.ca.gov/resources/forms/.

NAHC Recommendations for Cultural Resources Assessments

To adequately assess the existence and significance of tribal cultural resources and plan for avoidance, preservation in place, or barring both, mitigation of project-related impacts to tribal cultural resources, the NAHC recommends the following actions:

1.   Contact the appropriate regional California Historical Research Information System (CHRIS) Center (https://ohp.parks.ca.gov/?page_id=30331) for an archaeological records search. The records search will determine:
   a.   If part or all of the APE has been previously surveyed for cultural resources.
   b.   If any known cultural resources have already been recorded on or adjacent to the APE.
   c.   If the probability is low, moderate, or high that cultural resources are located in the APE.
   d.   If a survey is required to determine whether previously unrecorded cultural resources are present.

2.   If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
   a.   The final report containing site forms, site significance, and mitigation measures should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum and not be made available for public disclosure.
   b.   The final written report should be submitted within 3 months after work has been completed to the appropriate regional CHRIS center.

3. Contact the NAHC for:
   a. A Sacred Lands File search. Remember that tribes do not always record their sacred sites in the Sacred Lands File, nor are they required to do so. A Sacred Lands File search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with the geographic area of the project's APE.
   b. A Native American Tribal Consultation List of appropriate tribes for consultation concerning the project site and to assist in planning for avoidance, preservation in place, or, failing both, mitigation measures.

4. Remember that the lack of surface evidence of archaeological resources (including tribal cultural resources) does not preclude their subsurface existence.
   a. Lead agencies should include in their mitigation and monitoring reporting program plan provisions for the identification and evaluation of inadvertently discovered archaeological resources per Cal. Code Regs., tit. 14, §15064.5(f) (CEQA Guidelines §15064.5(f)). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American with knowledge of cultural resources should monitor all ground-disturbing activities.
   b. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the disposition of recovered cultural items that are not burial associated in consultation with culturally affiliated Native Americans.
   c. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the treatment and disposition of inadvertently discovered Native American human remains. Health and Safety Code §7050.5, Public Resources Code §5097.98, and Cal. Code Regs., tit. 14, §15064.5, subdivisions (d) and (e) (CEQA Guidelines §15064.5, subds. (d) and (e)) address the processes to be followed in the event of an inadvertent discovery of any Native American human remains and associated grave goods in a location other than a dedicated cemetery.

If you have any questions or need additional information, please contact me at my email address: Cody.Campagne@nahc.ca.gov.

Sincerely,

Cody Campagne

Cody Campagne
Cultural Resources Analyst

cc: State Clearinghouse

Ms. Genigno,

This email is being submitted on behalf of Connolly Ranch Inc. and Connolly Garamendi LLC., and is to comment on the scope and content of the environmental review of the Carnegie State Vehicular Recreation Area (SVRA) Resource Management Areas Program.

The DPR proposes to implement sediment and erosion controls at Carnegie SVRA through establishment of new Resource Management Areas (RMAs) within the park. Implementation of the proposed project would violate the attached Peremptory Writ of Mandate, Judgment and Order Granting Petition for Writ of Mandate. Please note that in the Supplemental Return to Peremptory Writ of Mandate Eduardo Guaracha indicates he directed Carnegie SVRA Staff to refrain from activity associated with implementation of Resolution 04-2016 that could result in a change or alteration to the physical environment until the California Environmental Quality Act compliance is corrected." Any physical implementation of this RMA Program would violate the Writ, Judgment and Order.

Resolution 04-2016 was the approval of the Carnegie SVRA General Plan, which was also a program EIR. That program EIR was also an attempt to avoid consideration and mitigation for significant unavoidable environmental impacts by fragmenting the larger project by use of a program EIR. This RMA Program suffers from the same defect. In fact, it is worse. The attached Order states the following, which if this project proceeds just to study and planning, would be applicable:

"Piecemealing of the environmental review process.
A program EIR is "an EIR which may be prepared on a series of actions that can be characterized as one large project are related either:
(1) Geographically,
(2) As logical parts in the chain of contemplated actions,
(3) In connection with issuance of rules, regulations, plans, or other general criteria to govern the conduct of a continuing program, or
(4) As individual activities carried out under the same authorizing statutory or regulatory authority and having generally similar environmental effects which can be mitigated in similar ways. (14 CCR § 15168.)
When using a program EIR with later activities, they must be "examined in the light of the program EIR to determine whether an additional environmental document must be prepared.
(1) If a later activity would have effects that were not examined in the program EIR, a new initial study would need to be prepared leading to either an EIR or a negative declaration. That later analysis may tier from the program EIR as
provided in Section 15152.
(2) If the agency finds that pursuant to Section 15162, no subsequent EIR would be required,

the agency can approve the activity as being within the scope of the project covered by the program EIR, and no new environmental documents
would be required. Whether a later activity is within the scope of a program EIR is a factual question that the lead agency determines based on substantial evidence in the record. Factors that an agency may consider in making that determination include, but are not limited to, consistency of the later activity with the type of allowable land use, overall planned density and building intensity, geographic area analyzed for environmental impacts, and covered infrastructure, as described in the program EIR.

(3) An agency shall incorporate feasible mitigation measures and alternatives developed in the program EIR into later activities in the program.

(4) Where the later activities involve site specific operations, the agency should use a written checklist or similar device to document the evaluation of the site and the activity to determine whether the environmental effects of the operation
were within the scope of the program EIR.

(5) A program EIR will be most helpful in dealing with later activities if it provides a description of planned activities that would implement the program and deals with the effects of the program as specifically and comprehensively as possible. With a good and detailed project description and analysis of the program, many later activities could be found to be within the scope of the project described in the program EIR, and no further environmental documents would be required. (14 CCR § 15168 (c).)

      The CEQA Guidelines also discuss the tiering process that occurs subsequent to finalization of a program EIR.

      Where a lead agency is using the tiering process in connection with an EIR for a large-scale planning approval, such as a general plan or component thereof (e.g., an area plan or community plan), the development of detailed, site-specific information may not be feasible but can be deferred, in many instances, until such time as the lead agency prepares a future environmental document in connection with a project of a more limited geographical scale, as long as deferral does not prevent adequate identification of significant effects of the planning approval at hand. (14 CCR § 15152 (c).)

      Petitioner argues Respondents identified the EIR as a program EIR in order to enable improper piecemealing of the environmental review process. Respondents acknowledge that the
General Plan includes "facility descriptions" but argues these are not specific projects being approved as part of the General Plan's EIR. (AR 8249.) Respondents further argue the "visitor experience areas" identified are allowable uses within different parts of the SVRA, but are not commitments to a definite course of action as to any of these potential allowable future uses.

      Prior to the hearing on this matter, the Court asked the parties to specifically address Rio Vista Farm Bureau Center v. County of Solano (1992) 5 Cal.App.4th 351, as part of their oral arguments. In Rio Vista Farm Bureau Center, the project at issue was adoption of a hazardous
waste management plan, which was incorporated into the County's general plan. (Id. at 371.) The appellant argued the FEIR failed to comply with CEQA because it did not provide a "description of potential future facilities or the 'degree to which project-level decisions' have been made by the County." (Id.) The First District Court of Appeal held the EIR was sufficient as the general plan made "no commitment to future facilities other than furnishing siting criteria and designating generally acceptable locations. While the Plan suggests that new facilities may
be needed by the County, no siting decisions are made; the Plan does not even determine that future facilities will ever be built." (Id.) Further, [w]hile we agree with appellant that additional hazardous waste facilities in the County may be a foreseeable consequence of the

Plan, any such facility would not alter the nature or scope of the initial assessment considered in the FEIR, which functions independently as merely a general planning device. The Plan is not, as we read it, the first part of a fragmented project; rather it provides the general guidelines required by law for any separate, but as yet undetermined future hazardous waste management project. The scope of the Plan, as appropriately described in the FEIR, is limited to recitation of policies requirements, and siting criteria, and designation of general areas in which future facilities may permissibly be located. No specific facility has been proposed, and the county has not committed to a definite course of action.

Moreover, any future projects have been expressly made contingent upon
CEQA compliance...

An EIR is not required for an element of a master plan which has not been proposed for development. Where, as here, an EIR cannot provide meaningful information about a speculative future project, deferral of an environmental assessment does not violate CEQA. (Id at 373)(citations omitted.)

Petitioner argues Rio Vista Farm Bureau is distinguishable because in that matter the County did not own all the land subject to the general plan. Petitioner further argues no siting decisions were made in Rio Vista Farm Bureau, whereas in this case a preferred concept for site
use has been developed, including distinct visitor experience areas. (See AR 8249.) In light of these decisions having been made as part of the subject project, Petitioner argues Respondents were obligated pursuant to CEQA to provide more detailed analysis of environmental impacts resulting from these decisions than was required in Rio Vista Farm Bureau Center. (See Cleveland National Forest Foundation v. San Diego Assn. of Gov'ts (2017) 17 Cal.App.5th 413,441.)

Respondents argue Rio Vista Farm Bureau is controlling and on point. Respondents contend the preferred concept map does not approve trails or campgrounds or specific uses, and is merely akin to, "siting criteria, and designation of general areas in which future facilities may
permissibly be located." Respondents also argue Al Larson Boat Shop, Inc. v. Board of Harbor Commissioners is applicable in the Second District Court of Appeal's summarization of the law that,[wjhile an FEIR cannot defer all consideration of cumulative impacts to a later time, it may legitimately indicate that more detailed information may be considered in future project EIR's." 'Tiering'" refers to "the coverage of
general matters in broader EIRs (such as on general plans...) with subsequent site-specific EIRs... concentrating solely on the issues specific to the EIR subsequently prepared." (Guidelines, § 15385.)

A FEIR need only conform with the general rule of reason in analyzing the impact of future projects, and may reasonably leave many specifics to future EIR's. "CEQA recognizes that environmental studies in connection with
amendments to a general plan will be, on balance, general." (Schaeffer Land Trust V. San Jose City Council (1989) 215 Cal.App.3d 612,625.)

Deferral of more detailed analysis to a project EIR is legitimate. It has been held that "where practical considerations prohibit devising such measures early in the planning process (e.g., at the general plan amendment or rezone stage), the agency can commit itself to eventually devising measures that will satisfy specific performance criteria articulated at the time of project approval...[Citation.]" (Sacramento Old City Assn. v. City Council (1991) 229 CaI.App.3d 1011, 1029.) ((1993) 18 Cal.App.4th 729,746-47.)

In response. Petitioner argues the project constitutes a site use plan. The Expansion Area was acquired for a specific use, as an SVRA, and the map demonstrates that certain uses/activities will be permitted in certain distinct sections of the Expansion Area. For

example.

Petitioner argues the entrance locations are clearly defined. Accordingly, Petitioner argues Rio Vista Farm and Al Larson Boat Shop do not apply and the EIR in this case improperly deferred analysis of reasonably foreseeable impacts to future phases. (See Vineyard Area Citizens for

Responsible Growth, Inc. v. City of Rancho Cordova (2007) 40 Cal.4th 412, 431.)

   The Court finds Petitioner is correct. The facts in this case are distinguishable from Rio Vista Farm Bureau and Al Larson Boat Shop. Here, the Respondents purchased the property with the intent of using it to expand the SVRA. Unlike the general plan in ^io Vista Farm Bureau,

Respondents have ownership of and control over the entirety of the land subject to the general plan. Further, Respondents have made definitive decisions as part of the "program" EIR that make certain reasonably foreseeable impacts ready for analysis now, as opposed to a circumstance wherein environmental analysis must be detailed because the project decisions will not be made until a future date. Respondents here have committed to a selection of development "zones" such as a gathering area and interpretive facility at the Tesla Coal Mine site, Gathering and Service areas as denoted in Figure 2-3 of the Draft EIR (AR008268), as well as entrance and exit locations for the Expansion Area.

   This case is analogous to Laurel Heights Improvement Assn. v. Regents (1988) 47 C3al.3d 376. Similar to the facts in that case, the intended use of the property has been established. Like the facts before the Supreme Court, the future expansion and general type of future use is

reasonably foreseeable here. Respondents have clearly stated the purpose for the acquisition was to expand OHV use at Carnegie SVRA; various areas within the Expansion area have contemplated uses such as an Advanced Trails area, an Intermediate/Beginner Trails area, and a

Potential Gathering Area. The Court acknowledges that case law does not require absolute precision. Although Respondents argue that the specific site of the visitors' center, for example, has not been determined, the use of the land outlined in the General Concept Map is clearly foreseeable. As the Supreme Court in Laurel Heights pointed out, "[t]he fact that precision may not be possible, [] does not mean that no analysis is required." (Id at p. 399.)

   While Respondents argue a more substantial environmental review will be done at a future date, CEQA does not authorize them to delay analysis in such a manner. On this issue, the Court finds the Respondents did not proceed in the maimer required by law."

   DPR is fragmenting the 2016 program EIR into smaller parts to avoid both the consideration of impacts but also to avoid the Judgment, Writ and Order described above. This RMA program EIR is a part of the larger Carnegie SVRA General Plan which DPR was required to set aside and rescind, and subject to the above-described Writ.

   Having failed in its attempt to use a program EIR for all of Carnegie, DPR cannot proceed by use of an RMA Program to proceed through the entire Park an RMA at a time and avoid the analysis required for an EIR for the entire park. We know this RMA plan is intended to proceed across the entire Park . The rescinded Final EIR stated the following:

O24-m: Overall, from 2009-2013 trail green ratings have increased from 27 percent to 46 percent; trail yellow ratings have decreased from 45 percent to 34 percent; and trail red ratings have decreased from 28 percent to 20 percent. Some trails have gone from green to yellow, or yellow to red. The reason for this is that rather than tackling trail maintenance in a fragmented approach, Carnegie SVRA is implementing sustainable trails via Resource Management Areas. This method is taking place from east to west, so those trails in the western areas of the park that need maintenance,

will not receive it (unless there is a safety concern related to it) until the areas east of it are rehabilitated. This uses staff time more efficiently, and results in recreational trails that are sustainable.

FREIR 02-29: As indicated in response to comment 024-m, rather than tackling trail maintenance in a fragmented approach, Carnegie SVRA is implementing sustainable trails via Resource Management Areas. This method is taking place from east to west, so those trails in the western areas of the park that need maintenance will not receive it until areas farther east are rehabilitated (unless there is a safety concern). This uses staff time more efficiently and results in recreational trails that are sustainable.

In summary, DPR is again using a program EIR to fragment and piecemeal the complete EIR required into smaller parts.

I have attached the May 19, 2022 letter from the California Department of Fish and Wildlife. It appears this RMA Program is an attempt to avoid the requirements stated in that letter. ALL the comments in that letter are applicable to this project. Please note it states: "An approved General Plan is required before State Parks can move forward with site-specific improvements that are beyond minor capital outlay projects."   DPR cannot avoid the analysis described in the May 19th, 2022 letter by again abandoning a General Plan process to a RMA Program approach.

Please make sure I am provided with all notices related to this project.

Mark Connolly.

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From:	Erik Schaffer
To:	Benigno, Gina@Parks
Subject:	CarnegieSVRA RMA Program EIR
Date:	Friday, February 17, 2023 3:05:01 PM

Hi Gina,
I have been riding at Carnegie since 1975. The damage caused by this major storm is unbelievable. The destruction is far beyond anything I've ever seen. Jeremy showed pictures of how much the park has changed.
  My concern was the hard to reach inner valleys for repair.
Maybe using large rock, in strategic spots, to reduce damage and slow the flow of water to save access to key parts of the park. Thanks for working hard to reopen the parks soon.
Cheers
Erik Schaffer

Sent from my iPhone

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California Department of Parks and Recreation
Carnegie State Vehicular Recreation Area
Resource Management Area Program EIR

Appendix B: Environmental Protection Measures

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Appendix B. Environmental Protection Measures

California Department of Parks and Recreation

OHV BMP Manual for Erosion and Sediment Control (2007)

BMP ID	Name	SWPPP Summary
EP-1	Scheduling and Phasing	Construction, maintenance, rehabilitation, and restoration projects shall be scheduled and phased to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and transport of sediment off-site (vehicle tracking). Project planners shall determine the rainy season and develop a list of candidate BMPs based on that information. Soil disturbing activities shall be phased, if possible, such that critical areas (such as highly erodible soils, areas adjacent to receiving waters, etc.) are not disturbed during the rainy season. If disturbance during the rainy season is unavoidable then the area shall receive an effective combination of soil stabilization and sediment control BMPs. Projects such as new road and trail construction shall be phased so the entire length of area that is disturbed at any one time is kept to a size that can be controlled effectively with appropriate BMPs as necessary. In the rainy season the DSA shall not exceed the Park staff's ability to promptly apply surface stabilization upon the imminent threat of an ensuing rainstorm.
EP-2	Wet Weather Closure	Wet weather closure is implemented to protect water quality, trail treads, road surfaces, and drainage facilities (rolling dips, outsloped road sections, etc.) from damage during wet weather. EP-2 also reduces maintenance costs and reduces the potential for adverse effects on other resources.
EP-3	Minimize Disturbance and Buffer Strip	Minimizing Disturbance and Buffer Strip is a planning process which retains natural vegetative cover and also maintains vegetative buffer strips near watercourses. A healthy dense and vigorous grassed buffer strip can greatly reduce the extent and need for alternative sediment control barriers such as a silt fence and fiber rolls.
EP-4	Land and Road Grading to Minimize Erosion	These land grading practices are intended to be integrated as construction and land disturbing activities are occurring in order to minimize the erosion potential and facilitate plant establishment. Roadways can be aligned following natural contours rather than up and down steep slopes. Natural drainage patterns shall be noted and maintained as possible. The layout of buildings and other Park facilities shall be tailored to fit the topography of the site. All graded or disturbed areas including slopes will be constructed in a manner that will facilitate the establishment of vegetation.
EP-5	Identify Underlying Geologic Soil Conditions	Soil survey data shall be reviewed and analyzed prior to new construction projects at the park. Erosion control measures will be properly chosen, located, and implemented in accordance with soil types. Roads and trails will be located where soils are the least erosive, whenever possible. Soil maps are useful for planning but not for site-specific purposes, so actual onsite review will also be performed.
SS-1	Surface Roughening	After final grading of all construction, rehabilitation, and restoration projects, a rough texture shall be applied to the disturbed soils to prevent erosion, decrease runoff, increase infiltration, and aid in vegetation establishment. SS-1 Surface Roughening is a technique for roughening a bare soil surface with furrows running across the slope, stair stepping, or tracking with construction equipment.

BMP ID	Name	SWPPP Summary
SS-2	Topsoiling	Topsoil shall be preserved to help provide a suitable growth medium for final site stabilization with vegetation. Topsoil shall be preserved in the Park by stripping the topsoil during facilities development and road and trail building activities and setting aside in stockpiles for later re-application.
SS-3	Mycorrhizae Inoculation	Mycorrhizal fungi and "biofertilizers" shall be used in construction and revegetation projects in order to enhance soil nutrient availability and biological soil structure, encourage native plant succession, reduce erosion, and discourage invasive plant species. Inoculation of soils with mycorrhizal fungi or the presence of pre-existing soil microbes is essential for the stabilization of adverse soils, establishment of native grasses, and the exclusion of non-native "annuals" and noxious weeds.
SS-4	Seeding	Seeding involves the establishment of a permanent, perennial vegetative cover on disturbed areas from seed. Native, indigenous, or naturally-occurring species (particularly grasses) will be used for seeding. These "native" species have evolved in a manner that will not compete with or preclude the establishment, or natural recruitment, of naturally-occurring woody vegetation.
SS-5	Straw Mulching	All disturbed soil areas shall be protected with straw mulch. Mulching is the application of a protective layer of straw or other suitable material to the soil surface. Straw mulch and/or hydromulch shall be used in conjunction with seeding and hydroseeding of critical areas for the establishment of vegetation. Mulching with straw (or fiber mulches) is commonly used as a temporary measure to protect bare or disturbed soil areas that have not been seeded, until native vegetation regrows. Certified weed-free or rice straw mulch shall be used to prevent the introduction of undesired plant species.
SS-6	Hydromulching	Hydromulching is a soil stabilization (erosion control) technique for applying fiber mulch to the exposed and disturbed soil surface. The fiber is applied hydraulically, in a slurry, produced by mixing fiber, water and a binding agent together in a mechanical hydroseeder. Wood fiber is widely-used but other fibers can include paper, straw, coir, corn, etc. The effectiveness of SS-6 Hydromulching is extremely dependant on the application rates (which can vary widely), the actual fibers used, and the type of bonding agent(s) added. A general rule of thumb is mulches (wood fiber, straw, compost, etc.) should have a minimum application rate of 3000# per acre for protection of the soil surface from raindrop impact erosion. Hydromulching is also useful as a tackifier to anchor straw mulch and as a means to apply seeds.
SS-7	Compost Blankets	A compost blanket is a layer of compost designed to prevent erosion, especially rills and gullies that may form under more traditional methods of erosion control. In many cases, a compost blanket can be more effective at vegetation establishment, weed suppression and erosion control than an Erosion Control Blanket (ECB) or hydroseeding. Compost blankets can be applied by hand, conveyor system or compost spreader; however, the most cost effective and efficient method is the use of a pneumatic delivery system, i.e. a compost blower truck.
SS-8	Erosion Control Blankets	Erosion Control Blankets (ECBs) are a soil stabilization (erosion control) BMP, intended to protect disturbed soil surfaces from raindrop impact erosion. ECBs are carpet-like mats, installed over and anchored to the properly prepared soil surfaces. Properly selected and installed, ECBs can mimic the beneficial effects of vegetative cover thereby reducing erosion rates by over 90%. ECBs also protect seeds and provide a beneficial environment for vegetation to become established.

BMP ID	Name	SWPPP Summary
SS-9	Cellular Confinement Systems	Cellular Confinement Systems are three-dimensional, honeycomb earth-retaining structures used to mechanically stabilize slopes, roads, trails, and low-water crossings, and other channel lining systems. The cells can be filled with rock, gravel, or topsoil and provide an alternative to hard armor soil stabilization.
SS-10	PAM (Polyacrylamide)	PAM (Polyacrlamide) is useful as a temporary soil stabilization and soil binding BMP which is also a flocculating agent used to reduce turbidity of runoff. PAM is also used as tackifier, either alone or in formulation with binding agents, for hydromulching applications.
SS-11	Dust Control and Tackifiers	Wind erosion (dust) control shall be considered year-round for all disturbed soils in the park that are subject to wind erosion, when significant windy, dry conditions are anticipated, particularly during large special OHV events, around camping areas, and on areas of facility construction. Tackifiers also act as a "glue" to hold soil in place for dust control, by mixing with water and a small amount of hydraulic mulch for trace purposes, and applying from a hydroseeder.
TC-1	Stabilized Construction Entrance	Temporary construction entrances are constructed at the egress point from the construction area onto a paved road. TC-1 Stabilized Construction Entrance is a Tracking Control BMP intended to prevent tracking of soil from the construction site by equipment and vehicles. The entrances are constructed of large angular rock and/or steel ribs (rumble strips) intended to knock the mud off the tires before traveling onto the roadway.
TC-2	Temporary Stabilized Construction Roadway	A Temporary Stabilized Construction Roadway is a temporary access road for use during construction and expansion of facilities at the Park. It is designed and stabilized to control dust and erosion from vehicular tracking during construction activities, or if needed for special events.
TC-3	Temporary Equipment Crossings	A temporary equipment crossing is a structure placed across a waterway that allows heavy equipment and other vehicles to cross the waterway during construction or maintenance activities. Proper design, installation, and maintenance of TC-3 Temporary Equipment Crossings shall be implemented in order to minimize sedimentation and ecological damage to waterways.
TC-4	Wash Racks	OHV park visitors often like to leave with mud covered trucks. However, was racks shall be used where mud and dirt is tracked onto public roads. Wsash racks shall be located near paved or stabilized gravel roadways to remove soil and sediment from motorcycles and ATV's. The wash rack would be located at a point where vehicles exit the park. During construction of roads, trails, and new park facilities, wash racks shall be located in the staging areas to remove soil and sediment from construction equipment. Runoff from all wash racks will be channeled away from natural drainages and into sediment traps.
RC-1	Energy Dissipator	An energy dissipator is a structure designed to control erosion at the outlet of a channel or conduit.
RC-2	Rock-lined Channels	Rock-lined channels are channels or roadside ditches lined with rock or riprap and incorporated into road and trail design in order to reduce sedimentation and improve the quality of surface water. Rock-lined channels shall be used to convey runoff and provide bed stability where an unlined or grassed waterway would be inadequate.
RC-3	Riprap	Riprap is a layer of stone designed to protect and stabilize areas subject to erosion. Riprap is a versatile, highly erosion-resistant material that can be used effectively in

BMP ID	Name	SWPPP Summary
		many locations and in a variety of ways to control erosion on construction sites, slopes, roadsides, and streambanks.
RC-4	Turf Reinforcement Mats / Grass-lined Channels	Turf Reinforcement Mats (TRMs) are a runoff control BMP, intended to protect soil from the tractive (erosive) forces of flowing water. They are used to line drainage conveyance channels on a temporary basis or, most commonly, until grasses or other natural vegetation becomes established (Grass-lined Channels). Vegetated TRMs are a biotechnical erosion control BMP because the structural materials (geotextile) and biological components (roots and shoots reinforcement) mutually reinforcing manner. However, some TRMs are very effective and long-lasting for use when vegetation is difficult to establish.
RC-5	Diversion Dikes and Diversion Swales	A Diversion Dike is a temporary ridge of compacted soil constructed immediately above a new cut or soil fill slope or around the perimeter of a disturbed area. Diversion Swales are ditches cut into the soil in a roughly parabolic or trapezoidal shape, and they accompany diversion dikes for intercepting runoff.
SC-1	Sediment Ponds	A sediment pond is usually created by excavation and/or construction of an embankment; it is designed to retain or detain runoff for a time sufficient to allow sediment to settle out of suspension. The skimmer outlet device improves sediment-trapping efficiency by regulating filling and draining of the sediment basin better than conventional methods using perforated risers or stone. Sediment basins shall be designed such that the flow length from the inlet to the outlet is relatively long. Flow length (L:W ratio) and detention time are the critical factors for increasing sediment pond efficiency.
SC-2	Sediment Traps	A sediment trap is a temporary containment area that allows sediment in collected storm water to settle out during infiltration of before the runoff is discharged through a stabilized spillway. Sediment traps are formed by excavating or constructing an earthen embankment across a waterway or low drainage area. Sediment traps shall be used in conjunction with BMPs such as TC-4 Wash Racks, PO-5 Stockpile Management, and PO-6 Solid and Liquid Waste Management.
SC-3	Bioretention and Swales	Bioretention basins and bioswales direct sheet flow across a grass buffer strip to a ponding area for infiltration. They utilize soils and both woody and herbaceous plants to remove pollutants from storm water runoff. The ponding area generally consists of a surface layer containing organics such as mulch, trees, native grasses and shrubs, a subsurface layer of planting soil, and a sand bed.
SC-4	Silt Fence	A silt fence is a temporary sediment barrier consisting of filter fabric entrenched into the soil and attached to supporting posts. Silt fence is intended to be installed where sediment-laden water can pond, thus allowing the sediment to fall out of suspension and separate from the runoff. Silt fence installed with a trencher or by slicing is the most effective installation method to ensure against common silt fence failures.
SC-5	Fiber Rolls	Fiber rolls are manufactured from straw, wood excelsior, coconut fibers, and/or other materials which are bound with polypropylene or biodegradable netting into tight tubular rolls. Fiber rolls control three types of erosional processes; erosion control, run off control, and sediment control. SC-5 Fiber Rolls are extremely effective as; 1) "slope interrupters" to reduce erosion on newly constructed slopes; 2) temporary "ditch checks" to reduce runoff velocities in drainage channels, and 3) sediment control barriers for small DSAs such as stockpiles, discrete slopes or individual lots.

BMP ID	Name	SWPPP Summary
SC-6	Straw Bale Dike	A straw bale dike is a temporary barrier consisting of straw bales installed across a slope, at the toe of a slope, and/or around the perimeter of the construction site. Straw bale dikes intercept and detain small amounts of sediment transported by sheet type runoff.
SC-7	Compost Berms and Compost Socks	A compost berm is a trapezoidal berm that intercepts sheet flow and ponds runoff, allowing sediment to fall out of suspension. Compost berms provide an environmentally-sensitive and cost-effective alternative to silt fence. A compost sock is a type of contained compost berm, with the added benefit of better withstanding any machinery or other vehicle traffic. Compost socks are mesh tubes filled with compost, installed across a slope or small drainage swale to pond water and allow sediments to settle. Compost socks are also similar to fiber rolls in their applications.
RT-1	Crown	Crowned roads are designed to quickly drain road surfaces from the center of the road to side ditches. This technique helps to prevent water from standing on the road surface. Standing water results in road failures, destabilized sub-base, potholes, and erosion.
RT-2	Outslope	An outsloped trail is one that is lower on the outside or downhill side of the trail bench than it is on the inside or bank side. Outsloping lets runoff flow naturally, as uniform sheet flow, off the trail. Outsloping protects the trail or road prism from erosion and mimics and attempts to restore the natural hillslope processes and watershed hydrology which can greatly improve water quality.
RT-3	Inslope	Insloping is a road shape where the road surface is lower on the inside (sloe side) of the road. Insloping collects surface runoff into an inboard ditch system.
RT-4	Road Surface	Surfacing the native roadbeds (and trail surfaces) with gravel, crushed aggregate and/or base rock improves the structural support and reduces road surface erosion. Low-volume roads intended for all-weather use shall be stabilized by surfacing with gravel.
RT-5	Rolling Dip	Rolling dips are gently sloping excavations running diagonally across the road surface. They limit the accumulation of erosive volumes of storm water on roads by diverting surface runoff off the road a pre-designed intervals.
RT-6	Terrain Dip	A terrain dip is a specially designed rolling dip that is placed at the intersection of a road (or trail) and a natural drainage course or swale in order to allow runoff from the upslope swale to exit the road in its pre-disturbance location.
RT-7	Climbing Turn	The climbing turn (switchback) is a road and trail design used to climb steep slopes in confined areas or make outboard turns (around a ridge node) with minimal erosion. From uphill to downhill the road drainage goes from outsloped to steeply insloped (super elevation) and then to outsloped again. A strategically placed rolling dip is used to cross drain (relieve) the inboard ditch.
RT-8	Culvert Crossing	Culverts shall be installed and maintained in order to convey water where a stream or drainage intersects a road or trail, if a culvert is the only drainage option. The use of culverts shall preserve road base by draining water from ditches along roads. Culverts shall be properly designed and installed in order to prevent erosion problems. Culvert inlets and outlets shall also be properly designed to stabilize soil, prevent scour, and improve flow efficiency.
RT-9	Slope Drain or Overside Drain	A slope drain is flexible tubing or a pipe, overside drain, or other conduit extending from the top to the bottom of a cut slope, fill slope, or other steep slope needing protection from runoff that cannot be diverted elsewhere. Slope drains shall be

BMP ID	Name	SWPPP Summary
		installed to convey concentrated runoff down the face of the slope without causing erosion.
RT-10	Low Water Crossings	Low water crossings are BMPs used to allow vehicular access across streams and drainage ways while protecting the channel. A well-designed low water crossing will protect the channel bottom and bands from erosion and sedimentation.
RR-1	Revegetation	Areas of rehabilitation and repair (revegetation) shall be closed to vehicular traffic. Closed areas shall be signed and fenced, and riders shall be educated to stay on established trails, and not blaze trails through vegetation. Native, locally-adapted plant species shall be used, and soil shall be amended as needed to promote growth.
RR-2	Live Staking	Live stakes are pieces of freshly cut woody plant stem planted in the ground or into erosion control or streambank stabilization structures. Live stake cuttings can be used to repair small earth slips and slumps. The stakes can help buttress the soil and arching. Gullies and bare gully banks can benefit from live staking. Live stakes or poles can be inserted or driven through interstices or openings in gabions, riprap, articulated block, or cellular confinement systems (joint planting). Live stakes can be used to anchor and enhance the effectiveness of live fascines, fiber rolls, turf reinforcement mats, and other erosion control materials.
RR-3	Willow Posts and Poles	RR-3 Willow Posts and Poles is a biotechnical erosion control technique whereby the use of vegetative components and structural materials are combined in a mutually reinforcing manner. Willow posts and poles are excellent additions to any technique that requires excavation, particularly when the depth and location of the excavation intercepts soils conducive to willow growth. Willow posts and poles may be inserted into stone or soil backfill and thus become incorporated with the structure as they root.
RR-4	Live Fascines	Live fascines are also known as live brush (willow) bundles, or willow wattles. Live fascines are bundles of live branch cuttings placed in long rows in shallow trenches across the slope on contour, or at an angle. Fascines are used for biotechnical stabilization of slopes and streambanks. Live fascines may be used for erosion control and vegetation establishment on long slopes, road fills, road cuts, trails, gullies, slumped areas, eroded slopes, or eroding streambanks. Frequently, they are used to repair small earth slips and slumps or to protect slopes from shallow slides 1-2 feet deep. This technique is useful on slopes requiring other planting materials such as woody vegetation, transplants, seeded grasses, and forbs. Live fascines provide soil stability while promoting vegetation and cover establishment.
RR-5	Vegetated Riprap	Correctly designed and installed, vegetated riprap offers an opportunity for the designer to attain the immediate and long-term protection afforded by riprap, with the habitat benefits inherent with the establishment of a healthy riparian buffer. The riprap will resist the hydraulic forces, while roots and branches increase geotechnical stability, prevent soil loss (or piping) from behind the structures, and increase pull-out resistance. Aboveground components of the plants will create habitat for both aquatic and terrestrial wildlife, provide shade (reducing thermal pollution), and improve aesthetic and recreational opportunities. The roots, stems, and shoots will help anchor the rocks and resist 'plucking' and gouging by debris. This technique can also be applied to stabilize slopes where habitat and aesthetic values are important.

BMP ID	Name	SWPPP Summary
RR-6	Vegetated Gabion Basket	Vegetated gabions are used as pervious retaining and armoring structures, culvert outlet or inlet stabilization, and as flexible toe-walls that reduce the steepness of slopes or streambanks. This technique is typically used where large rock is unavailable, as gabion baskets filled with small rocks can resist higher tractive forces than the rocks would normally be able to withstand without wire reinforcement. Vegetated gabions are mitigation for unvegetated gabions. Besides providing habitat enhancements, vegetating gabions with woody plants during construction will increase longevity of the structures.
RR-7	Gully Repair	When gully erosion rates and sediment yield are excessive, gully repair becomes imperative. Gullys are complex and RR-7 Gully Repair usually consists of a combination of techniques for stabilizing these eroding intermittent or ephemeral channels. These repair techniques include identifying and minimizing the source of concentrated flows, installing drainage measures as required, preventing further downcutting, grading the disturbed soils, and applying soil stabilization techniques.
PO-1	Trail and Service Road Inspection and Maintenance	Erosion control features on trails and service roads in the Park shall be maintained through periodic inspection and maintenance, including cleaning dips and crossdrains, repairing ditches, marking culvert inlets to aid in location, and clearing debris from culverts. Roads and trails will be avoided during wet periods if such use would likely damage the road drainage features.
PO-2	Campground Maintenance	The implementation of best management practices for campground, trail, and parking lot activities is designed to prevent pollutants from these areas from entering nearby stream systems or storm water conveyance systems.
PO-3	Portable Septic Waste Management	Portable septic systems will be necessary in order to perform projects throughout isolated areas of the park. Portable septic waste management controls shall be practiced to minimize or eliminate the discharge of septic waste materials to watercourses. Park staff and other contractors shall be educated on portable septic practices.
PO-4	Vehicle Maintenance and Fueling	Vehicle and equipment fueling procedures and practices are designed to minimize or eliminate the discharge of fuel spills and leaks into storm drain systems or to watercourses.
PO-5	Stockpile Management	Stockpile management procedures and practices shall be implemented to reduce or eliminate air and storm water pollution from stockpiles of soil, compost, sand, and paving materials such as Portland cement and asphalt-based materials, aggregates, and pressure-treated wood.
PO-6	Solid and Liquid Waste Management	Solid and liquid waste management procedures and guidelines shall be practiced in order to minimize or eliminate the discharge of pollutants to the watercourses at the Park. The specifications for PO-6 Solid and Liquid Waste Management shall be followed for the creation, collection, and disposal of these wastes. Recycling stations shall be made available in order to reduce solid waste.
PO-7	Hazardous Materials and Waste Management	Hazardous materials and waste management controls shall be practiced in order to minimize or eliminate the discharge of pollutants from hazardous waste to a storm drain or to watercourses.
PO-8	Hazardous Spill Response	Hazardous spill control procedures shall be implemented anytime chemicals and/or other hazardous substances are actively used or stored. This BMP shall apply to all construction, maintenance and road/trail building projects.

**California Department of Parks and Recreation
Resource Services
STANDARD PROJECT REQUIREMENTS (SPRs)**

Carnegie SVRA Resource Management Area (RMA) Program

The following SPRs applicable to the Carnegie SVRA RMA Program are used by California State Parks for park projects throughout the statewide park system. Applicable SPRs are built into individual projects as part of each park's internal planning process. As indicated by the brackets, these SPRs are meant to be tailored for each project by filling in text as appropriate. Brackets have been filled in with relevant project information. Underlined or ~~strikeout~~ text denotes where SPR text has been modified for implementation clarity and reflects Diablo Range District standard practices. Because there are various Natural and Cultural Resource classifications within DPR, the following naming convention is used for anyone qualified who possesses the skills to do a particular task correctly as [Natural Resource Specialist] and [Cultural Resource Specialist]. This naming convention also applies to any qualified and DPR-approved consultant or contractor who possesses the necessary skills and qualifications to do a particular task correctly.

General

- Prior to the start of on-site construction work, a [Cultural and Natural Resource Specialists] will consult with the contractor or project manager to identify all resources that must be protected.

- No track-mounted or heavy-wheeled vehicles will be allowed in identified environmentally sensitive areas, including culturally sensitive sites, at any time; foot traffic will only be allowed with specific permission from the State's Representative after clearance from [DPR Resource Specialists].

- At the discretion of [DPR Resource Specialists], mechanized vehicles on [sensitive] resource sites will be restricted to ~~a~~ short-term use of rubber tire tractors only. All such vehicles must enter and exit the area via the same route of travel (by backing up). Vehicles are strictly prohibited from turning on the surface of site(s).

- Prior to the start of on-site construction work, a DPR-qualified [natural, cultural, historical, aesthetic, public safety, recreational or other value] Resources Specialist will train construction personnel in [applicable] Resource identification and protection procedures.

- Prior to the start of on-site construction work, and at the discretion of a [DPR Environmental Scientist], a [DPR-approved biologist] will flag and/or fence all [Sensitive Natural Communities] with a buffer of [100 feet] for avoidance during on-site construction activities. The [Project Manager] will remove the fencing after project completion.

- Prior to any earthmoving activities, a DPR-qualified [Resource Specialist] will approve all subsurface work, including the operation of heavy equipment within [buffered distances as specified in Project Mitigation identified in EIR Table S-1] of the identified Environmentally Sensitive Area (ESA).

- Prior to the start of [earth moving] work, the [Project Manager] will notify the [Diablo Range District CEQA Coordinator] or [the Altamont Sector Manager] a minimum of three weeks in advance, unless other arrangements are made, to schedule [resource] monitoring as previously identified during the planning process. ~~A DPR qualified [**insert who**] will monitor all ground disturbing phases of this project at his/her discretion.~~

Cultural Resources

General Cultural Standard Requirements

- Prior to the start of on-site construction work, the [Project Manager] will notify the **Cultural Resources Supervisor**, unless other arrangements are made in advance, a minimum of three weeks to schedule a **Cultural Resource Specialist** to monitor work, as necessary, to ensure that ~~removal and reconstruction of historic fabric~~ treatment of known cultural resources will occur in a manner consistent with the Secretary of the Interior's Standards.

- If sensitive cultural resources were previously identified during the planning process ~~Before, during, and after construction~~, a [Cultural Resource Specialist] will photo-document all aspects of the project, before, during, and after construction, and will add the photos to the historical records (archives) for the park.

- Prior to the start of on-site construction work, and to the extent not already completed, a [Cultural Resource Specialist or DPR-approved Cultural Resource Specialist] will map and record all cultural features within the proposed Area of Potential Effects (APE) to a level appropriate to the Secretary of Interior Standards.

Historian's Standard Requirements

- As needed, a~~A~~ [Cultural Resource Specialist] familiar with the project site's cultural/tribal cultural/historic resources will monitor all construction activities. Where appropriate and as requested through tribal consultation, a Native American monitor will be present during ground disturbing construction activity. All cultural/tribal cultural/historical resources uncovered during the project will be recorded in place with a photograph and/or drawing showing any new material or recovered and archived, at the discretion of the monitor.

Archaeologist's Standard Requirements

- Prior to the start of any ground-disturbing activities, a DPR-approved archaeologist will complete pre-construction testing to determine specific avoidance areas as identified in the planning process.
  - If necessary, a DPR-qualified Cultural Resource Specialist will prepare a research design, including appropriate trenching and/or pre-construction excavations
  - Based on preconstruction testing, project design and/or implementation will be altered, as necessary, to avoid impacts to archaeological resources or reduce the impacts to a less than significant level, as determined in consultation with a DPR-qualified archaeologist.

- Unless previously flagged by DPR Resource Specialists, [DPR or Contractor] will manually remove or flush cut vegetation to avoid ground-disturbing activities; removal of roots will not be allowed. In areas lacking appropriate archaeological survey coverage

only chemical treatments will be allowed unless archaeological surveys are performed first.

- If **anyone** discovers previously undocumented ~~cultural~~ archaeological resources during project construction, all work ~~within~~ [in the project area and in areas nearby reasonably suspected of having undiscovered cultural resources] will stop. Work ~~of the find~~ will be temporarily halted until the DPR archaeologist designs and implements appropriate treatments in accordance with the Secretary of the Interior's Standards and Guidelines for archaeological resource protection.

  o [The RMA Program supervisor or designee] will modify the project to ensure that construction activities will avoid ~~cultural~~ archaeological resources upon review and approval of a [DPR-qualified Cultural Resource Specialist].

  o If ground disturbing activities uncover intact ~~cultural features~~ archaeological sites (including but not limited to dark soil containing shellfish, bone, flaked stone, groundstone, or deposits of historic ash), when a DPR Qualified cultural resources specialist is not on-site, [Project Manager] will contact the DPR State Representative immediately and [Contractor] will temporarily halt or divert work within the immediate vicinity of the find until a DPR-qualified cultural resources specialist evaluates the find and determines the appropriate treatment and disposition of the cultural resource.

- In the event that human remains are discovered on the project site, work will cease immediately in the area of the find and the project manager/site supervisor will notify the ~~appropriate DPR Personnel~~ Supervising Ranger, who will secure the discovery. Any human remains and/or funerary objects will be left in place or returned to the point of discovery ~~and covered with soil~~. The ~~DPR Sector Superintendent (or authorized representative)~~ Supervising Ranger will then notify the County Coroner, in accordance with §7050.5 of the California Health and Safety Code, and the Native American Heritage Commission (or Tribal Representative). If a Native American monitor is on-site at the time of the discovery, the monitor will be responsible for notifying the appropriate Native American authorities. The County Coroner will make the determination of whether the human bone is of Native American origin.

  o If the Coroner determines the remains represent Native American interment, the NAHC in Sacramento and/or ~~tribe~~tribal representative will be consulted to identify the most likely descendants and appropriate disposition of the remains. Work will not resume in the area of the find until proper disposition is complete (PRC §5097.98). No human remains or funerary objects will be cleaned, photographed, analyzed, or removed from the site prior to determination.

  o If it is determined that the find indicates a sacred or religious site, the site will be recorded and evaluated under PRC 5024 and 5024.5 with consultation of the MLD (if needed) or Tribal representative. Formal consultation with the State Historic Preservation Office and review by the Native American Heritage Commission/Tribal Cultural representatives will occur as necessary to define additional site mitigation or future restrictions.

Natural Resources

<u>General Biological Resource Standard Project Requirements</u>

- To prevent the spread of noxious weeds, all construction vehicles and equipment will enter and leave the project site free of soil, vegetative matter, or other debris that could contain weed seeds.

- All <u>new or modified trail</u> construction will be consistent with the State Parks Trail Manual guidelines, <u>State Parks OHV BMP Manual, Carnegie SVRA Stormwater Management Plan, and Soil Conservation Standard</u>.

- At the discretion of [the Natural Resource Specialist], ~~project activities will be a~~ [DPR-approved Natural Resource Specialist] <u>will</u> monitor~~ed~~ [construction in the RMA Program work sites] to ensure that impacts to [special-status plants and animals, nesting birds, roosting bats, sensitive natural communities, or jurisdictional waters potentially occurring in the work site area as identified during the project planning phase] are minimized. <u>This individual will be familiar with the life history of the protected species with the potential to occur within the work areas and shall be trained in identification of these special-status species that could be encountered during the project and shall have the authority to stop work to avoid impacts on such species.</u>

- The [RMA Program Supervisor or designee] will post information signs near project areas with restricted access or closures lasting longer than 3 months. The signs will include the following information:

  o Explanation for and description of the project; and

  o Anticipated completion date.

- Prior to the start of on-site construction activities, a [DPR-approved Natural Resource Specialist] will train on-site construction personnel on the life history of [special-status plants and animals, nesting birds, roosting bats, and sensitive natural communities potentially occurring in the work site area as identified during the project planning phase], work constraints, and any other pertinent information related to the species. <u>For the RMA Program, pertinent information includes project boundaries, sensitive resources, and protected species and habitats relevant to the current year's work site location(s). This training shall include:</u>

  - <u>a description of the special-status species, their habitats, and other sensitive natural communities,</u>

  - <u>the importance of the species,</u>

  - <u>the general measures that are being implemented to avoid potential project impacts,</u>

  - <u>the appropriate protocol to follow in the event that these sensitive resources are found onsite,</u>

  - <u>buffer areas, and</u>

  - <u>any other measures to protect the sensitive resources.</u>

Plants

- If [special-status plants or locally rare plants] are located within [100 feet] of the project area, the [plants] will be flagged by [a DPR-approved botanist], fenced off prior to the start of on-site construction activities, and ~~completely~~ avoided. <u>The Environmental Scientist may adjust the buffer distance based on site conditions.</u>

- Best Management Practices (BMPs) to avoid creation of dust will be employed during all construction activities within [100 feet] of [special-status plants or locally rare plants].

- Prior to the start of on-site construction activities and when the plants are in a phenological stage conducive to positive identification (i.e., usually during the blooming period for the species), a [DPR-approved Natural Resource Specialist] will conduct surveys for special-status <u>and locally rare</u> plant species ~~throughout the project area~~ <u>with the potential to occur in the project work area. The surveys shall include but not be limited to, conducting surveys during appropriate conditions, utilizing appropriate reference sites, and evaluating all direct and indirect impacts such as altering off-site hydrological conditions where special-status plant species may be present. The location and extent of all occurrences of special-status plant species encountered during the surveys shall be mapped and maintained in the SVRA's Geographic Information System (GIS) database.</u>

- Prior to the start of on-site construction activities, a [DPR-approved Natural Resource Specialist] will flag and fence <u>sensitive</u> plant communities (e.g., vegetation series, alliances, or associations) <u>and jurisdictional waters</u> within [100] feet of the project area to avoid impacts.

- No [ground-disturbing activities or equipment storage] will be allowed within [ten] times the diameter-at-breast-height (DBH) of retention trees, unless approved in advance by a DPR-approved biologist, forester, or certified arborist.

- The [RMA Program Supervisor] will avoid or minimize impacts to federally protected wetlands <u>and other jurisdictional waters</u> to the extent practicable by conducting work in upland areas.

- A [DPR-approved biologist, forester, or certified arborist] will be present during all ground-disturbing activities within the [area of ten times the DBH] of trees.

- Any trenching in a "structural root zone" will be completed by hand; no roots larger than [two inches] in diameter will be cut or damaged.

- All herbicides will be handled, applied, and disposed of in accordance with the MSDS Fact Sheet and all local, State, and federal laws.

- To maintain genetic integrity, only <u>locally native</u> plant stock collected within the [Carnegie SVRA or from the same ecological region, elevation, and site characteristics as the site to be revegetated] will be used for re-vegetation in the project area <u>in accordance with the DPR Genetic Integrity Policy (DOM Natural Resources Section, Plant Resources Chapter 0310.4.4)</u>.

- [DPR] will employ Best Management Practices (BMPs) for erosion control to avoid runoff of project-related sediments, vehicle fluids, and other liquids into ~~special~~ <u>sensitive</u> plant communities.

Wildlife

- If feasible, [DPR] will schedule all work (including but not limited to mobilization and staging, clearing, grubbing, vegetation removal, fence installation, demolition, and grading) between September 16 and January 31 to avoid the[impacts to nesting birds].

- If work is required during the [nesting bird] season ([February 1-September 15]) a [DPR-approved Natural Resource Specialist] will conduct a survey to identify [active nests[1]] within [a 250-foot (passerines) and 1,000-foot (raptor nests) buffer around disturbance areas including staging and storage] of the project area. The survey will be conducted no more than [five] calendar days prior to the beginning of construction. If project activities are delayed by more than five days, an additional nesting bird survey shall be performed. The results of the surveys shall be documented.

- If [active nest(s)] are found during the nesting bird survey, located within feet of the project area, no construction will occur within [250-feet for passerines or 1,000 feet for raptors] of the [work site] during the [nesting bird] season or until the young have fledged, as determined by a DPR-approved biologistNatural Resource Specialist.

- If individuals or other recent signs of [special-status animals] are observed within [500 feet] of the project area, [a DPR-approved Natural Resource Specialist] will be present on the site to monitor during construction activities at his/her discretion.

- Immediately prior to the start of work each morning, [a DPR-approved Natural Resource Specialist] will conduct a visual inspection of the construction zone.

- If [a special-status animal] is found on the project site, work in the vicinity of the animal will be delayed until the species moves out of the site on its own accord, or is temporarily relocated to a suitable habitat area outside of the work site by [a USFWS- and/or CDFW-permitted biologist or a DPR-approved Natural Resource Specialist (depending on the listing status of the species)]biologist. DPR shall not relocate state- or federally-listed species or species that are candidates for listing under the California Endangered Species Act without applicable permits.

- To prevent trapping of [wildlife], all holes and trenches will be covered at the close of each working day with plywood or similar materials, or will include escape ramps constructed of earth fill or wooden planks; all pipes will be capped. A [DPR-approved biologist], or other staff trained by a [DPR-approved Natural Resource Specialist] will inspect trenches and pipes for [trapped animals] at the beginning of each workday. If a trapped animal is discovered, they will be released in suitable habitat at least [100 feet] from the project area.

- [DPR or Contractor] will not remove any trees equal to or greater than [four] inches DBH unless first inspected by [a DPR-approved Natural Resource Specialist] and determined to be unsuitable as habitat for roosting bats.

Aesthetics

- Projects will be designed to incorporate appropriate park scenic & aesthetic values including the choices for: specific building sites, scope & scale; building and fencing materials and colors; use of compatible aesthetic treatments on pathways, retaining

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[1] Active nesting is present if a bird is building a nest, sitting in a nest, a nest has eggs or chicks in it, or adults are observed carrying food to the nest.

walls or other ancillary structures; location of and materials used in parking areas, campsites and picnic areas; development of appropriate landscaping. The park scenic and aesthetic values will also consider views into the park from neighboring properties.

- [Contractor] will store all project-related materials outside of the viewshed of [the Carnegie SVRA].

Air Quality

- During dry, dusty conditions, all active construction areas will be lightly sprayed with dust suppressant (water) to reduce dust without causing runoff.

- All trucks or light equipment hauling soil, sand, or other loose materials on public roads will be covered or required to maintain at least two feet of freeboard.

- All ~~gasoline-powered~~ equipment will be maintained according to manufacturer's specifications, and in compliance with all State and federal requirements.

- Excavation and grading activities will be suspended when sustained winds exceed 15 miles per hour (mph), instantaneous gusts exceed 25 mph, or when dust occurs from remediation related activities where visible emissions (dust) cannot be controlled by watering or conventional dust abatement controls.

Geology and Soils (erosion)

- After a large earthquake event (i.e., magnitude 5.0 or greater within 50 miles of the project site), [RMA Program Supervisor or designee] will inspect all project structures and features for damage, as soon as is possible after the event. Any damaged structures or features will be closed to park visitors, volunteers, residents, contractors, and staff.

- No track-mounted or heavy-wheeled vehicles will be driven through [project site] areas during the rainy season or when soils are saturated to avoid compaction and/or damage to soil structure.

- [RMA Program Supervisor or designee] will develop a rehabilitation plan for the decommissioned trail that includes using brush and trees removed from the new trail alignment for bio-mechanical erosion control (bundling slash and keying it in to fall of trail, filling damaged trails sections with soil and duff removed from the new trail alignment, constructing water bars, and replanting native trees and shrubs).

- [DPR or Contractor] will clearly block both ends of the trail and scatter its length with vegetative debris from new trail construction to discourage continued use and degradation of the decommissioned portion of the trail.

Hazards

- Prior to the start of on-site construction activities, [DPR or Contractor] will inspect all equipment for leaks and regularly inspect thereafter until equipment is removed from the project site. All contaminated water, sludge, spill residue, or other hazardous compounds will be contained and disposed of outside the boundaries of the site, at a lawfully permitted or authorized destination.

- Prior to the start of on-site construction activities, [DPR or Contractor] will prepare a Spill Prevention and Response Plan (SPRP) ~~as part of the Storm Water Pollution Prevention Plan (SWPPP) for~~ [Regional Water Quality Control Board] ~~approval~~ to

provide protection to on-site workers, the public, and the environment from accidental leaks or spills of vehicle fluids or other potential contaminants. This plan will include (but not be limited to);

– a map that delineates construction staging areas, where refueling, lubrication, and maintenance of equipment will occur;

– a list of items required in a spill kit on-site that will be maintained throughout the life of the project;

– procedures for the proper storage, use, and disposal of any solvents or other chemicals used in the restoration process;

– and identification of lawfully permitted or authorized disposal destinations outside of the project site.

- [DPR or Contractor] will set up decontamination areas for vehicles and equipment at Park entry/exit points. The decontamination areas will be designed to completely contain all wash water generated from washing vehicles and equipment. Best Management Practices (BMPs) will be installed, as necessary, to prevent the dispersal of wash water beyond the boundaries of the decontamination area, including over-spray.

- All heavy equipment will be required to include spark arrestors or turbo chargers (which eliminate sparks in exhaust) and have fire extinguishers on-site.

- Construction crews will be prohibited from parking vehicles and using portable tools powered by gasoline-fueled internal combustion engines [within 25 feet] from flammable material, such as dry grass or brush. At the end of each workday, construction crews will park heavy equipment over a non-combustible surface to reduce the chance of fire.

- DPR personnel will have a State Park radio at the Park, which allows direct contact with CalFire and a centralized dispatch center, to facilitate the rapid dispatch of control crews and equipment in case of a fire.

- Prior to the start of on-site construction activities, [DPR or Contractor] will clean and repair (other than emergency repairs) all equipment outside the project site boundaries.

- Under dry conditions, a filled water truck and/or fire engine crew will be onsite during activities with the potential to start a fire.

- [DPR or Contractor] will designate and/or locate staging and stockpile areas within the existing maintenance yard area or existing roads and campsites to prevent leakage of oil, hydraulic fluids, etc. into [the environment].

Hydrology

- If subject to NPDES General Construction Permit requirements, ~~Prior to the start of construction involving ground-disturbing activities,~~ [DPR or Contractor] will prepare and submit a Storm Water Pollution Prevention Plan (SWPPP). ~~that identifies~~ Pprior to the start of land-disturbing activities for~~DPR~~ approval by the State Water Resources Control Board. The SWPPP is a document that must assess the site conditions, sources of sediment and other pollutants in stormwater and non-stormwater discharges and shall identify the Best Management Practices (BMPs) that will best suit the construction activities and meet the requirements of Regional, State, and Federal water pollution

control objectives. Water Pollution Control Drawings shall be included as a component of the SWPPP and shall show locations of all construction site BMPs, in accordance with Construction Site Monitoring Program Guidelines. The SWPPP will identify temporary (e.g., tarping of any stockpiled materials or soil; use of silt fences, straw bale barriers,[2] fiber rolls,[3] etc.) and permanent (e.g., structural containment, preserving or planting of vegetation) for use in all construction areas to reduce or eliminate the discharge of soil, surface water runoff, and pollutants during all excavation, grading, trenching, repaving, or other ground-disturbing activities. The SWPPP will include BMPs for hazardous waste and contaminated soils management and a Spill Prevention and Control Plan (SPCP), as appropriate.

- The project will comply with all applicable water quality standards as specified in the [Central Valley RWQCB] Basin Plan.

- All heavy equipment parking, refueling, and service will be conducted within designated areas outside of the 100-year floodplain to avoid watercourse contamination.

- If construction activities extend into the rainy season ([October through April]) or if an unseasonal storm is anticipated, [DPR or Contractor] will properly winterize the site by covering (tarping) any stockpiled materials or soils and by constructing temporary perimeter sediment barriers, such as silt fences, ~~straw bale~~strawbale barriers, fiber rolls, or other structures around stockpiles and graded areas.

- All construction activities will be suspended during heavy precipitation events (i.e., at least 1/2-inch of precipitation in a 24-hour period) or when heavy precipitation events are forecast.

- [DPR or Contractor] will install appropriate energy dissipators at water discharge points, as appropriate.

Traffic

- Prior to delivery and/or removal of project-related equipment or materials that could impede or block access to driveways, cross streets, or street parking, [RMA Program Supervisor or designee] will coordinate with the local jurisdictions to develop and implement traffic control measures.

Noise

- Internal combustion engines used for project implementation will be equipped with a muffler of a type recommended by the manufacturer. Equipment and trucks used for ~~p~~Project-related activities will utilize the best available noise control techniques (e.g., engine enclosures, acoustically attenuating shields or shrouds, intake silencers, ducts, etc.) whenever necessary.

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[2] Straw/hay bales shall be certified weed-free materials. A copy of CDFA Form 66-079 "Certificate of Quarantine Compliance (CQC)" associated with the inspection of the specific forage/straw materials may be obtained from the vendor to ensure certification.

[3] Fiber rolls shall be temporary products that do not contain netting, or that contain netting manufactured from 100% biodegradable non-plastic materials such as jute or coir fiber. Degradable, photodegradable, UV-degradable, oxo-degradable, or oxo-biodegradable plastic netting are not acceptable alternatives. All netting materials used should have a wildlife-safe, loose-weave design with movable joints between the horizontal and vertical twines that allow twines to move independently and reduce the potential for wildlife entanglement.

- [DPR or Contractor] will locate stationary noise sources and staging areas as far from potential sensitive noise receptors, as possible. If they must be located near potential sensitive noise receptors, stationary noise sources will be muffled or shielded, and/or enclosed within temporary sheds.

- Construction activities will generally be limited to the daylight hours, Monday – Friday. If work during weekends or holidays is required, no work will occur on those days before [8:00] a.m. or after [5:00] p.m. (check contract docs for time restrictions)

- Internal combustion engines used for any purpose at the job site will be equipped with a muffler of a type recommended by the manufacturer. Equipment and trucks used for construction will utilize the best available noise control techniques (e.g. engine enclosures, acoustically-attenuating shields, or shrouds, intake silencers, ducts, etc.) whenever necessary.

California Department of Parks and Recreation
Carnegie State Vehicular Recreation Area
Resource Management Area Program EIR

Appendix C: 2024 General Plan Update Policies
Relevant to RMA Program

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Appendix C. Carnegie SVRA General Plan Update 2024, Goals and Guidelines Relevant to the RMA Program

Visitor Experience and Opportunities (VEO) Goals and Guidelines

VEO Goal 1: When planning for recreation opportunities and visitor services, provide a broad range of OHV and other recreation experiences and opportunities for visitors to enjoy and appreciate.

- **VEO Guideline 1.2:** Provide appropriate facilities for a range of age and skill levels from novice through expert OHV recreationists, as feasible.

Visitor Use Facilities Goals and Guidelines

Off-Highway Vehicle (OHV) Use Goal 1: State Parks will maintain, improve, or expand visitor area connectivity, practice areas, and riding opportunities for all OHV recreationalists.

- **OHV Use Guideline 1.5**: State Parks may enhance or develop other trails, practice areas, and riding opportunities for motorized recreationists of all skill levels and as allowed in the visitor experience areas (may require additional environmental analysis).

Parkwide Goals and Guidelines

Water Goal 1: Manage the SVRA for the protection of jurisdictional waters of the United States, including wetlands and waters of the state, while maintaining a quality OHV recreational experience.

- **Water Guideline 1.1:** Avoid locating facilities in areas delineated as jurisdictional waters of the United States, including wetlands; areas that qualify as waters of the state under the Porter-Cologne Water Quality Control Act of 1969, and areas subject to California Department of Fish and Wildlife (CDFW) regulation under California Fish and Game Code Section 1602. Where avoidance is not feasible, such as for trail crossings, design facilities to minimize impacts.

- **Water Guideline 1.2:** Work to attain no net loss of wetlands functions and values at the SVRA. If impacts on jurisdictional features cannot be fully avoided:

  ─ Determine the acreage of direct impacts (i.e., fill of wetlands) and indirect impacts (i.e., alterations to wetland hydrology) that would result from project implementation, and obtain necessary permits.

  ─ Provide compensatory mitigation such that the functions and values of all affected wetlands and other waters of the United States, waters of the state, and stream and riparian habitats protected under the California Fish and Game Code are replaced, restored, or enhanced on a "no net loss" basis. Restore, enhance, and/or replace wetland, water, and riparian habitat acreage at a location and by methods agreeable to the U.S. Army Corps of Engineers (USACE), the Central Valley and San Francisco Bay Regional Water Quality Control Boards (RWQCBs), CDFW, and/or the U.S. Fish and Wildlife Service (USFWS) as appropriate and depending on agency jurisdiction.

Water Goal 2: Manage the SVRA for the protection of water quality while maintaining a quality OHV recreational experience.

- **Water Guideline 2.1:** Avoid siting facilities in and immediately adjacent to riparian or stream corridors or within waters of the United States or the state, including seeps, ponds, or drainages. Stream corridors shall be managed with vegetated buffers and crossings shall be properly sited for circulation and designed to minimize erosion and other water quality impacts. Design measures include but are not limited to:

  ─ armoring approaches,

  ─ providing sediment traps or filter areas,

  ─ hardening the crossing surface,

  ─ protecting the streambanks from vehicle backwash and overflow during flooding, and

  ─ modifying super elevation (direction of tilt) such that roads and trails drain away from stream corridors.

  Culverts or bridge crossings shall be considered in highly erosive areas.

- **Water Guideline 2.2:** Implement best management practices (BMPs) in operating the SVRA, consistent with the *Storm Water Management Plan for Carnegie SVRA* (SWMP) or applicable subsequent document. Monitor water quality regularly and implement adaptive management practices as warranted. Adaptive management practices used may include permanent or seasonal area closures, facility redesign, and hillside restoration.

- **Water Guideline 2.3:** Implement the requirements of the SWMP or subsequent amendments or replacement documents. These requirements include use of sediment basins, revegetation and erosion control blankets, dust suppressants, gully rehabilitation, and monitoring for water quality as prescribed in the plan and may include additional measures in the future.

- **Water Guideline 2.4:** Before, during, and after the construction of facilities proposed and envisioned in this General Plan, implement all water quality control measures required under the National Pollutant Discharge Elimination System Construction General Permit. Develop a storm water pollution prevention plan, including the identification of BMPs that must be implemented to reduce water quality degradation of receiving waters during and after construction activities. Incorporate construction BMPs from the *OHV BMP Manual for Erosion and Sediment Control* (OHV BMP Manual) or subsequent applicable document, as appropriate.

- **Water Guideline 2.5:** When developing detailed plans for facilities proposed and envisioned in this General Plan, incorporate permanent water quality control features, as appropriate, with guidance from the SWMP and any subsequent amendments or replacement documents. Incorporate information from the OHV BMP Manuel and the OHMVR *Soil Conservation Standard and Guidelines* (or subsequent amendments) as appropriate to designs. Select water quality control features appropriate to site conditions at Carnegie SVRA and consistent with state-of-the art science on water quality management.

- **Water Guideline 2.6:** To reduce erosion and sedimentation, improve areas that have experienced substantial erosion from surface water runoff as determined by annual inspections. Implement rehabilitation concepts for these features as described in the SWMP or subsequent or replacement documents.

- **Water Guideline 2.7:** Close an area to OHV use if it has been determined that the area cannot feasibly be rehabilitated or reclaimed in accordance with OHMVR Division water quality management standards.

- **Water Guideline 2.8:** To minimize erosion problems, landslide hazards, and costly maintenance, temporarily close portions or all of the SVRA based upon conditions established by the rain closure policy. That policy will be reviewed and updated as necessary.

Soils Goal 1: Manage the SVRA for a balance of uses that allow protection and conservation of soil while maintaining a quality OHV recreational experience.

- **Soils Guideline 1.1:** Manage Carnegie SVRA facilities to meet the current OHMVR Division *Soil Conservation Standard and Guidelines* or subsequent amendments or replacement documents.

- **Soils Guideline 1.3:** Incorporate the guidance provided in the OHV BMP Manual or subsequent or replacement document when planning for the development of new facilities. Select, implement, and maintain BMPs, including those designed for stockpiles, during and after construction activities to avoid soil loss and the potential for resulting air pollution or degradation of water quality.

- **Soils Guideline 1.4:** Use slope to help manage soils. A full range of park facilities may be considered on areas with less than 20 percent slopes. Trails may be constructed (with BMPs) in areas with slopes between 20 percent and 45 percent, but buildings should not be constructed in these areas. On areas with slopes in excess of 45 percent, trails and park facilities should be limited and serve only the most advanced riders. Appropriate BMPs should be implemented in each area to manage erosion potential.

- **Soils Guideline 1.5:** Restrict hillclimbing activities to the hills adjacent to Corral Hollow Creek. In this area, soils mapped as Altamont clay (0–65 percent slope) and Saurin loam and clay loam (0–65 percent slope) are preferred for intensive hillclimbing.

Geo Goal 2: Promote staff education and visitor awareness of paleontological resources and proper procedures to be followed if fossils are discovered.

- **Geo Guideline 2.2:** If paleontological resources are discovered inadvertently during construction activities, cease construction activities within and in the vicinity of the fossil and consult an OHMVR Division archaeologist or other qualified paleontological resource professional to determine the potential significance of the find. If the fossil is determined to be a unique paleontological resource, develop and implement a recovery plan consistent with Society of Vertebrate Paleontology (SVP 2010) criteria. The recovery plan may include but is not limited to a field survey, construction monitoring, sampling and data recovery procedures, curation for any specimen recovered, and a report of findings.

Natural Resources Management (NRM) Goal 1: Manage Carnegie SVRA for a balance of uses that allow protection and stewardship of natural resources while maintaining a quality OHV recreational experience.

- **NRM Guideline 1.1:** Locate visitor-serving facilities in prior disturbed areas or areas of relatively low resource value to minimize disturbance to higher-value habitat areas.

- **NRM Guideline 1.2:** Before planning new visitor-serving or operations facilities, or expanding existing ones, conduct site-specific surveys/mapping of sensitive biological resources (e.g., special-status species and sensitive habitats, migratory corridors, nesting sites, and colony locations) and take the location and extent of these resources into consideration during the planning and design process. Avoid affecting sensitive biological resources during planning, design, and construction. Utilize fencing and other methods to exclude public access in environmentally sensitive areas, as necessary. Conduct worker environmental awareness training for construction personnel before construction.

- **NRM Guideline 1.3:** In the event that disturbing a sensitive biological resource is unavoidable, minimize the disturbance to the minimum area necessary to achieve the project purpose, and identify and implement measures to offset those impacts in coordination with a qualified biologist and the appropriate resource agencies, depending on the listing or protection status of the resource. Coordination with the agencies may include acquisition of any required environmental permits, take authorizations, management plans, or other documents as required by the respective agencies.

- **NRM Guideline 1.5:** Focus new trail development in areas of relatively low habitat value. Route new trails around the edges of high-quality habitat and include buffers to avoid habitat fragmentation. Maintain strict enforcement of riding destination requirements throughout the SVRA, according to the allowable uses in the respective visitor experience areas and monitor for compliance. If noncompliance is documented, enact adaptive management techniques such as temporary closures or other measures proven effective at the SVRA.

NRM Goal 2: Encourage a balance of uses that allow for the restoration or enhancement of natural habitats while maintaining a quality OHV recreational experience.

- **NRM Guideline 2.2:** Implement adaptive management, including temporary or rotating closures, invasive species management, and habitat enhancement, to allow natural regenerative processes to occur; enact these measures proactively. Use signage to inform visitors of areas that contain sensitive biological resources or are closed. Use interpretive materials to inform visitors of habitat enhancement and restoration activities to promote environmental stewardship.

- **NRM Guideline 2.3:** Manage SVRA landscapes to preserve natural vegetation and to enhance native California plant communities and associated habitat functions and values. Management strategies include habitat restoration and enhancement; invasive species management; focused propagation of desired species; fencing or other barriers to protect sensitive habitats such as riparian areas, to maximize natural recruitment of riparian species; controlled burns; managed grazing; or other management techniques proven beneficial to the maintenance of healthy natural ecosystems.

Plant Goal 1: Manage the SVRA for a balance of uses that allow protection of special-status plants and sensitive natural communities while maintaining a quality OHV recreational experience.

- **Plant Guideline 1.1:** Conduct protocol-level surveys for special-status plants and sensitive natural communities on the sites of proposed facilities during the planning and design process. Conduct the surveys during the blooming season for all potentially occurring special-status plant species according to the most current methodology recommended by CDFW and USFWS, depending on the listing status of the species. The surveys shall be conducted by a qualified botanist familiar with the flora of Alameda and San Joaquin Counties. Document the survey results in a written report submitted to the OHMVR Division. Map the location and extent of all occurrences of special-status plant species encountered during the surveys and maintain the data in the SVRA's Geographic Information System database. If construction of facilities is delayed, repeat special-status plant surveys every 5 years to ensure that data are current and account for long-term and seasonal variation.

- **Plant Guideline 1.2:** Prohibit impacts on existing occurrences of special-status plants during project implementation.

- **Plant Guideline 1.3:** Avoid siting facilities within 100 feet of known special-status plant occurrences to avoid indirect impacts. If these buffers cannot be maintained, use design features to protect the occurrences from indirect impacts.

- **Plant Guideline 1.4:** Use drought-tolerant plants, and whenever feasible, use plants native to the site for landscaping. Select plants that require little or no irrigation. If irrigation is required for plant establishment, use temporary irrigation methods that allow a gradual tapering off of watering over a 3- to 5-year period. Regulate water pressure at a level that applies sufficient water without causing erosion, damage to plants, or runoff.

- **Plant Guideline 1.5:** Monitor for existing and/or incipient populations of invasive weeds annually. If new invasive weeds are documented, implement actions to prevent their establishment and spread before they become established or occupy large portions of the SVRA. Maintain weed management practices for the SVRA consistent with OHMVR Division policies or other applicable guidance and based on best available science.

- **Plant Guideline 1.6:** Limit removal of native trees. Any trees removed as a result of facilities construction shall be replaced, with the specific number of trees to be replaced determined during project-level planning. At both new and existing facilities, prohibit adverse indirect effects on native trees from root compaction and physical damage. Preserve or enhance the extent of native woodlands at the SVRA and look for opportunities for enhancement and restoration.

Wildlife Goal 1: Manage the SVRA to maintain a quality OHV recreational experience while protecting native wildlife species, including special-status wildlife species and their designated habitats.

- **Wildlife Guideline 1.1:** Conduct annual (or more frequent) monitoring as part of the HMS or WHPP, to look for signs of active use by burrowing owls and for active kit fox dens in the planning area. If signs of burrowing owl use or active dens are detected

during monitoring, consider active management strategies to encourage and preserve use of the site by the species. Such strategies include placing new facilities away from any active burrowing owl; appropriate buffers shall be sized depending on the use of the burrow (nesting or wintering) and the disturbance impact, as described in Staff Report on Burrowing Owl Mitigation (DFG 2012) or subsequent version and/or consultation with CDFW. If active dens were found, strategies that include not siting facilities within 500 feet of active dens would be initiated based on USFWS guidelines (USFWS 2011). USFWS would be contacted regarding appropriate setbacks for a natal/pupping den if found, both occupied and unoccupied.

- **Wildlife Guideline 1.2:** Avoid siting new facilities within 150 feet of pools currently known or later identified to support California red-legged frog, California tiger salamander, western pond turtle, or western spadefoot.

- **Wildlife Guideline 1.3:** Avoid siting facilities within 100 feet of elderberry shrub locations, for complete avoidance. If work or placement of facilities closer to existing shrubs is required, implement appropriate measures, developed in consultation with USFWS, to avoid or compensate for direct and indirect impacts on valley elderberry longhorn beetle.

- **Wildlife Guideline 1.4:** Avoid siting facilities within 150 feet of preferred Alameda whipsnake habitat, particularly scrub vegetation types. If placement of facilities within or adjacent to Alameda whipsnake habitat cannot be avoided, implement appropriate measures to avoid or compensate for direct and indirect impacts on Alameda whipsnake resulting from project-specific activities. Implement protection measures agreed upon during consultation with USFWS. Encourage further research into the presence of Alameda whipsnake at the site, to ensure that management is based on the best available knowledge of the species and its requirements.

- **Wildlife Guideline 1.5:** During placement of new facilities, avoid known breeding locations of all special-status avian species known to occur in the planning area.

- **Wildlife Guideline 1.6:** If construction activities are planned during the breeding season of common and special-status birds, conduct a preconstruction survey of the construction zone and establish an appropriate buffer (as determined by a qualified biologist) within 2 weeks of construction onset. If breeding birds are documented, establish appropriate buffer zones around the occupied nests to protect the birds until the young have fledged.

- **Wildlife Guideline 1.7:** If construction activities are planned within suitable upland habitat for special-status herpetofauna (California red-legged frog, California tiger salamander, western pond turtle, or western spadefoot) and within the known maximum upland dispersal distance of those species from known breeding habitat, develop and implement appropriate measures to avoid or compensate for potential direct and indirect impacts of project-specific activities on special-status herpetofauna in upland habitats. Before the start of construction, implement any protection or mitigation measures agreed upon during consultation with the wildlife agencies.

- **Wildlife Guideline 1.8:** Perform a preconstruction survey for potential bat roosting habitat (large trees with cavities, rock outcrops, caves, mines) in proposed construction areas and a 100-foot buffer around the construction area (Western Bat Working Group 2007). Implement avoidance and minimization measures determined appropriate by a

qualified biologist based on guidance from the wildlife agencies and the best available science before conducting any activity within 100 feet of known bat roost locations. Avoidance and minimization measures may include establishment of roost avoidance buffers, seasonal activity restrictions, or monitoring of roost locations.

- **Wildlife Guideline 1.9:** Perform preconstruction surveys for active burrowing owl burrows for proposed construction that would occur within suitable burrowing owl habitat or within 50 feet of suitable burrowing owl habitat. Conduct preconstruction surveys according to current CDFW guidelines as described in their Staff Report on Burrowing Owl Mitigation (DFG 2012) or subsequent version. Because burrowing owls can be present throughout the year, this guideline would be implemented in suitable burrowing owl habitat regardless of the time period for initiation of construction. If active burrowing owl burrows are found, CDFW would be consulted regarding appropriate avoidance and minimization measures, including no disturbance buffers, to be implemented during construction and any additional mitigation measures agreed upon during consultation with CDFW.

- **Wildlife Guideline 1.10:** During placement of new facilities, avoid interference of movement through known migratory wildlife corridors in the planning area.

CR Goal 2: Protect, stabilize, and preserve cultural resources.

- **CR Guideline 2.4:** Design all SVRA undertakings, including routine maintenance and new facility development, to avoid or minimize significant impacts on all known cultural resources either listed or eligible for listing in the NRHP, CRHR, or as a CHL, and all tribal cultural resources identified by local tribes and individuals as sacred or culturally significant. Knowledge of the location of these sites was taken into consideration when selecting the preferred concept and shall be taken into consideration during future site specific planning in all visitor experience areas.

- **CR Guideline 2.8:** If cultural resources are inadvertently discovered during construction activities, cease construction activities within and in the vicinity of the find and consult a State Parks archaeologist or other qualified cultural resource professional to determine the potential NRHP/CRHR/CHL eligibility/ significance of the find. If the find is recommended to be significant, develop and implement mitigation measures in consultation with the qualified state archaeologist or cultural resource professional consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties. Mitigation measures could include, but would not necessarily be restricted to, redesign to avoid the resource, archival research, additional in-field documentation, interpretive signage, capping of the site, or data recovery through excavation. If data recovery is the only feasible mitigation, a data recovery plan, which makes provisions for adequately recovering the scientifically consequential information from and about the significant resource, should be prepared and adopted before any excavation. If the discovery is determined not to be eligible for listing in the NRHP or CRHR, then no further investigations or mitigation of adverse effects is necessary.

- **CR Guideline 2.10:** In the event that human remains are discovered during project activities, temporarily halt all work at the discovery location and areas within 100 feet adjacent to the find. Leave any human remains and associated artifacts and features in

place; avoid cleaning, photographing, or analyzing human remains or associated artifacts and features, and avoid removing them from the site. The State Parks employee or construction contractor must immediately contact the State Park District Superintendent to inform him/her of the find. The State Parks District Superintendent (or designee) will notify the county coroner, in accordance with Section 7050.5 of the California Health and Safety Code, and the NAHC will be notified within 24 hours of the discovery if the coroner determines that the remains are Native American. In compliance with PRC Section 5097.98, the NAHC will immediately notify those person(s) believed to be the most likely descendant (MLD) of the deceased Native American. The MLD will complete his/her inspection and make recommendations for treating or disposing the human remains or associated grave goods. If a Native American monitor is at the park at the time of the discovery, and that person has been designated the MLD by the NAHC, the monitor, as a representative of the MLD, may make a recommendation of the appropriate disposition. Work will not resume in the area of the find until proper disposition is complete (PRC Section 5097.98).

Tribal Cultural Resources (TCR) Goal 1: Identify and interpret the tribal cultural resources, traditional cultural places, and past and present cultural uses in the Park and protect these culturally significant places.

- **TCR Guideline 1.6:** Provide annual tribal cultural resource training to park staff members. Ensure that SVRA field staff, such as maintenance and trails team members, understand the procedures for what to do if tribal cultural resources, and most importantly human remains, are inadvertently discovered during a project or a park visitor. Involve local California Native American guest speakers as participants in annual tribal cultural resource training to share and teach park staff members about today's local Native American population, their heritage, and the important role of cultural resource management in protecting their heritage. Inform SPPOs about the location of known tribal cultural resources most susceptible to looting, vandalism, or damage by park visitors so that they can monitor site conditions and watch for site impacts and vandalism. Ensure that SPPOs have the latest information on current tribal cultural resource laws.

  If anyone identifies previously undocumented tribal cultural resources or suspected tribal cultural resources during any maintenance, construction, or other activities – work will be temporarily halted in the area of the resource/suspected resource. Work will not resume in that area until the Native American monitor inspects the resource, and appropriate avoidance, protection, or treatment is implemented.

  In the event of an accidental discovery or recognition of human remains during any maintenance, construction, or other activities – all work will cease immediately in the area of the find in compliance with California Health and Safety Code §7050.5 and §7052; and Public Resources Code §5097.99. The State Parks' Sector Superintendent (or authorized representative) will notify the County Coroner/Medical Examiner in accordance with § 7050.5 of the California Health and Safety Code. If the coroner determines the remains represent Native American internment, the Native American Heritage Commission in Sacramento will be consulted to identify the most likely

descendant/s and the appropriate disposition of the remains. Work will not resume in the area of the find until proper disposition is complete (PRC § 5097.98).

Park Operations and Maintenance (OM) Goals and Guidelines

OM Goal 2: Maintain and enhance the quality of OHV recreational opportunities.

- **OM Guideline 2.1:** Provide recreation opportunities that enhance OHV recreation at the SVRA, and provide opportunities for a range of OHV types, riding skill development, and practice areas.

- **OM Guideline 2.4:** Provide SVRA park maps and trail signs that help visitors easily understand the allowable recreational activities within the different visitor experience areas.

OM Goal 3: Provide facilities and services that contribute to the safety and convenience of visitors and staff.

- **OM Guideline 3.2:** Ensure that recreation areas are maintained properly and monitor for hazards. Close areas with unsafe conditions until improvements are completed; close areas with unauthorized trails and restore these areas.

- **OM Guideline 3.3:** Provide clear signage and/or fencing as appropriate around areas of known potential hazard, such as deep gullies, drop-offs, or restricted areas.

- **OM Guideline 3.14:** Mark the boundaries of the SVRA and the different visitor experience areas (if applicable) clearly with signs, fences, barriers, or a combination. Signs must be clearly visible to, and worded for, the benefit of SVRA visitors. Identify use areas and appropriate uses in visitor maps.

OM Goal 5: Develop and maintain SVRA facilities and monitor OHV activities to ensure compatibility with surrounding land uses.

- **OM Guideline 5.3:** Employ practices to reduce noise levels for noise-sensitive receptors during construction of facilities. Reduce noise generated during construction and maintenance activities by:

  — properly maintaining equipment with noise-reduction devices in accordance with manufacturer specifications (e.g., mufflers, shrouds, filters);

  — using quieter than standard equipment when possible (e.g., electrically powered equipment);

  — limiting activities to between 8:00 a.m. and 6:00 p.m., Monday through Saturday (excluding emergency work);

  — restricting equipment travel and use within 500 feet of noise-sensitive receptors, unless the equipment used would not exceed the daytime standard of 50 A-weighted decibels day-night average sound level (dBA Ldn) and the nighttime standard of 45 dBA Ldn at the property line of noise-sensitive receptors;

  — turning off equipment during prolonged periods of nonuse;

─ restricting alarms to warn of safety issues only;

─ using noise-attenuating buffers when activities take place within 500 feet of adjacent sensitive receptors (e.g., berms, stationary barriers, noise blankets, shrouds);

─ following standard construction practices;

─ locating equipment staging areas and material loading and unloading zones greater than 500 feet from the nearest sensitive receptor;

─ using rubber-tired equipment as much as feasible to minimize groundborne noise; and

─ locating any stationary noise sources (e.g. generators) within noise enclosures.

- **OM Guideline 5.4:** Maintain the fencing and existing buffer areas between Carnegie SVRA and adjacent properties to minimize conflicts and prevent OHV use where it is not allowed.

- **OM Guideline 5.5:** Place rest areas and steep uphill trails at locations to provide a barrier effect and/or increase the distance to noise-sensitive uses.

OM Goal 6: Limit potential air quality impacts on residential properties within the planning area that could result from construction, maintenance, and OHV recreation activities.

- **OM Guideline 6.1:** Implement current Bay Area Air Quality Management District (BAAQMD) Table 5-2 Basic Best Management Practices for Construction-Related Fugitive Dust Emissions for all projects as feasible and applicable, which may include the following measures:

─ All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.

─ All haul trucks transporting soil, sand, or other loose material off-site shall be covered.

─ All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.

─ All vehicle speeds on unpaved roads shall be limited to 15 miles per hour (mph).

─ All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.

─ All excavation, grading, and/or demolition activities shall be suspended when average wind speeds exceed 20 mph.

─ All trucks and equipment, including their tires, shall be washed off prior to leaving the site.

─ Unpaved roads providing access to sites located 100 feet or further from a paved road shall be treated with a 6- to 12-inch layer of compacted layer of wood chips, mulch, or gravel.

─ Publicly visible signs shall be posted at the soil transfer site within BAAQMD, with the telephone number and person to contact at Alameda County regarding dust complaints. This person shall respond and take corrective action within 48 hours.

BAAQMD's phone number also shall be visible, to ensure compliance with applicable regulations.

- **OM Guideline 6.2:** Implement current Bay Area Air Quality Management District (BAAQMD) Table 6-1 Best Management Practices for Construction-Related GHG Emissions for all projects as feasible and applicable, which may include the following measures:

  ─ Use zero-emission and hybrid-powered equipment to the greatest extent possible, particularly if emissions are occurring near sensitive receptors or located within a BAAQMD-designated Community Air Risk Evaluation (CARE) area or Assembly Bill 617 community.

  ─ Require all diesel-fueled off-road construction equipment be equipped with EPA Tier 4 Final compliant engines or better as a condition of contract.

  ─ Require all on-road heavy-duty trucks to be zero emissions or meet the most stringent emissions standard, such as model year (MY) 2024 to 2026, as a condition of contract.

  ─ Minimize idling time either by shutting equipment off when not in use or reducing the time of idling to no more than 2 minutes (A 5-minute limit is required by the state airborne toxics control measure [Title 13, Sections 2449(d)(3) and 2485 of the California Code of Regulations]). Provide clear signage that posts this requirement for workers at the entrances to the site and develop an enforceable mechanism to monitor idling time to ensure compliance with this measure.

  ─ Prohibit off-road diesel-powered equipment from being in the "on" position for more than 10 hours per day.

  ─ Use California Air Resources Board–approved renewable diesel fuel in off-road construction equipment and on- road trucks.

  ─ Use U.S. Environmental Protection Agency SmartWay certified trucks for deliveries and equipment transport.

  ─ Require all construction equipment is maintained and properly tuned in accordance with manufacturer's specifications. Equipment should be checked by a certified mechanic and determined to be running in proper condition prior to operation.

  ─ Where grid power is available, prohibit portable diesel engines and provide electrical hook ups for electric construction tools, such as saws, drills and compressors, and using electric tools whenever feasible.

  ─ Where grid power is not available, use alternative fuels, such as propane or solar electrical power, for generators at construction sites.

  ─ Encourage and provide carpools, shuttle vans, transit passes, and/or secure bicycle parking to construction workers and offer meal options onsite or shuttles to nearby meal destinations for construction employees.

  ─ Use locally sourced or recycled materials for construction materials (goal of at least 20% based on costs for building materials and based on volume for roadway, parking lot, sidewalk and curb materials). Wood products used should be certified through a sustainable forestry program.

― Use low-carbon concrete, minimize the amount of concrete used and produce concrete on-site if it is more efficient and lower emitting than transporting ready-mix.

― Include all requirements in applicable bid documents, purchase orders, and contracts, with successful contractors demonstrating the ability to supply the compliant on- or off-road construction equipment for use prior to any ground-disturbing and construction activities.

- **OM Guideline 6.3:** Implement current BAAQMD Table 5-3 Enhanced Best Management Practices for Construction-Related Fugitive Dust Emissions as necessary and as feasible for projects with construction emissions above the BAAQMD thresholds of significance, which may include the following measures:

  ― Limit the simultaneous occurrence of excavation, grading, and ground-disturbing construction activities.

  ― Install wind breaks (e.g., trees, fences) on the windward side(s) of actively disturbed areas of construction. Wind breaks should have at maximum 50 percent air porosity.

  ― Plant vegetative ground cover (e.g., fast-germinating native grass seed) in disturbed areas as soon as possible and watered appropriately until vegetation is established.

  ― Install sandbags or other erosion control measures to prevent silt runoff to public roadways from sites with a slope greater than one percent.

  ― Minimize the amount of excavated material or waste materials stored at the site.

  ― Hydroseed or apply non-toxic soil stabilizers to construction areas, including previously graded areas, that are inactive for at least 10 calendar days.

- **OM Guideline 6.4:** Implement San Joaquin Valley Air Pollution Control District (SJVAPCD) Regulation VIII control measures for construction emissions of respirable particulate matter with an aerodynamic diameter of 10 micrometers or less (PM_{10}), which includes the following requirements:

  ― All disturbed areas, including storage piles, that are not being actively utilized for construction purposes shall be effectively stabilized of dust emissions using water, chemical stabilizer/suppressant, and covered with a tarp or other suitable cover or vegetative ground cover.

  ― All on-site unpaved roads and off-site unpaved access roads shall be effectively stabilized of dust emissions using water or chemical stabilizer/suppressant.

  ― All land clearing, grubbing, scraping, excavation, land leveling, grading, cut and fill, and demolition activities shall be effectively controlled of fugitive dust emissions through application of water or presoaking.

  ― With the demolition of buildings up to six stories in height, all exterior surfaces of the building shall be wetted during demolition. When materials are transported off-site, all material shall be covered or effectively wetted to limit visible dust emissions, and at least 6 inches of freeboard space from the top of the container shall be maintained.

  ― All operations shall limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at the end of each workday. The use of dry rotary brushes is expressly prohibited except where preceded or accompanied by sufficient wetting to limit

the visible dust emissions. Use of blower devices is expressly forbidden. Following the addition of materials to or the removal of materials from the surface of outdoor storage piles, said piles shall be effectively stabilized of fugitive dust emissions utilizing sufficient water or chemical stabilizer/suppressant.

─ Within urban areas, trackout shall be immediately removed when it extends 50 or more feet from the site and at the end of each workday.

─ An owner/operator of any site with 150 or more vehicle trips per day, or 20 or more vehicle trips per day by vehicles with three or more axles, shall implement measures to prevent carryout and trackout.

- **OM Guideline 6.5:** Implement current SJVAPCD Emission Reduction Clean Air Measures as necessary for projects with construction emissions above the SJVAPCD thresholds of significance, which may include the following measures (note that this is not an exhaustive list):

─ Utilize the cleanest available off-road construction equipment, including the latest Tier diesel or electric equipment (e.g. scrapers, graders, trenchers, tractors, loaders, backhoes, etc.).

─ Utilize electric on-road vehicles and off-road vehicles and equipment to the extent feasible.

─ Limit traffic speeds on unpaved roads to 15 mph.

─ Install sandbags or other erosion control measures to prevent silt runoff to public roadways from sites with a slope greater than 1 percent.

─ Additional control measures (for projects that are large in area or located near sensitive receptors, or that for any other reason warrant additional emissions reductions):

─ Construct and maintain wind barriers sufficient to limit visible dust to 20% opacity on the construction site.

─ Utilize On-site water sprays or other dust suppression materials.

─ Suspend excavation and grading activity when winds exceed 20 mph.

─ Minimize idling time (e.g., 5-minute maximum).

─ Limit the hours of operation of heavy-duty equipment and/or the amount of equipment in use.

─ Curtail construction during periods of high ambient concentrations of pollutants; this may include ceasing construction activity during the peak hour of vehicular traffic on adjacent roadways.

─ Implement activity management (e.g., rescheduling activities to reduce short-term impacts).

- **OM Guideline 6.6:** Maintain a buffer of at least 250 feet around any non-State Park owned residential properties within the planning area during and after implementation of the General Plan.

- **OM Guideline 6.7:** Conduct an environmental analysis for all construction projects located within 1,000 feet of any residents (on-site or off-site) to assess potential air

quality health impacts of construction-related emissions on the existing residence(s). If any significant impacts (e.g., health risk thresholds) are determined pursuant to the applicable air district thresholds of significance (i.e., BAAQMD or SJVAPCD), the applicant and contractor shall implement all necessary measures to minimize emissions.

OM Goal 8: Manage the SVRA to maintain current aesthetic qualities and reduce visual impacts on surrounding areas that could result from construction, maintenance, and OHV recreation activities.

- **OM Guideline 8.1:** Design any new structures such that they are similar in height and scale to existing structures at the SVRA, and have an architectural style similar to the existing structures. Locate facilities with minimal impact on the viewshed. Utilize California native plant and tree species as necessary to screen new facilities from views.

California Department of Parks and Recreation
Carnegie State Vehicular Recreation Area
Resource Management Area Program EIR

Appendix D: Air Quality Emission Estimates and
Transportation Energy Calculations

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Carnegie SVRA RMA EIR

Operational Air Quality Emission Estimates and Transportation Energy Calculations
Prepared by: MIG, Inc.
November 2024

Contents:

Sheet 1: Emissions Summary

Table 1-1: 2019 Conditions: Annual Exhaust Emission Totals

Construction Phase / Source	AQ Emissions (short tons)					GHG Emissions (Metric tons)			
	ROG	CO	NOx	PM10 (Exh)	PM2.5 (Exh)	CO2	CH4	N2O	CO2e
Heavy-Duty Off-Road Equipment	0.0	0.2	0.1	0.0	0.0	10.3	0.0	0.0	10.4
Parks-Owned On- and Off-Road Vehicles	0.0	0.2	0.2	0.0	0.0	97.3	0.0	0.0	99.9
Small, Utility Off-Road Equipment	1.6	5.2	0.2	0.0	0.0	30.9	0.0	0.0	31.1
Worker and Vendor Trips	0.3	0.3	0.3	0.3	0.3	2.9	0.3	0.3	88.8
Total	1.9	5.9	0.9	0.3	0.3	141.4	0.3	0.3	230.1

Table 1-2: 2019 Conditions: Average Daily Exhaust Emission Totals

Construction Phase / Source	Emissions (pounds)				
	ROG	CO	NOx	PM10 (Exh)	PM2.5 (Exh)
Heavy-Duty Off-Road Equipment	0.0	1.4	0.9	0.0	0.0
Parks-Owned On- and Off-Road Vehicles	0.2	1.5	1.6	0.0	0.0
Small, Utility Off-Road Equipment	12.1	40.3	1.8	0.1	0.1
Worker and Vendor Trips	2.5	2.5	2.5	2.5	2.5
Total	14.9	45.7	6.8	2.6	2.6

Sheet 2: Off-Road Heavy-Duty Equipment Emissions

Table 2-1: Existing Heavy-Duty Equipment Annual Emissions

Equipment	Annual Runtime	Horsepower	Load Factor	Emission Factor (g/hp-hr)								Annual Emissions (short tons)							
				NOx	CO	ROG	PM10	PM2.5	CO2	CH4	N2O	NOx	CO	ROG	PM10	PM2.5	CO2	CH4	N2O
7130 TRACTOR	149.0	130	0.70	2.32	3.7	0.09	0.112	0.112	256.19	0.021	0.004	0.03	0.06	0.00	0.00	0.00	3.83	0.00	0.00
672G GRADER	68.0	255	0.41	1.29	2.6	0.06	0.009	0.009	215.47	0.021	0.004	0.01	0.02	0.00	0.00	0.00	1.69	0.00	0.00
430E BACKHOE	149.0	95	0.37	2.74	3.7	0.09	0.112	0.112	194.32	0.021	0.004	0.02	0.02	0.00	0.00	0.00	1.12	0.00	0.00
480 TRAIL DOZER	7.0	91	0.43	2.74	3.7	0.09	0.112	0.112	226.33	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00
750J DOZER	8.0	157	0.43	2.32	3.7	0.09	0.112	0.112	225.68	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.00
544K LOADER	167.0	163	0.36	2.15	3.7	0.08	0.009	0.009	190.18	0.021	0.004	0.02	0.04	0.00	0.00	0.00	2.05	0.00	0.00
E18B MINI EX	7.0	15	0.38	4.55	4.1	0.09	0.128	0.128	223.65	0.024	0.005	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
T190 SKID STEER	50.0	61	0.37	2.74	3.7	0.09	0.192	0.192	194.06	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00
500 TRAIL DOZER	0.0	80	0.43	2.74	3.7	0.09	0.192	0.192	226.52	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RENTAL KOBELCO	160.0	175	0.37	2.15	3.7	0.08	0.009	0.009	193.09	0.021	0.004	0.02	0.04	0.00	0.00	0.00	2.21	0.00	0.00
											Total	0.11	0.19	0.00	0.00	0.00	11.35	0.00	0.00

Sheet 3: Off-Road Heavy-Duty Equipment Emission Factors

Table 3-1: Equipment Category and Emissions Assignment (Default; No Runtime Hour Adjustment)

Equipment	Horsepower	Engine Tier	OFFROAD Category	HP_Bin	Load Factor	Default (Zero Hour) Emission Factors							
						ROG g_hp-hr	CO g_hp-hr	Nox g_hp-hr	PM10 g_hp-hr	PM2_5 g_hp-hr	Co2_g_hp-hr	CH4_g_hp-hr	N2O_g_hp-hr
7130 TRACTOR	130	3	Agricultural - Agricultural Tractors	175	0.70	0.090	3.700	2.320	0.112	0.112	256.1869078	0.021	0.004
672G GRADER	255	4	Construction and Mining - Graders	300	0.41	0.060	2.600	1.290	0.009	0.009	215.47	0.021	0.004
430E BACKHOE	95	3	Construction and Mining - Tractors/Loaders/Backh	100	0.37	0.090	3.700	2.740	0.112	0.112	194.3169133	0.021	0.004
480 TRAIL DOZER	91	3	Construction and Mining - Crawler Tractors	100	0.43	0.090	3.700	2.740	0.112	0.112	226.3270142	0.021	0.004
750J DOZER	157	3	Construction and Mining - Crawler Tractors	175	0.43	0.090	3.700	2.320	0.112	0.112	225.6829174	0.021	0.004
544K LOADER	163	4	Construction and Mining - Rubber Tired Loaders	175	0.36	0.080	3.700	2.150	0.009	0.009	190.1849419	0.021	0.004
E18B MINI EX	15	4	Construction and Mining - Excavators	50	0.38	0.090	4.100	4.550	0.128	0.128	223.6520186	0.024	0.005
T190 SKID STEER	61	3	Construction and Mining - Skid Steer Loaders	75	0.37	0.090	3.700	2.740	0.192	0.192	194.0642185	0.021	0.004
500 TRAIL DOZER	80	3	Construction and Mining - Crawler Tractors	75	0.43	0.090	3.700	2.740	0.192	0.192	226.5213249	0.021	0.004
RENTAL KOBELCO	175	4	Construction and Mining - Tractors/Loaders/Backh	175	0.37	0.080	3.700	2.150	0.009	0.009	193.0941923	0.021	0.004

Note: CH4 and N2O emission rates for standard OFFROAD2021 equipment profiles taken from CalEEMod. Load factors from CalEEMod / Carl Moyer.

Table 3-2: Equipment Category and Emissions Assignment (Runtime Hour Adjustment)

Equipment	Existing Runtime Hours on Equipment	Adjusted/Deteriorated Emission Factors							
		ROG g_hp-hr	CO g_hp-hr	Nox g_hp-hr	PM10 g_hp-hr	PM2_5 g_hp-hr	Co2_g_hp-hr	CH4_g_hp-hr	N2O_g_hp-hr
7130 TRACTOR	459.3	0.099	3.700	2.332	0.112	0.112	256.19	0.021	0.004
672G GRADER	1941.5	0.093	2.600	1.323	0.010	0.010	215.47	0.021	0.004
430E BACKHOE	2658.9	0.151	3.700	2.836	0.133	0.133	194.32	0.021	0.004
480 TRAIL DOZER	346.7	0.098	3.700	2.752	0.115	0.115	226.33	0.021	0.004
750J DOZER	4230.4	0.175	3.700	2.434	0.114	0.114	225.68	0.021	0.004
544K LOADER	1672.1	0.113	3.700	2.195	0.010	0.010	190.18	0.021	0.004
E18B MINI EX	2200	0.169	4.100	4.759	0.149	0.149	223.65	0.024	0.005
T190 SKID STEER	2140.9	0.139	3.700	2.817	0.222	0.222	194.06	0.021	0.004
500 TRAIL DOZER	1.4	0.090	3.700	2.740	0.192	0.192	226.52	0.021	0.004
RENTAL KOBELCO	4230.4	0.165	3.700	2.264	0.011	0.011	193.09	0.021	0.004

Sheet 4: U.S. EPA Tier III and Tier IV Emission Factors

Table 4-1: U.S. EPA Tier III Emission Standards

Maximum Horsepower	Assigned HP Bin	Emission Factors (g/hp-hr)				
		ROG	CO	NOx	PM10	PM2.5
25≤hp<50	50	--	--	--	--	--
50≤hp<75	75	0.09	3.7	2.74	0.192	0.192
75≤hp<100	100	0.09	3.7	2.74	0.112	0.112
100≤hp<175	175	0.09	3.7	2.32	0.112	0.112
175≤hp<300	300	0.09	2.6	2.32	0.088	0.088
300≤hp<600	600	0.09	2.6	2.32	0.088	0.088

CARB 2017 Table D-9 (pg. 235); and CalEEMod v2022.4.0 for CO.

Table 4-2: U.S EPA Tier III Controlled Off-Road Diesel Engine Deterioration Rates

Maximum Horsepower	Assigned HP Bin	Emission Factors (g/hp-hr)		
		ROG	NOx	PM
25≤hp<50	50	--	--	--
50≤hp<75	75	0.000023	0.000036	0.0000141
75≤hp<100	100	0.000023	0.000036	0.0000080
100≤hp<175	175	0.000020	0.000027	0.0000004
175≤hp<300	300	0.000023	0.000030	0.0000046
300≤hp<600	600	0.000023	0.000030	0.0000044

Table 4-3: U.S. EPA Tier IV (Interim) Emission Standards

Maximum Horsepower	Assigned HP Bin	Emission Factors (g/hp-hr)				
		ROG	CO	NOx	PM10	PM2.5
25≤hp<50	50	0.09	4.1	4.55	0.128	0.128
50≤hp<75	75	0.09	3.7	2.74	0.112	0.112
75≤hp<100	100	0.08	3.7	2.15	0.009	0.009
100≤hp<175	175	0.08	3.7	2.15	0.009	0.009
175≤hp<300	300	0.06	2.6	1.29	0.009	0.009
300≤hp<600	600	0.06	2.6	1.29	0.009	0.009

CARB 2017 Table D-9 (pg. 235); EFs for Tier IV (Phase-In or Alt. NOx) Used Where Option Exists and CalEEMod v2022.4.0 for CO.

Table 4-4: U.S. EPA Tier IV (Interim) Controlled Off-Road Diesel Engine Deterioration Rates

Maximum Horsepower	Assigned HP Bin	Emission Factors (g/hp-hr)		
		ROG	NOx	PM
25≤hp<50	50	0.000036	0.000095	0.0000096
50≤hp<75	75	0.000023	0.000036	0.0000080
75≤hp<100	100	0.000021	0.000027	0.0000009
100≤hp<175	175	0.000020	0.000027	0.0000004
175≤hp<300	300	0.000017	0.000017	0.0000003
300≤hp<600	600	0.000017	0.000017	0.0000003

Sheet 5: On-Site, On-Road Vehicles Emission Factors and Emissions

Table 5-1: 2019 On-Road Vehicle Emission Factor Assignment

Make	Model	Gross Vehicle Weight Rating (lbs)	Vehicle Class	Fuel	Emission Factors (tons / mi)							
					ROG	CO	NOx	PM10 (Exh)	PM2.5 (Exh)	CO2	CH4	N2O
RAM	4500 OPERATOR	16,500	MHDT	Diesel	2.95177E-07	9.75697E-07	5.88463E-06	1.44396E-07	1.38149E-07	0.001346682	1.37102E-08	2.11979E-07
INTERNATIONAL	TRANSPORT 9300	50,000	HHDT	Diesel	1.90897E-07	1.09968E-06	5.49052E-06	9.70054E-08	9.2809E-08	0.001941087	8.86668E-09	3.05544E-07
FORD	F350 RESOURCES	10,100 to 14,000	LHDT2	Diesel	2.29935E-07	6.46878E-07	2.40381E-06	5.03049E-08	4.81287E-08	0.000871754	1.068E-08	1.37222E-07
CHEVROLET	1500 ELIZ	6,700 to 7,300	MDV	Gasoline	3.12272E-07	2.93213E-06	3.62218E-07	2.36115E-09	2.17242E-09	0.000540153	3.32521E-08	2.40673E-08
FORD	F350 r FLATBED	10,100 to 14,000	LHDT2	Gasoline	4.39437E-07	3.19795E-06	6.71947E-07	2.39678E-09	2.20375E-09	0.001192808	3.66614E-08	4.39588E-08
RAM	2500 DAVID	10000	LHDT1	Gasoline	5.192E-07	3.61201E-06	7.43895E-07	2.76602E-09	2.54647E-09	0.001085672	4.29073E-08	4.73319E-08
INTERNATIONAL	WATER TRUCK	52000	HHDT	Diesel	1.90897E-07	1.09968E-06	5.49052E-06	9.70054E-08	9.2809E-08	0.001941087	8.86668E-09	3.05544E-07
FORD	F350 JOHN M	10,100 to 14,000	LHDT2	Gasoline	4.39437E-07	3.19795E-06	6.71947E-07	2.39678E-09	2.20375E-09	0.001192808	3.66614E-08	4.39588E-08
FORD	F250 ERIC	10,000 to 11,400	LHDT2	Gasoline	4.39437E-07	3.19795E-06	6.71947E-07	2.39678E-09	2.20375E-09	0.001192808	3.66614E-08	4.39588E-08
FORD	F250 JESSE/MIKE	10,000 to 11,400	LHDT2	Gasoline	4.39437E-07	3.19795E-06	6.71947E-07	2.39678E-09	2.20375E-09	0.001192808	3.66614E-08	4.39588E-08
INTERNATIONAL	DUMPTRUCK		HHDT	Diesel	1.90897E-07	1.09968E-06	5.49052E-06	9.70054E-08	9.2809E-08	0.001941087	8.86668E-09	3.05544E-07
FORD	F250 ROBERT	10,000 to 11,400	LHDT2	Gasoline	4.39437E-07	3.19795E-06	6.71947E-07	2.39678E-09	2.20375E-09	0.001192808	3.66614E-08	4.39588E-08

Table 5-2: 2019 On-Road Vehicle Emission Calculations

Make	Model	Annual VMT	Vehicle Class	Fuel	Emissions (tons)							
					ROG	CO	NOx	PM10 (Exh)	PM2.5 (Exh)	CO2	CH4	N2O
RAM	4500 (OPERATOR)	10030	MHDT	Diesel	0.002960625	0.009786245	0.059022834	0.00144829	0.001385637	13.50721678	0.000137513	0.002126154
INTERNATIONAL	TRANSPORT 9300	5231	HHDT	Diesel	0.000998583	0.005752402	0.028720917	0.000507435	0.000485484	10.15382653	4.63816E-05	0.001598301
FORD	F350 (RESOURCES)	11674	LHDT2	Diesel	0.002684257	0.007551654	0.02806206	0.000587259	0.000561854	10.17685284	0.000124679	0.001601926
CHEVROLET	1500 (ELIZ)	8944.5	MDV	Gasoline	0.002793114	0.026226466	0.003239856	2.11193E-05	1.94312E-05	4.831398293	0.000297424	0.00021527
FORD	F350 r FLATBED	1624	LHDT2	Gasoline	0.000713645	0.005193477	0.001091242	3.89236E-06	3.57888E-06	1.937119742	5.95381E-05	7.13892E-05
RAM	2500 (DAVID)	10158	LHDT1	Gasoline	0.005274036	0.036690831	0.007556488	2.80972E-05	2.58671E-05	11.02825438	0.000435852	0.000480797
INTERNATIONAL	WATER TRUCK	1382	HHDT	Diesel	0.00026382	0.001519751	0.007587901	0.000134061	0.000128262	2.682582347	1.22537E-05	0.000422262
FORD	F350 (JOHN M)	8588	LHDT2	Gasoline	0.003773882	0.027464026	0.005770681	2.05835E-05	1.89258E-05	10.24383272	0.000314848	0.000377519
FORD	F250 (ROBERT)	6797.5	LHDT2	Gasoline	0.002987071	0.02173809	0.00456756	1.62921E-05	1.498E-05	8.108110497	0.000249206	0.00029881
FORD	F250 (JESSE/MIKE)	4684	LHDT2	Gasoline	0.002058322	0.014979215	0.0031474	1.12265E-05	1.03223E-05	5.587111374	0.000171722	0.000205903
INTERNATIONAL	DUMPTRUCK	8572	HHDT	Diesel	0.00163637	0.009426418	0.047064749	0.00083153	0.000795559	16.63899847	7.60051E-05	0.002619124
FORD	F250 (KEITH)	10363	LHDT2	Gasoline	0.004553883	0.033140394	0.006963387	2.48378E-05	2.28374E-05	12.36106643	0.000379922	0.000455546
				Total	0.030697608	0.19946897	0.202795075	0.003634625	0.003472739	107.2563704	0.002305344	0.010473

Sheet 6: On-Site Small Equipment Emission Factors and Emissions

Table 6-1: On-site Small Equipment Category and Emission Factor Assignment

Make	Model	Horsepower	Fuel	OFFROAD Category	HP_Bin	Load Factor	ROG g_hp-hr	CO g_hp-hr	Nox g_hp-hr	PM10 g_hp-hr	PM2_5 g_hp-hr	Co2_g_hp-hr	CH4_g_hp-hr	N2O_g_hp-hr
											Emission Factors			
GATOR 1*	XUV 855D	24.6	Diesel	Agricultural - ATVs	25	1.00	18.648	81.654	72.908	3.811	3.506	10179.997	0.021	0.004
GATOR 2*	XUV 855D	24.6	Diesel	Agricultural - ATVs	25	1.00	18.648	81.654	72.908	3.811	3.506	10179.997	0.021	0.004
KUBOTA 1	RTV-X1100CWL-A	24	Diesel	Agricultural - ATVs	25	0.40	1.132	3.258	2.396	0.158	0.145	284.807	0.021	0.004
KUBOTA 2*	RTV-X1100CWL-A	24	Diesel	Agricultural - ATVs	25	1.00	18.648	81.654	72.908	3.811	3.506	10179.997	0.021	0.004
Gator 855*	XUV 855D	24.6	Diesel	Agricultural - ATVs	25	1.00	18.648	81.654	72.908	3.811	3.506	10179.997	0.021	0.004
Canycom 1	SC75	22.1	Gasoline	Construction and Mining - Paving Equipme	50	0.36	0.251	1.571	1.511	0.096	0.088	206.916	0.018	0.004
Canycom 2	SC75	22.1	Gasoline	Construction and Mining - Paving Equipme	50	0.36	0.251	1.571	1.511	0.096	0.088	206.916	0.018	0.004
Dewalt Generator	DXGNR4000	8	Gasoline	N/A; CalEEMod - Generator Sets	25	0.68	674.990	258.674	3.372	0.284	0.215	429.448	0.018	0.004
Dewalt Generator	DXGNR4000	8	Gasoline	N/A; CalEEMod - Generator Sets	25	0.68	674.990	258.674	3.372	0.284	0.215	429.448	0.018	0.004
Dewalt Generator	DXGNR4000	8	Gasoline	N/A; CalEEMod - Generator Sets	25	0.68	674.990	258.674	3.372	0.284	0.215	429.448	0.018	0.004
Gerenac Generator	GP8000E	13	Gasoline	N/A; CalEEMod - Generator Sets	25	0.68	674.990	258.674	3.372	0.284	0.215	429.448	0.018	0.004
Honda Generator	EU2200I	3.6	Gasoline	N/A; CalEEMod - Generator Sets	25	0.68	674.990	258.674	3.372	0.284	0.215	429.448	0.018	0.004
Honda Generator	EU2200I	3.6	Gasoline	N/A; CalEEMod - Generator Sets	25	0.68	674.990	258.674	3.372	0.284	0.215	429.448	0.018	0.004
Honda Generator	EG 2500	5.5	Gasoline	N/A; CalEEMod - Generator Sets	25	0.68	674.990	258.674	3.372	0.284	0.215	429.448	0.018	0.004
Ryobi Generator	RYI2322VNM	5	Gasoline	N/A; CalEEMod - Generator Sets	25	0.68	674.990	258.674	3.372	0.284	0.215	429.448	0.018	0.004
Ryobi Generator	RYI2322VNM	5	Gasoline	N/A; CalEEMod - Generator Sets	25	0.68	674.990	258.674	3.372	0.284	0.215	429.448	0.018	0.004
Echo Generator	EGI-3600LN	7	Gasoline	N/A; CalEEMod - Generator Sets	25	0.68	674.990	258.674	3.372	0.284	0.215	429.448	0.018	0.004
Honda Generator	EM6500SX	11.7	Gasoline	N/A; CalEEMod - Generator Sets	25	0.68	674.990	258.674	3.372	0.284	0.215	429.448	0.018	0.004
Jumping Jack	MTX-70	2.8	Gasoline	N/A; CalEEMod - Plate Compactor	25	0.55	994.174	229.329	4.855	2.346	1.773	429.441	0.018	0.004
Jumping Jack	MTR-40	2.8	Gasoline	N/A; CalEEMod - Plate Compactor	25	0.55	994.174	229.329	4.855	2.346	1.773	429.441	0.018	0.004
Vibroplate	WP 1550	4.15	Gasoline	N/A; CalEEMod - Plate Compactor	25	0.55	994.174	229.329	4.855	2.346	1.773	429.441	0.018	0.004
John Deere Mower	727A	23	Gasoline	Lawn and Garden - Misc - Rear Engine Rid Aggregate		1.00	52.758	2357.741	25.170	0.367	0.278	4990.505	0.367	0.278

Note: CH4 and N2O emission rates for standard OFFROAD2021 equipment profiles taken from CalEEMod. Load factors from CalEEMod / Carl Moyer.

* - Emission factors for Gator 1, Gator 2, Kubota 2, Gator 855, and John Deere Mower (727A) are based on emissions per gallon of fuel consumed (g / gal).

Table 6-2: Small Equipment Annual Emissions Estimates

Make	Model	Annual Runtime	Horsepower	Load Factor	Annual Emissions (tons)							
					ROG	CO	NOx	PM10 (Exh)	PM2.5 (Exh)	CO2	CH4	N2O
GATOR 1*	XUV 855D	321	24.6	1.00	0.006598574	0.028892807	0.025798045	0.001348396	0.001240525	3.602112761	7.43069E-06	1.41537E-06
GATOR 2*	XUV 855D	156.75	24.6	1.00	0.003222201	0.014108871	0.012597644	0.000658446	0.00060577	1.758975624	3.62854E-06	6.9115E-07
KUBOTA 1	RTV-X1100CWL-A	2593.8	24	0.40	0.031058417	0.089415463	0.065773341	0.004330083	0.003983677	7.817418136	0.00057641	0.000109792
KUBOTA 2*	RTV-X1100CWL-A	840	24	1.00	0.02	0.08	0.07	0.00	0.00	9.43	0.00	0.00
Gator 855*	XUV 855D	73	24.6	1.00	0.001490332	0.006525634	0.005826661	0.000304544	0.000280181	0.813561293	1.67827E-06	3.19671E-07
Canycom 1	SC75	77	22.1	0.36	0.000169601	0.001061006	0.001020041	6.49203E-05	5.97267E-05	0.139728179	1.21552E-05	2.70116E-06
Canycom 2	SC75	47.1	22.1	0.36	0.000103743	0.000649005	0.000623947	3.9711E-05	3.65341E-05	0.085470094	7.4352E-06	1.65227E-06
Dewalt Generator	DXGNR4000	63.8	8	0.68	0.258238824	0.09896394	0.001290066	0.000108653	8.22551E-05	0.164298947	6.88647E-06	1.53033E-06
Dewalt Generator	DXGNR4000	52.6	8	0.68	0.212905363	0.08159096	0.001063596	8.95793E-05	6.78153E-05	0.135456499	5.67756E-06	1.26168E-06
Dewalt Generator	DXGNR4000	6.2	8	0.68	0.025095309	0.009617185	0.000125367	1.05588E-05	7.99344E-06	0.015966355	6.69218E-07	1.48715E-07
Gerenac Generator	GP8000E	18.9	13	0.68	0.124312851	0.047639969	0.000621021	5.23043E-05	3.95965E-05	0.079091402	3.31506E-06	7.3668E-07
Honda Generator	EU2200I	35.4	3.6	0.68	0.064433218	0.024692511	0.000321884	2.71101E-05	2.05235E-05	0.040994261	1.71824E-06	3.81832E-07
Honda Generator	EU2200I	35.4	3.6	0.68	0.064433218	0.024692511	0.000321884	2.71101E-05	2.05235E-05	0.040994261	1.71824E-06	3.81832E-07
Honda Generator	EG 2500	35.4	5.5	0.68	0.098439638	0.03772467	0.000491768	4.14182E-05	3.13553E-05	0.062630121	2.6251E-06	5.83355E-07
Ryobi Generator	RYI2322VNM	35.4	5	0.68	0.08949058	0.034295154	0.000447062	3.76529E-05	2.85048E-05	0.056936474	2.38645E-06	5.30322E-07
Ryobi Generator	RYI2322VNM	35.4	5	0.68	0.08949058	0.034295154	0.000447062	3.76529E-05	2.85048E-05	0.056936474	2.38645E-06	5.30322E-07
Echo Generator	EGI-3600LN	35.4	7	0.68	0.125286812	0.048013216	0.000625887	5.2714E-05	3.99068E-05	0.079711064	3.34103E-06	7.42451E-07
Honda Generator	EM6500SX	35.4	11.7	0.68	0.209407957	0.080250661	0.001046125	8.81078E-05	6.67013E-05	0.133231349	5.58429E-06	1.24095E-06
Jumping Jack	MTX-70	9	2.8	0.55	0.015189037	0.003503699	7.41749E-05	3.58423E-05	2.7088E-05	0.00656102	2.75005E-07	6.11122E-08
Jumping Jack	MTR-40	9	2.8	0.55	0.015189037	0.003503699	7.41749E-05	3.58423E-05	2.7088E-05	0.00656102	2.75005E-07	6.11122E-08
Vibroplate	WP 1550	9	4.15	0.55	0.022512323	0.005192983	0.000109938	5.31234E-05	4.01483E-05	0.009724369	4.07596E-07	9.0577E-08
John Deere Mower*	727A	1725.1	23	1.00	0.100324667	4.483477964	0.04786322	0.000697755	0.000527844	9.489938566	0.000697755	0.000527844
				Total	1.574659576	5.233714407	0.234071813	0.011670037	0.010508495	34.02238774	0.001363204	0.000656401

Note: * - Assumes XUVs, RTVs, and mower consume one gallon of gas per hour runtime.

Sheet 7: Off-site Worker and Vendor Emission Factors

Table 7-1: Worker and Vendor Trips: Emissions Assignment

Trip Source	Reason	Number of Trips	Trip Distance	Total VMT	Vehicle Class	Fuel Type	Percent of Workers by Vehcile Class	Emission Factors (tons / mi)							
								ROG	CO	NOx	PM10 (Exh)	PM2.5 (Exh)	CO2	CH4	N2O
Worker Trips															
General Workers	N/A	50	19.4	336590	LDA	Agg	0.5	1.833E-07	1.833E-07	1.833E-07	1.833E-07	1.833E-07	1.833E-07	1.833E-07	1.833E-07
					LDT1	Agg	0.25	5.54E-07	5.54E-07	5.54E-07	5.54E-07	5.54E-07	5.54E-07	5.54E-07	5.54E-07
					LDT2	Agg	0.25	2.211E-07	2.211E-07	2.211E-07	2.211E-07	2.211E-07	2.211E-07	2.211E-07	2.211E-07
Vendor Trips															
Harkrader and Sons Trucking	3/4 in Road Base	19	60	1140	HHDT	Diesel	0.5	1.909E-07	1.1E-06	5.491E-06	9.701E-08	9.281E-08	0.0019411	8.867E-09	3.055E-07
Harkrader and Sons Trucking	Sand	6	60	360	HHDT	Diesel	0.5	1.909E-07	1.1E-06	5.491E-06	9.701E-08	9.281E-08	0.0019411	8.867E-09	3.055E-07

Table 7-2: Worker and Vendor Trips: Emissions Calculations

Trip Source	Reason	Number of Trips	Trip Distance	Total VMT	Vehicle Class	Fuel Type	Percent of Workers by Vehcile Class	Annual Emissions (tons)							
								ROG	CO	NOx	PM10 (Exh)	PM2.5 (Exh)	CO2	CH4	N2O
Worker Trips															
General Workers	N/A	50	19.4	336590	LDA	Agg	0.5	0.0616859	0.0616859	0.0616859	0.0616859	0.0616859	0.0616859	0.0616859	0.0616859
					LDT1	Agg	0.25	0.1864786	0.1864786	0.1864786	0.1864786	0.1864786	0.1864786	0.1864786	0.1864786
					LDT2	Agg	0.25	0.074406	0.074406	0.074406	0.074406	0.074406	0.074406	0.074406	0.074406
							Worker Sub-Total	0.3225706	0.3225706	0.3225706	0.3225706	0.3225706	0.3225706	0.3225706	0.3225706
Vendor Trips															
Harkrader and Sons Trucking	3/4 in Road Base	19	60	1140	HHDT	Diesel	0.5	0.0002176	0.0012536	0.0062592	0.0001106	0.0001058	2.2128393	1.011E-05	0.0003483
Harkrader and Sons Trucking	Sand	6	60	360	HHDT	Diesel	0.5	6.872E-05	0.0003959	0.0019766	3.492E-05	3.341E-05	0.6987913	3.192E-06	0.00011
							Vendor Sub-Total	0.0002863	0.0016495	0.0082358	0.0001455	0.0001392	2.9116306	1.33E-05	0.0004583

| | | | | | | | Total | 0.3228569 | 0.3242201 | 0.3308063 | 0.3227161 | 0.3227098 | 3.2342012 | 0.3225839 | 0.3230289 |

Sheet 8: OFFROAD Output

Model Output: OFFROAD2021 (v1.0.7) Emissions Inventory
Region Type: County
Region: San Joaquin
Calendar Year: 2019
Scenario: All Adopted Rules - Exhaust
Vehicle Classification: OFFROAD2021 Equipment Types
Units: tons/day for Emissions, gallons/year for Fuel, hours/year for Activity, Horsepower-hours/year for Horse

Region	Calendar Year	Vehicle Category	Model Year
San Joaquin	2019	Agricultural - Agricultural Tractors	Aggregate
San Joaquin	2019	Agricultural - Agricultural Tractors	Aggregate
San Joaquin	2019	Agricultural - Agricultural Tractors	Aggregate
San Joaquin	2019	Agricultural - Agricultural Tractors	Aggregate
San Joaquin	2019	Agricultural - Agricultural Tractors	Aggregate
San Joaquin	2019	Agricultural - Agricultural Tractors	Aggregate
San Joaquin	2019	Agricultural - ATVs	Aggregate
San Joaquin	2019	Agricultural - ATVs	Aggregate
San Joaquin	2019	Agricultural - ATVs	Aggregate
San Joaquin	2019	Agricultural - Bale Wagons (Self Propelled)	Aggregate
San Joaquin	2019	Agricultural - Bale Wagons (Self Propelled)	Aggregate
San Joaquin	2019	Agricultural - Balers (Self Propelled)	Aggregate
San Joaquin	2019	Agricultural - Combine Harvesters	Aggregate
San Joaquin	2019	Agricultural - Combine Harvesters	Aggregate
San Joaquin	2019	Agricultural - Construction Equipment	Aggregate
San Joaquin	2019	Agricultural - Construction Equipment	Aggregate
San Joaquin	2019	Agricultural - Construction Equipment	Aggregate
San Joaquin	2019	Agricultural - Construction Equipment	Aggregate
San Joaquin	2019	Agricultural - Construction Equipment	Aggregate
San Joaquin	2019	Agricultural - Forklifts	Aggregate
San Joaquin	2019	Agricultural - Forklifts	Aggregate
San Joaquin	2019	Agricultural - Forklifts	Aggregate
San Joaquin	2019	Agricultural - Forklifts	Aggregate
San Joaquin	2019	Agricultural - Hay Squeeze/Stack Retriever	Aggregate
San Joaquin	2019	Agricultural - Hay Squeeze/Stack Retriever	Aggregate
San Joaquin	2019	Agricultural - Hay Squeeze/Stack Retriever	Aggregate
San Joaquin	2019	Agricultural - Nut Harvester	Aggregate
San Joaquin	2019	Agricultural - Nut Harvester	Aggregate
San Joaquin	2019	Agricultural - Nut Harvester	Aggregate
San Joaquin	2019	Agricultural - Nut Harvester	Aggregate
San Joaquin	2019	Agricultural - Nut Harvester	Aggregate
San Joaquin	2019	Agricultural - Nut Harvester	Aggregate
San Joaquin	2019	Agricultural - Other Harvesters	Aggregate
San Joaquin	2019	Agricultural - Other Harvesters	Aggregate
San Joaquin	2019	Agricultural - Other Harvesters	Aggregate
San Joaquin	2019	Agricultural - Other Harvesters	Aggregate

San Joaquin	2019	Agricultural - Sprayers/Spray Rigs	Aggregate
San Joaquin	2019	Agricultural - Sprayers/Spray Rigs	Aggregate
San Joaquin	2019	Agricultural - Sprayers/Spray Rigs	Aggregate
San Joaquin	2019	Agricultural - Sprayers/Spray Rigs	Aggregate
San Joaquin	2019	Agricultural - Sprayers/Spray Rigs	Aggregate
San Joaquin	2019	Agricultural - Sprayers/Spray Rigs	Aggregate
San Joaquin	2019	Agricultural - Swathers/Windrowers/Hay Conditioners	Aggregate
San Joaquin	2019	Agricultural - Swathers/Windrowers/Hay Conditioners	Aggregate
San Joaquin	2019	Agricultural - Swathers/Windrowers/Hay Conditioners	Aggregate
San Joaquin	2019	Agricultural - Swathers/Windrowers/Hay Conditioners	Aggregate
San Joaquin	2019	Agricultural - Swathers/Windrowers/Hay Conditioners	Aggregate
San Joaquin	2019	Construction and Mining - Bore/Drill Rigs	Aggregate
San Joaquin	2019	Construction and Mining - Bore/Drill Rigs	Aggregate
San Joaquin	2019	Construction and Mining - Bore/Drill Rigs	Aggregate
San Joaquin	2019	Construction and Mining - Bore/Drill Rigs	Aggregate
San Joaquin	2019	Construction and Mining - Bore/Drill Rigs	Aggregate
San Joaquin	2019	Construction and Mining - Cranes	Aggregate
San Joaquin	2019	Construction and Mining - Cranes	Aggregate
San Joaquin	2019	Construction and Mining - Cranes	Aggregate
San Joaquin	2019	Construction and Mining - Cranes	Aggregate
San Joaquin	2019	Construction and Mining - Cranes	Aggregate
San Joaquin	2019	Construction and Mining - Cranes	Aggregate
San Joaquin	2019	Construction and Mining - Crawler Tractors	Aggregate
San Joaquin	2019	Construction and Mining - Crawler Tractors	Aggregate
San Joaquin	2019	Construction and Mining - Crawler Tractors	Aggregate
San Joaquin	2019	Construction and Mining - Crawler Tractors	Aggregate
San Joaquin	2019	Construction and Mining - Crawler Tractors	Aggregate
San Joaquin	2019	Construction and Mining - Excavators	Aggregate
San Joaquin	2019	Construction and Mining - Excavators	Aggregate
San Joaquin	2019	Construction and Mining - Excavators	Aggregate
San Joaquin	2019	Construction and Mining - Excavators	Aggregate
San Joaquin	2019	Construction and Mining - Excavators	Aggregate
San Joaquin	2019	Construction and Mining - Excavators	Aggregate
San Joaquin	2019	Construction and Mining - Graders	Aggregate
San Joaquin	2019	Construction and Mining - Graders	Aggregate
San Joaquin	2019	Construction and Mining - Graders	Aggregate
San Joaquin	2019	Construction and Mining - Graders	Aggregate
San Joaquin	2019	Construction and Mining - Graders	Aggregate
San Joaquin	2019	Construction and Mining - Misc - Bore/Drill Rigs	Aggregate
San Joaquin	2019	Construction and Mining - Misc - Cement And Mortar Mixers	Aggregate
San Joaquin	2019	Construction and Mining - Misc - Concrete/Industrial Saws	Aggregate
San Joaquin	2019	Construction and Mining - Misc - Concrete/Industrial Saws	Aggregate
San Joaquin	2019	Construction and Mining - Misc - Dumpers/Tenders	Aggregate
San Joaquin	2019	Construction and Mining - Misc - Excavators	Aggregate
San Joaquin	2019	Construction and Mining - Misc - Other	Aggregate
San Joaquin	2019	Construction and Mining - Misc - Pavers	Aggregate
San Joaquin	2019	Construction and Mining - Misc - Paving Equipment	Aggregate

San Joaquin	2019	Construction and Mining - Misc - Rollers	Aggregate
San Joaquin	2019	Construction and Mining - Misc - Rubber Tired Loaders	Aggregate
San Joaquin	2019	Construction and Mining - Misc - Signal Boards	Aggregate
San Joaquin	2019	Construction and Mining - Misc - Skid Steer Loaders	Aggregate
San Joaquin	2019	Construction and Mining - Misc - Tractors/Loaders/Backhoes	Aggregate
San Joaquin	2019	Construction and Mining - Misc - Trenchers	Aggregate
San Joaquin	2019	Construction and Mining - Off-Highway Tractors	Aggregate
San Joaquin	2019	Construction and Mining - Off-Highway Tractors	Aggregate
San Joaquin	2019	Construction and Mining - Off-Highway Tractors	Aggregate
San Joaquin	2019	Construction and Mining - Off-Highway Tractors	Aggregate
San Joaquin	2019	Construction and Mining - Off-Highway Tractors	Aggregate
San Joaquin	2019	Construction and Mining - Off-Highway Trucks	Aggregate
San Joaquin	2019	Construction and Mining - Off-Highway Trucks	Aggregate
San Joaquin	2019	Construction and Mining - Off-Highway Trucks	Aggregate
San Joaquin	2019	Construction and Mining - Off-Highway Trucks	Aggregate
San Joaquin	2019	Construction and Mining - Off-Highway Trucks	Aggregate
San Joaquin	2019	Construction and Mining - Pavers	Aggregate
San Joaquin	2019	Construction and Mining - Pavers	Aggregate
San Joaquin	2019	Construction and Mining - Pavers	Aggregate
San Joaquin	2019	Construction and Mining - Pavers	Aggregate
San Joaquin	2019	Construction and Mining - Pavers	Aggregate
San Joaquin	2019	Construction and Mining - Paving Equipment	Aggregate
San Joaquin	2019	Construction and Mining - Paving Equipment	Aggregate
San Joaquin	2019	Construction and Mining - Paving Equipment	Aggregate
San Joaquin	2019	Construction and Mining - Paving Equipment	Aggregate
San Joaquin	2019	Construction and Mining - Paving Equipment	Aggregate
San Joaquin	2019	Construction and Mining - Rollers	Aggregate
San Joaquin	2019	Construction and Mining - Rollers	Aggregate
San Joaquin	2019	Construction and Mining - Rollers	Aggregate
San Joaquin	2019	Construction and Mining - Rollers	Aggregate
San Joaquin	2019	Construction and Mining - Rollers	Aggregate
San Joaquin	2019	Construction and Mining - Rough Terrain Forklifts	Aggregate
San Joaquin	2019	Construction and Mining - Rough Terrain Forklifts	Aggregate
San Joaquin	2019	Construction and Mining - Rough Terrain Forklifts	Aggregate
San Joaquin	2019	Construction and Mining - Rough Terrain Forklifts	Aggregate
San Joaquin	2019	Construction and Mining - Rough Terrain Forklifts	Aggregate
San Joaquin	2019	Construction and Mining - Rubber Tired Dozers	Aggregate
San Joaquin	2019	Construction and Mining - Rubber Tired Dozers	Aggregate
San Joaquin	2019	Construction and Mining - Rubber Tired Dozers	Aggregate
San Joaquin	2019	Construction and Mining - Rubber Tired Dozers	Aggregate
San Joaquin	2019	Construction and Mining - Rubber Tired Dozers	Aggregate
San Joaquin	2019	Construction and Mining - Rubber Tired Loaders	Aggregate
San Joaquin	2019	Construction and Mining - Rubber Tired Loaders	Aggregate
San Joaquin	2019	Construction and Mining - Rubber Tired Loaders	Aggregate
San Joaquin	2019	Construction and Mining - Rubber Tired Loaders	Aggregate
San Joaquin	2019	Construction and Mining - Scrapers	Aggregate

San Joaquin	2019	Construction and Mining - Scrapers	Aggregate
San Joaquin	2019	Construction and Mining - Scrapers	Aggregate
San Joaquin	2019	Construction and Mining - Scrapers	Aggregate
San Joaquin	2019	Construction and Mining - Scrapers	Aggregate
San Joaquin	2019	Construction and Mining - Skid Steer Loaders	Aggregate
San Joaquin	2019	Construction and Mining - Skid Steer Loaders	Aggregate
San Joaquin	2019	Construction and Mining - Skid Steer Loaders	Aggregate
San Joaquin	2019	Construction and Mining - Skid Steer Loaders	Aggregate
San Joaquin	2019	Construction and Mining - Skid Steer Loaders	Aggregate
San Joaquin	2019	Construction and Mining - Surfacing Equipment	Aggregate
San Joaquin	2019	Construction and Mining - Surfacing Equipment	Aggregate
San Joaquin	2019	Construction and Mining - Surfacing Equipment	Aggregate
San Joaquin	2019	Construction and Mining - Surfacing Equipment	Aggregate
San Joaquin	2019	Construction and Mining - Surfacing Equipment	Aggregate
San Joaquin	2019	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate
San Joaquin	2019	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate
San Joaquin	2019	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate
San Joaquin	2019	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate
San Joaquin	2019	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate
San Joaquin	2019	Construction and Mining - Trenchers	Aggregate
San Joaquin	2019	Construction and Mining - Trenchers	Aggregate
San Joaquin	2019	Construction and Mining - Trenchers	Aggregate
San Joaquin	2019	Construction and Mining - Trenchers	Aggregate
San Joaquin	2019	Construction and Mining - Trenchers	Aggregate
San Joaquin	2019	Lawn and Garden - Misc - Rear Engine Riding Mowers	Aggregate
San Joaquin	2019	Agricultural - ATVs	Aggregate

power-hours

Horsepower	Fuel	HC_tpd	ROG_tpd	TOG_tpd	CO_tpd	NOx_tpd	CO2_tpd	PM10_tpd
25	Diesel	0.005024	0.006079	0.007234	0.0175	0.012873	1.529966	0.000847
50	Diesel	0.113719	0.1376	0.163755	0.411154	0.333973	37.02098	0.030234
75	Diesel	0.06305	0.07629	0.090792	0.299808	0.51379	41.21754	0.034058
100	Diesel	0.098399	0.119063	0.141695	0.64471	0.873689	100.8049	0.060295
175	Diesel	0.061761	0.074731	0.088936	0.522849	0.686879	86.02175	0.031473
300	Diesel	0.033382	0.040392	0.04807	0.179301	0.369676	68.77038	0.016387
25	Diesel	0.001874	0.002267	0.002698	0.009926	0.008863	1.237537	0.000463
50	Diesel	0.003076	0.003722	0.00443	0.019407	0.018304	2.683274	0.000964
175	Diesel	6.23E-05	7.53E-05	8.97E-05	0.000845	0.000762	0.153847	2.90E-05
175	Diesel	0.001565	0.001894	0.002254	0.011939	0.01739	1.902604	0.000824
300	Diesel	0.000176	0.000213	0.000254	0.000903	0.001973	0.279483	8.99E-05
75	Diesel	7.32E-05	8.86E-05	0.000105	0.000463	0.000651	0.072048	3.70E-05
175	Diesel	0.000707	0.000855	0.001018	0.005822	0.007877	0.951958	0.000354
300	Diesel	0.001301	0.001574	0.001873	0.006419	0.014348	2.033788	0.00066
50	Diesel	0.000172	0.000208	0.000247	0.000719	0.000595	0.078986	4.51E-05
75	Diesel	0.000501	0.000606	0.000722	0.003166	0.004455	0.4931	0.000253
100	Diesel	0.002223	0.00269	0.003201	0.013146	0.018983	1.988782	0.001355
175	Diesel	0.005986	0.007243	0.00862	0.045233	0.070037	7.663808	0.002953
300	Diesel	0.000995	0.001204	0.001433	0.004614	0.011488	1.345981	0.000521
50	Diesel	0.002449	0.002963	0.003526	0.010181	0.008702	1.103894	0.000659
75	Diesel	0.006728	0.008141	0.009689	0.042337	0.059693	6.594527	0.003419
100	Diesel	0.002251	0.002724	0.003241	0.01465	0.019398	2.271041	0.001338
175	Diesel	0.000429	0.00052	0.000618	0.003536	0.004769	0.577122	0.000216
75	Diesel	2.76E-05	3.34E-05	3.97E-05	0.000174	0.000245	0.027158	1.39E-05
175	Diesel	0.000408	0.000493	0.000587	0.003354	0.004397	0.53784	0.000207
300	Diesel	0.000694	0.000839	0.000999	0.003557	0.00777	1.100682	0.000354
25	Diesel	0.000664	0.000804	0.000956	0.002779	0.00235	0.305425	0.000133
50	Diesel	0.002937	0.003554	0.00423	0.011796	0.009672	1.198769	0.000786
75	Diesel	0.001115	0.001349	0.001605	0.007059	0.00988	1.095592	0.00057
100	Diesel	0.009226	0.011163	0.013285	0.056263	0.078691	8.498855	0.005701
175	Diesel	0.004162	0.005036	0.005993	0.032836	0.046313	5.29637	0.002145
300	Diesel	0.002761	0.003341	0.003976	0.012934	0.030253	3.590996	0.001447
75	Diesel	0.000943	0.001141	0.001358	0.005956	0.008383	0.927772	0.000476
100	Diesel	0.004229	0.005118	0.00609	0.026879	0.036299	4.131644	0.002552
175	Diesel	0.004258	0.005152	0.006132	0.033903	0.04741	5.486626	0.002182
300	Diesel	0.001519	0.001839	0.002188	0.007645	0.016889	2.393173	0.000773

25	Diesel	2.33E-05	2.82E-05	3.36E-05	9.75E-05	8.25E-05	0.010715	4.66E-06
50	Diesel	0.001127	0.001363	0.001622	0.004714	0.00392	0.516363	0.000297
75	Diesel	0.018512	0.0224	0.026657	0.104253	0.156448	15.37211	0.010653
100	Diesel	0.000898	0.001087	0.001293	0.00574	0.007715	0.884287	0.00054
175	Diesel	0.002856	0.003456	0.004113	0.022881	0.031791	3.708058	0.001459
300	Diesel	0.002503	0.003029	0.003604	0.011882	0.027512	3.356328	0.001307
50	Diesel	0.00083	0.001004	0.001195	0.003472	0.002876	0.381604	0.000218
75	Diesel	0.00054	0.000653	0.000777	0.003413	0.004797	0.531092	0.000273
100	Diesel	0.001997	0.002417	0.002876	0.013178	0.017216	2.042349	0.001191
175	Diesel	0.000454	0.00055	0.000654	0.003515	0.005052	0.562846	0.000237
300	Diesel	0.000946	0.001144	0.001362	0.00473	0.010487	1.484378	0.000481
50	Diesel	6.42E-05	7.77E-05	9.24E-05	0.000484	0.000508	0.064059	3.26E-05
75	Diesel	3.78E-05	4.58E-05	5.45E-05	0.000668	0.000743	0.102431	3.52E-05
100	Diesel	0.000132	0.00016	0.00019	0.001909	0.001817	0.296413	0.000103
175	Diesel	0.000132	0.000159	0.00019	0.002577	0.001769	0.463523	7.73E-05
300	Diesel	0.000155	0.000187	0.000223	0.001363	0.002498	0.663647	7.11E-05
25	Diesel	1.85E-06	2.24E-06	2.67E-06	1.05E-05	9.84E-06	0.001229	7.30E-07
50	Diesel	6.00E-05	7.26E-05	8.64E-05	0.000255	0.000208	0.01992	2.18E-05
75	Diesel	2.04E-05	2.46E-05	2.93E-05	8.50E-05	0.000187	0.00988	1.72E-05
100	Diesel	0.000547	0.000662	0.000788	0.003606	0.005789	0.447705	0.000416
175	Diesel	0.001251	0.001514	0.001802	0.009463	0.015681	1.378724	0.000848
300	Diesel	0.001615	0.001954	0.002325	0.008935	0.023531	2.42661	0.000989
50	Diesel	0.000206	0.000249	0.000297	0.00085	0.000656	0.064305	7.17E-05
75	Diesel	7.07E-05	8.55E-05	0.000102	0.000277	0.000678	0.023097	4.97E-05
100	Diesel	0.003287	0.003977	0.004733	0.021662	0.033624	2.829664	0.002819
175	Diesel	0.002524	0.003054	0.003635	0.019956	0.031794	3.103984	0.00177
300	Diesel	0.002263	0.002739	0.003259	0.014285	0.034557	3.309467	0.001383
25	Diesel	1.79E-06	2.16E-06	2.57E-06	6.07E-06	4.13E-06	0.000319	5.75E-07
50	Diesel	0.002317	0.002803	0.003336	0.020225	0.018474	2.578729	0.001101
75	Diesel	9.43E-05	0.000114	0.000136	0.001408	0.001573	0.200742	9.57E-05
100	Diesel	0.001603	0.00194	0.002309	0.021142	0.019814	3.146646	0.001239
175	Diesel	0.002755	0.003334	0.003968	0.041402	0.034209	7.06807	0.001657
300	Diesel	0.002741	0.003317	0.003947	0.019885	0.040678	9.13921	0.001235
50	Diesel	6.57E-05	7.95E-05	9.46E-05	0.00025	0.000179	0.016557	2.22E-05
75	Diesel	2.35E-05	2.84E-05	3.38E-05	0.00019	0.00024	0.025758	1.67E-05
100	Diesel	0.000669	0.000809	0.000963	0.003293	0.006281	0.355004	0.000523
175	Diesel	0.004053	0.004904	0.005837	0.029636	0.048414	4.319835	0.002718
300	Diesel	0.005	0.00605	0.0072	0.024118	0.077178	9.092025	0.002567
25	Diesel	2.18E-05	2.62E-05	3.13E-05	8.94E-05	0.000165	0.000239	5.55E-06
25	Diesel	6.55E-06	7.88E-06	9.42E-06	2.6E-05	4.82E-05	7.07E-05	1.89E-06
25	Diesel	4.23E-06	5.09E-06	6.08E-06	1.74E-05	3.21E-05	4.65E-05	1.08E-06
50	Diesel	1.74E-05	2.07E-05	2.50E-05	0.000129	0.000121	0.016271	6.77E-06
25	Diesel	3.06E-06	3.68E-06	4.40E-06	1.26E-05	2.33E-05	3.36E-05	8.02E-07
25	Diesel	2.19E-05	2.63E-05	3.15E-05	8.99E-05	0.000166	0.000241	5.60E-06
25	Diesel	1.13E-05	1.36E-05	1.63E-05	4.65E-05	8.60E-05	0.000124	2.89E-06
25	Diesel	5.75E-06	6.92E-06	8.27E-06	2.36E-05	4.38E-05	6.31E-05	1.52E-06
25	Diesel	9.78E-06	1.18E-05	1.41E-05	4.01E-05	7.43E-05	0.000107	2.49E-06

25	Diesel	6.90E-05	8.29E-05	9.91E-05	0.000283	0.000524	0.000758	1.76E-05
25	Diesel	3.57E-06	4.29E-06	5.13E-06	1.46E-05	2.71E-05	3.92E-05	9.12E-07
50	Diesel	7.58E-06	9.02E-06	1.09E-05	5.59E-05	5.27E-05	0.00707	2.91E-06
25	Diesel	0.001164	0.001401	0.001674	0.004725	0.008769	0.012708	0.000315
25	Diesel	0.000104	0.000126	0.00015	0.000428	0.000793	0.001146	2.71E-05
25	Diesel	0.000102	0.000122	0.000146	0.000418	0.000774	0.001119	2.60E-05
50	Diesel	0.001581	0.001913	0.002276	0.010094	0.008657	1.069582	0.000665
75	Diesel	0.000384	0.000464	0.000553	0.004812	0.004568	0.701226	0.000283
100	Diesel	0.000615	0.000744	0.000885	0.004912	0.006732	0.654512	0.000563
175	Diesel	0.000541	0.000655	0.000779	0.007112	0.00712	1.163898	0.000353
300	Diesel	0.000432	0.000523	0.000623	0.002735	0.006494	1.043908	0.000223
50	Diesel	0.000133	0.000161	0.000192	0.001	0.000846	0.098338	6.43E-05
75	Diesel	1.37E-05	1.66E-05	1.97E-05	0.000224	0.000133	0.030928	5.35E-06
100	Diesel	7.17E-05	8.67E-05	0.000103	0.000589	0.000723	0.076129	6.10E-05
175	Diesel	0.001251	0.001514	0.001801	0.01553	0.013247	2.442091	0.000701
300	Diesel	0.002411	0.002918	0.003472	0.013883	0.028367	4.980883	0.001131
50	Diesel	0.000141	0.000171	0.000203	0.000681	0.000592	0.070713	5.25E-05
75	Diesel	0.000199	0.000241	0.000287	0.001192	0.001877	0.163518	0.000168
100	Diesel	0.000317	0.000384	0.000457	0.003462	0.00404	0.512828	0.000268
175	Diesel	0.000455	0.000551	0.000655	0.005399	0.005914	0.93999	0.000295
300	Diesel	0.000217	0.000263	0.000313	0.001445	0.004264	0.74197	0.000121
50	Diesel	8.83E-05	0.000107	0.000127	0.000668	0.000643	0.088027	4.09E-05
75	Diesel	1.70E-05	2.05E-05	2.44E-05	0.00011	0.000179	0.013145	1.36E-05
100	Diesel	0.000223	0.00027	0.000321	0.002447	0.002627	0.365621	0.000178
175	Diesel	0.000177	0.000214	0.000255	0.00233	0.002187	0.398609	0.000117
300	Diesel	0.000103	0.000125	0.000149	0.00064	0.00169	0.28726	5.91E-05
50	Diesel	0.001987	0.002404	0.002861	0.011823	0.011493	1.451897	0.000864
75	Diesel	3.52E-05	4.26E-05	5.07E-05	0.000141	0.000347	0.012336	2.42E-05
100	Diesel	0.001463	0.001771	0.002107	0.015125	0.01759	2.256329	0.001155
175	Diesel	0.00085	0.001029	0.001224	0.013067	0.012028	2.346316	0.000552
300	Diesel	0.000148	0.00018	0.000214	0.001154	0.002371	0.388382	8.19E-05
50	Diesel	0.000105	0.000127	0.000151	0.000587	0.000572	0.073596	4.12E-05
75	Diesel	5.95E-06	7.19E-06	8.56E-06	2.42E-05	5.97E-05	0.002177	4.02E-06
100	Diesel	0.001432	0.001732	0.002062	0.034728	0.025795	5.678341	0.000937
175	Diesel	0.000702	0.00085	0.001011	0.007929	0.008017	1.366973	0.000534
300	Diesel	1.57E-05	1.90E-05	2.27E-05	0.000172	0.000281	0.093286	6.26E-06
50	Diesel	0.000111	0.000134	0.00016	0.000643	0.000494	0.064429	4.12E-05
75	Diesel	0.000109	0.000132	0.000157	0.00052	0.001042	0.053896	8.34E-05
100	Diesel	0.000333	0.000403	0.000479	0.001979	0.003157	0.241752	0.000279
175	Diesel	0.000315	0.000381	0.000453	0.001988	0.003752	0.263971	0.000217
300	Diesel	0.00032	0.000387	0.000461	0.001971	0.004168	0.292659	0.000202
50	Diesel	0.000456	0.000552	0.000657	0.002406	0.001873	0.201781	0.000178
100	Diesel	0.004637	0.005611	0.006678	0.037555	0.047239	4.902698	0.003793
175	Diesel	0.007426	0.008985	0.010693	0.074967	0.085586	11.65826	0.004731
300	Diesel	0.008139	0.009848	0.011721	0.043739	0.118025	16.8874	0.003974
50	Diesel	1.92E-05	2.32E-05	2.77E-05	6.56E-05	4.75E-05	0.004106	6.51E-06

75	Diesel	5.32E-05	6.44E-05	7.66E-05	0.000242	0.000511	0.026901	4.18E-05
100	Diesel	0.000178	0.000216	0.000257	0.001388	0.002154	0.18231	0.000163
175	Diesel	0.001758	0.002127	0.002531	0.014738	0.02195	2.227611	0.001181
300	Diesel	0.002027	0.002453	0.002919	0.010928	0.028533	2.558438	0.001256
50	Diesel	0.000689	0.000833	0.000992	0.00698	0.007	1.098597	0.000287
75	Diesel	0.001781	0.002155	0.002565	0.035346	0.028563	5.683031	0.001293
100	Diesel	4.32E-05	5.23E-05	6.22E-05	0.000935	0.000838	0.145547	5.42E-05
175	Diesel	1.05E-05	1.28E-05	1.52E-05	0.000214	0.000159	0.039394	6.92E-06
300	Diesel	5.57E-06	6.74E-06	8.02E-06	6.75E-05	8.47E-05	0.036582	2.39E-06
50	Diesel	9.01E-06	1.09E-05	1.30E-05	6.84E-05	7.39E-05	0.009871	4.26E-06
75	Diesel	6.32E-06	7.65E-06	9.11E-06	5.30E-05	8.99E-05	0.007539	5.66E-06
100	Diesel	2.82E-05	3.41E-05	4.06E-05	0.000393	0.000385	0.061052	2.07E-05
175	Diesel	3.29E-05	3.99E-05	4.74E-05	0.000307	0.000435	0.052187	2.37E-05
300	Diesel	4.01E-05	4.85E-05	5.78E-05	0.000299	0.000764	0.111882	2.40E-05
50	Diesel	0.002873	0.003476	0.004137	0.019658	0.017414	2.175922	0.001247
75	Diesel	0.001031	0.001247	0.001484	0.004148	0.009804	0.404438	0.000781
100	Diesel	0.018979	0.022965	0.02733	0.235328	0.23328	34.5049	0.015447
175	Diesel	0.002588	0.003131	0.003727	0.036144	0.032237	6.039825	0.001622
300	Diesel	0.001443	0.001746	0.002078	0.008861	0.022345	3.641767	0.000737
50	Diesel	0.001032	0.001249	0.001486	0.006396	0.006256	0.769393	0.000493
75	Diesel	8.03E-05	9.71E-05	0.000116	0.000454	0.000814	0.052923	5.58E-05
100	Diesel	0.000468	0.000567	0.000674	0.003579	0.005172	0.503934	0.000397
175	Diesel	8.29E-05	0.0001	0.000119	0.000729	0.001081	0.113782	5.55E-05
300	Diesel	0.000152	0.000183	0.000218	0.00084	0.0023	0.263361	9.19E-05
Aggregate	Gasoline	0.089202	0.090107	0.098191	4.026858	0.042989	8.523436	0.000627
25	Diesel	0.001874	0.002267	0.002698	0.009926	0.008863	1.237537	0.000463

PM2.5_tpd	SOx_tpd	NH3_tpd	Fuel Consumption	Total_Activity_hp	Total_Populati	Horsepowe
0.00078	1.38E-05	1.25E-05	49764.84808	31956.73144	129.7123776	1778768
0.027815	0.000335	0.000303	1204172.925	136462.5474	1569.244232	43041312
0.031334	0.000375	0.000337	1340673.479	146487.9116	1179.755825	47920315
0.055472	0.000919	0.000825	3278857.034	148943.9258	1703.003074	1.17E+08
0.028955	0.000785	0.000704	2798009.691	192536.2165	1015.207455	1.11E+08
0.015076	0.000628	0.000563	2236878.539	123387.862	326.4357801	88885951
0.000426	1.13E-05	1.01E-05	40253.07935	40444.06364	114.7326225	1726541
0.000887	2.45E-05	2.20E-05	87278.22754	37012.67041	161.5052306	3743552
2.67E-05	1.41E-06	1.26E-06	5004.15983	4024.771222	2.410095387	238618
0.000758	1.74E-05	1.56E-05	61885.56398	27911.28344	17.84710458	2360757
8.27E-05	2.55E-06	2.29E-06	9090.675169	10029.99547	2.282693043	346783.2
3.40E-05	6.57E-07	5.90E-07	2343.49944	1947.008809	1.3426777	80414.2
0.000326	8.69E-06	7.79E-06	30964.10925	2819.471394	11.52324548	1330980
0.000607	1.86E-05	1.66E-05	66152.54622	14501.71562	12.2707705	2843541
4.15E-05	7.17E-07	6.46E-07	2569.164531	4565.496109	2.575946783	110197
0.000233	4.50E-06	4.03E-06	16038.95421	14712.71501	13.35985029	687945.4
0.001247	1.81E-05	1.63E-05	64688.66223	27746.22098	42.15536686	2774636
0.002717	6.99E-05	6.27E-05	249278.9166	36256.63058	160.4900671	11886596
0.000479	1.23E-05	1.10E-05	43780.41883	19894.43286	10.96644093	2087622
0.000606	1.00E-05	9.03E-06	35906.10853	40195.80707	48.53773553	1540090
0.003145	6.01E-05	5.40E-05	214498.6637	75304.82805	169.4937071	9200311
0.001231	2.07E-05	1.86E-05	73869.64381	50085.45524	46.16456176	3168428
0.000198	5.27E-06	4.72E-06	18771.91072	11476.59628	9.084293804	895118.3
1.28E-05	2.48E-07	2.22E-07	883.3780646	7784.017112	0.602523843	36085.71
0.00019	4.91E-06	4.40E-06	17494.20174	11977.82019	7.336114078	794468.7
0.000326	1.00E-05	9.01E-06	35801.63754	9480.187037	9.266382261	1625869
0.000122	2.77E-06	2.50E-06	9934.478846	1942.990672	24.4883531	384117.4
0.000723	1.09E-05	9.81E-06	38992.08268	27278.63685	44.76932725	1507632
0.000524	9.99E-06	8.96E-06	35636.08562	16973.33234	22.29382603	1377872
0.005245	7.75E-05	6.95E-05	276440.3174	80931.63285	142.5749555	10688585
0.001974	4.83E-05	4.33E-05	172273.8154	66418.6996	70.91200366	7405121
0.001331	3.28E-05	2.94E-05	116803.5095	18530.24506	23.40926647	5020752
0.000438	8.46E-06	7.59E-06	30177.43345	19897.2205	19.47285734	1166813
0.002348	3.77E-05	3.38E-05	134389.0239	54411.08658	66.21597798	5196162
0.002007	5.01E-05	4.49E-05	178462.2224	59518.24549	71.60714518	7671128
0.000711	2.18E-05	1.96E-05	77842.19118	13141.47045	14.19221438	3346016

4.28E-06	9.73E-08	8.77E-08	348.5330002	5371.486593	1.047814796	14237.46
0.000273	4.69E-06	4.23E-06	16795.63118	27909.73644	22.13316002	686096.1
0.009801	0.00014	0.000126	500004.9396	35488.07312	449.6535432	20425039
0.000497	8.06E-06	7.24E-06	28762.98578	9901.030545	16.07993733	1174959
0.001342	3.38E-05	3.03E-05	120611.1386	58094.34009	46.27470715	5477345
0.001202	3.06E-05	2.75E-05	109170.5098	41461.89752	24.16407651	4957789
0.000201	3.47E-06	3.12E-06	12412.33812	2819.471394	11.52324548	443660
0.000251	4.84E-06	4.35E-06	17274.71021	6118.380241	11.99091797	617458
0.001096	1.86E-05	1.67E-05	66431.01011	17801.30427	29.47652411	2374474
0.000218	5.13E-06	4.61E-06	18307.57218	13408.82296	6.005945892	727480.7
0.000442	1.35E-05	1.21E-05	48282.00805	14441.02045	9.626772293	1918563
3.00E-05	5.92E-07	5.24E-07	2083.622916	1809.568808	5.271807258	71089.75
3.24E-05	9.48E-07	8.38E-07	3331.73649	1783.036617	3.773504142	130505.7
9.51E-05	2.74E-06	2.43E-06	9641.352047	4424.1512	12.31938117	375989.3
7.11E-05	4.29E-06	3.79E-06	15076.9141	3875.350551	12.70783013	576585.7
6.54E-05	6.15E-06	5.43E-06	21586.2935	4044.080616	12.87430825	838414
6.71E-07	1.13E-08	1.01E-08	39.98527593	96.58843013	0.209082772	2414.711
2.00E-05	1.83E-07	1.63E-07	647.9336241	939.5489822	2.230216232	38738.89
1.59E-05	9.10E-08	8.08E-08	321.3517526	311.7241863	0.836331087	21467.24
0.000383	4.13E-06	3.66E-06	14562.38437	11145.36813	26.06565222	981432.5
0.00078	1.27E-05	1.13E-05	44845.43729	20551.06961	46.62545811	3005060
0.00091	2.24E-05	1.99E-05	78929.79625	23913.77507	52.41008146	5298045
6.60E-05	5.90E-07	5.26E-07	2091.644952	2035.794831	6.185554263	84989.59
4.57E-05	2.12E-07	1.89E-07	751.2605522	470.1919442	2.226799535	33762.08
0.002593	2.61E-05	2.32E-05	92039.81979	47281.47976	104.1647338	4139873
0.001629	2.87E-05	2.54E-05	100962.5672	30513.14029	69.71119655	4554171
0.001272	3.06E-05	2.71E-05	107646.2689	23503.25984	55.60813283	4854759
5.29E-07	2.90E-09	2.61E-09	10.36757163	18.91356613	0.061979231	472.8392
0.001013	2.38E-05	2.11E-05	83877.74143	106753.3565	151.3532812	3817874
8.81E-05	1.86E-06	1.64E-06	6529.491843	4455.203163	6.197923063	329075.7
0.00114	2.91E-05	2.57E-05	102350.2396	63586.99964	102.7615644	5203652
0.001524	6.54E-05	5.78E-05	229901.4836	79693.02782	139.7011858	11636391
0.001137	8.46E-05	7.48E-05	297268.9737	68557.03417	122.4089805	15044437
2.05E-05	1.52E-07	1.35E-07	538.5603498	613.8965114	1.806210047	22922.06
1.54E-05	2.38E-07	2.11E-07	837.8091514	544.8014195	1.432511417	39773.93
0.000481	3.27E-06	2.90E-06	11547.13314	6138.62204	17.25242011	550022.3
0.0025	3.99E-05	3.53E-05	140510.2775	44625.27436	98.03360739	6637383
0.002362	8.41E-05	7.44E-05	295734.2204	64509.90864	87.88146126	13972211
4.19E-06	2.27E-09	1.96E-09	7.780291597	0	1.224098264	0
1.43E-06	6.71E-10	5.78E-10	2.298062271	0	0.853989966	0
8.17E-07	4.41E-10	3.80E-10	1.511512877	0	0.31611582	0
6.23E-06	2.05E-07	1.33E-07	529.25	383.25	0.64	12647.25
6.06E-07	3.19E-10	2.75E-10	1.093421749	0	0.441827089	0
4.23E-06	2.28E-09	1.97E-09	7.825721228	0	0.695645078	0
2.18E-06	1.18E-09	1.02E-09	4.043924583	0	0.904617096	0
1.15E-06	5.99E-10	5.16E-10	2.053186846	0	0.273254775	0
1.88E-06	1.02E-09	8.78E-10	3.495208405	0	0.681146489	0

1.33E-05	7.19E-09	6.19E-09	24.64494613	0	5.421917333	0
6.89E-07	3.72E-10	3.20E-10	1.274962527	0	0.160547358	0
2.68E-06	9.05E-08	5.78E-08	229.95	142.35	0.25	5266.95
0.000238	1.21E-07	1.04E-07	413.3387856	0	72.31047434	0
2.05E-05	1.09E-08	9.37E-09	37.28906554	0	5.090587338	0
1.97E-05	1.06E-08	9.15E-09	36.38984362	0	3.64933607	0
0.000612	9.87E-06	8.75E-06	34790.05255	36889.04217	58.03541961	1391704
0.00026	6.49E-06	5.74E-06	22808.61366	14385.77584	23.36093814	1013258
0.000518	6.05E-06	5.36E-06	21289.16263	11812.86908	18.77436651	942465.9
0.000325	1.08E-05	9.52E-06	37857.84693	10628.14624	16.08357783	1681351
0.000205	9.66E-06	8.54E-06	33954.96679	6953.787471	11.25238905	1510697
5.92E-05	9.08E-07	8.05E-07	3198.612435	5090.583137	3.271985168	145562.9
4.92E-06	2.86E-07	2.53E-07	1005.971701	716.9844806	0.484738543	51004.9
5.61E-05	7.03E-07	6.23E-07	2476.224151	1405.933072	1.15125404	125364.9
0.000645	2.26E-05	2.00E-05	79433.34116	25529.74737	18.84421087	4029978
0.00104	4.61E-05	4.08E-05	162012.0466	39079.02517	31.75037459	8233268
4.83E-05	6.51E-07	5.79E-07	2300.080928	2483.423465	7.258136999	96164.85
0.000155	1.51E-06	1.34E-06	5318.699475	3412.891507	9.375093624	248301.5
0.000247	4.74E-06	4.20E-06	16680.62318	9546.954129	25.34299502	778722.6
0.000272	8.70E-06	7.69E-06	30574.854	9025.948278	24.37524342	1421841
0.000111	6.87E-06	6.07E-06	24133.87674	5055.269333	11.67350367	1124071
3.76E-05	8.13E-07	7.20E-07	2863.22846	4061.355132	8.937306566	140867.2
1.25E-05	1.21E-07	1.08E-07	427.550933	336.8884402	0.905808098	23342.36
0.000164	3.38E-06	2.99E-06	11892.47874	7258.003324	16.30454576	645982.2
0.000107	3.69E-06	3.26E-06	12965.47073	4885.081962	10.99047159	707324
5.44E-05	2.66E-06	2.35E-06	9343.642798	2165.891973	4.770589316	508097.9
0.000795	1.34E-05	1.19E-05	47225.51386	61263.71739	183.4742973	2189086
2.22E-05	1.13E-07	1.01E-07	401.2652785	296.7122785	1.30653111	20610.3
0.001063	2.09E-05	1.85E-05	73391.11176	43347.34036	135.5681566	3780640
0.000508	2.17E-05	1.92E-05	76318.0761	27373.81531	79.13845581	3936574
7.53E-05	3.60E-06	3.18E-06	12632.81792	3011.605637	10.14117004	650855.8
3.79E-05	6.79E-07	6.02E-07	2393.824364	2175.732771	8.256817658	103463.7
3.70E-06	2.00E-08	1.78E-08	70.82421847	46.35108895	0.215395243	3414.53
0.000862	5.26E-05	4.65E-05	184698.0986	92360.39795	337.8833383	8871863
0.000491	1.26E-05	1.12E-05	44463.21771	17314.97923	66.48533175	2138273
5.76E-06	8.64E-07	7.63E-07	3034.294101	693.6843859	2.871936577	145833.8
3.79E-05	5.94E-07	5.27E-07	2095.670128	2222.484133	2.426889382	92161.75
7.68E-05	4.96E-07	4.41E-07	1753.051924	1204.100978	1.775772718	85220.18
0.000257	2.23E-06	1.98E-06	7863.42016	4525.893765	5.268125731	381133.2
0.0002	2.44E-06	2.16E-06	8586.118445	2838.978617	3.906699981	420189.5
0.000186	2.70E-06	2.39E-06	9519.245802	2135.102855	3.196390893	465671.4
0.000164	1.86E-06	1.65E-06	6563.286369	7567.678935	9.131073194	314723.8
0.00349	4.53E-05	4.01E-05	159468.9191	100286.0023	113.4597541	8605069
0.004353	0.000108	9.54E-05	379205.6379	135295.3448	148.8118145	20297676
0.003656	0.000156	0.000138	549292.7465	141083.9486	137.1511872	29425660
5.99E-06	3.75E-08	3.36E-08	133.5571821	126.4095756	0.366011689	4895.834

3.84E-05	2.48E-07	2.20E-07	875.0019609	520.423048	1.403044809	35017.56
0.00015	1.68E-06	1.49E-06	5929.94178	2645.058206	4.697150014	237553.3
0.001087	2.06E-05	1.82E-05	72456.99929	17243.44889	39.65126635	2893998
0.001155	2.37E-05	2.09E-05	83217.73267	14934.47483	38.43122739	3346041
0.000264	1.02E-05	8.99E-06	35733.82353	38568.03569	127.0357607	1680865
0.001189	5.26E-05	4.65E-05	184850.6562	137694.742	400.3169533	9696683
4.98E-05	1.35E-06	1.19E-06	4734.158613	3298.30035	9.636326912	250988.2
6.37E-06	3.65E-07	3.22E-07	1281.369592	442.8864679	1.700528279	67297.31
2.20E-06	3.39E-07	2.99E-07	1189.896006	304.5321491	1.07070299	62404.25
3.92E-06	9.12E-08	8.08E-08	321.0587714	502.1268156	2.17125058	18326.33
5.21E-06	6.97E-08	6.17E-08	245.2126036	235.6729093	0.91421077	15679.82
1.90E-05	5.65E-07	5.00E-07	1985.832478	1411.58253	5.370988276	126874.3
2.18E-05	4.83E-07	4.27E-07	1697.48372	792.5005151	3.25687587	108952.2
2.21E-05	1.04E-06	9.16E-07	3639.168337	1012.059037	4.285362987	233844.9
0.001147	2.01E-05	1.78E-05	70775.72003	88640.60207	177.7904616	3360040
0.000718	3.72E-06	3.31E-06	13155.0778	9519.496834	44.78832882	689366.6
0.014211	0.000319	0.000282	1122332.841	706281.8455	1162.390321	58797481
0.001492	5.59E-05	4.94E-05	196455.9872	72294.30294	135.0464133	10357232
0.000678	3.37E-05	2.98E-05	118454.9197	30181.50503	56.000898	6223137
0.000453	7.10E-06	6.30E-06	25025.87804	21662.50346	58.29917241	864838.6
5.13E-05	4.88E-07	4.33E-07	1721.416372	934.8510399	3.643698275	66013.95
0.000365	4.66E-06	4.12E-06	16391.3367	7505.593418	23.38591802	630274.3
5.11E-05	1.05E-06	9.31E-07	3700.963243	998.6389866	3.577449216	142991.5
8.45E-05	2.44E-06	2.16E-06	8566.278659	1455.007443	4.836181347	329133.4
0.000474	0.000146	0.000201	565534.0797	0	6373.309044	0
0.000426	1.13E-05	1.01E-05	40253.07935	40444.06364	114.7326225	1726541

Table 23-1: Conversions

Days/YR	lbs / ton	grams / lbs
365	2000	453.59237

r_Hours_hhpy	HC_g_hp-hr	TOG_g_hp-hr	NH3_g_hp-hr	ROG_g_hp-hr	CO_g_hp-hr
	0.935150782	1.346617059	0.002330501	1.131532355	3.257619043
	0.874852629	1.259787787	0.002330495	1.058571684	3.163064776
	0.435665238	0.627357938	0.002330494	0.527154938	2.071628481
	0.278010761	0.400335494	0.002330495	0.336393018	1.821519982
	0.183934279	0.264865363	0.002096303	0.222560478	1.557131564
	0.124356374	0.179073176	0.002096303	0.15047121	0.667939975
	0.359316464	0.517415815	0.001942078	0.434772976	1.903716121
	0.272106186	0.391832872	0.001942084	0.329248454	1.716539829
	0.086409092	0.124429103	0.001746921	0.104554928	1.1726069
	0.219532072	0.316126257	0.002183655	0.265633938	1.674551954
	0.168193117	0.242198929	0.002183652	0.20351455	0.862472398
	0.301459682	0.434101448	0.002427601	0.364766195	1.904573109
	0.17586399	0.253244315	0.001937901	0.21279552	1.448310062
	0.151496666	0.218155246	0.001937903	0.183310978	0.747455479
	0.516123296	0.743218748	0.00194208	0.62451024	2.159550736
	0.241167729	0.347281645	0.001942081	0.291813269	1.523658159
	0.265319684	0.382060235	0.001942076	0.321036695	1.56885488
	0.166751808	0.240122612	0.001746919	0.201769688	1.260042262
	0.157828862	0.227273429	0.001746924	0.190972795	0.731853885
	0.526485994	0.758140046	0.00194208	0.63704816	2.188853021
	0.242156057	0.348704708	0.001942079	0.293008843	1.523708061
	0.235240501	0.338746268	0.001942082	0.284640988	1.53103384
	0.15886116	0.228759819	0.001746919	0.192221682	1.308176875
	0.253226396	0.364645974	0.002039182	0.306404068	1.599844742
	0.169854366	0.244590121	0.001834265	0.205523637	1.397716778
	0.141282545	0.203446726	0.001834265	0.170951753	0.724476641
	0.572548688	0.824469662	0.002154397	0.692783541	2.39564485
	0.645100146	0.928944236	0.002154398	0.780571303	2.590666347
	0.26790632	0.385785332	0.002154399	0.324166801	1.696486415
	0.285805186	0.411559485	0.002154399	0.345824284	1.742980403
	0.186100765	0.267985082	0.001937904	0.225181916	1.468277134
	0.182091889	0.262212299	0.001937904	0.220331194	0.852990417
	0.267533685	0.385248586	0.002154398	0.323715764	1.690232789
	0.269520437	0.388109435	0.002154396	0.326119775	1.712851501
	0.183801096	0.264673565	0.001937904	0.222399332	1.463419401
	0.150363021	0.216522774	0.001937898	0.181939247	0.75657628

0.54192831	0.780378999	0.002039183	0.655734743	2.267528184
0.543731632	0.782973183	0.002039182	0.657915231	2.274880129
0.30011014	0.432158595	0.002039175	0.363133261	1.690105989
0.253136944	0.36451721	0.002039183	0.306295663	1.617697461
0.172666604	0.248639878	0.001834268	0.20892655	1.383226706
0.167171394	0.240726786	0.001834268	0.202277411	0.793546962
0.619348117	0.89186102	0.002330493	0.749411043	2.591460522
0.289486653	0.416860823	0.002330494	0.350278968	1.830382697
0.278518307	0.401066441	0.002330502	0.337007192	1.837712307
0.206859375	0.297877901	0.002096304	0.250300149	1.599814821
0.163188903	0.234991875	0.002096298	0.197458476	0.816326798
0.298957685	0.430498843	0.002441502	0.361738883	2.254588709
0.095984028	0.138216919	0.002126602	0.116140768	1.694057723
0.116184138	0.167305264	0.00213603	0.140583097	1.680815746
0.075636305	0.108916486	0.00217818	0.091520354	1.480029968
0.061104184	0.087990056	0.002144689	0.073936149	0.538487579
0.254321518	0.366224138	0.001379362	0.307729804	1.445951061
0.512932233	0.738622483	0.00139325	0.620648403	2.176145296
0.314127059	0.452341793	0.001246951	0.380093217	1.311765132
0.184612696	0.265842633	0.001235997	0.223381484	1.21666192
0.137869339	0.198531843	0.001243111	0.16682186	1.042675991
0.10091105	0.145311954	0.001240999	0.122102393	0.558420186
0.802653349	1.155821134	0.002050062	0.971211409	3.311906411
0.693408749	0.998504204	0.001853564	0.839025008	2.719921138
0.262876883	0.378542776	0.001851967	0.318081085	1.73262319
0.183532868	0.26428735	0.001846698	0.222074754	1.450932456
0.154368905	0.222291188	0.001847039	0.186786346	0.974324061
1.251613374	1.802317937	0.001826457	1.514451553	4.2528552
0.20091002	0.289310491	0.00183008	0.243101165	1.754111186
0.094862858	0.136602355	0.001652836	0.114784496	1.416919137
0.102028553	0.146921109	0.001638421	0.123454512	1.345351427
0.078401557	0.112898256	0.001645768	0.094865893	1.178119321
0.060327833	0.086872101	0.001645957	0.072996683	0.437668377
0.949051337	1.366633982	0.001957159	1.148351193	3.617114853
0.19560182	0.28166682	0.00175465	0.236678751	1.584684934
0.402683345	0.579863993	0.001748797	0.487246782	1.982576029
0.20220759	0.291178945	0.001763423	0.244671178	1.478444074
0.11849646	0.170634896	0.001763117	0.143380699	0.571559386
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#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0.455192052	0.655476974	0.003485867	0.541716269	3.389990976
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0.476740355	0.686505608	0.003636799	0.567360126	3.515494894
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#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0.376093471	0.541574485	0.002082346	0.455072965	2.401731062
0.125383689	0.180552669	0.001875097	0.15171445	1.572489623
0.215942843	0.310957511	0.001881644	0.261290865	1.725736524
0.106586778	0.153484889	0.001875609	0.128970003	1.400593064
0.094787308	0.136493653	0.00187228	0.114692614	0.59937186
0.302833546	0.43608058	0.001830441	0.366429342	2.275206289
0.089028965	0.128202176	0.00164293	0.107725196	1.453364397
0.189250077	0.272520829	0.001645352	0.22899272	1.554444778
0.10278006	0.148003332	0.001641891	0.124363937	1.276044437
0.096979599	0.139650653	0.001639153	0.117345318	0.558352097
0.485488596	0.699106195	0.001992378	0.587444093	2.344225807
0.265344448	0.382096752	0.001784317	0.321066836	1.589475602
0.134852684	0.194187661	0.001784327	0.163171399	1.471877109
0.105986158	0.152620254	0.001791258	0.128243473	1.257334147
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0.240855114	0.346831931	0.001525761	0.291434829	1.556061066
0.114260377	0.164534964	0.001533544	0.138255113	1.254196131
0.082816653	0.119255737	0.001526917	0.100207832	1.090654426
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0.565319541	0.814061039	0.001621786	0.684038315	2.270204363
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0.336336927	0.484325431	0.001927301	0.406965986	1.879528569
0.576588194	0.830287115	0.001727805	0.697671549	2.350584792
0.053432348	0.07694259	0.001734172	0.064653138	1.296134161
0.108722679	0.156560824	0.001732132	0.131554514	1.227844348
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0.248166755	0.357360284	0.001702147	0.300282404	1.566995118
0.227581911	0.327718294	0.001702815	0.275374696	1.401275083
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0.178444924	0.256960673	0.001543715	0.21591833	1.445099387
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0.502907165	0.724186506	0.00208146	0.608517244	2.28513103
0.24849793	0.357837186	0.002079386	0.300683652	1.935209497
0.201098756	0.289582296	0.002085581	0.243329591	1.686241621
0.200631184	0.288908953	0.002071716	0.242763764	1.081409591
0.13565822	0.195347781	0.001770891	0.164146294	1.375006574
0.060820477	0.087581488	0.001587971	0.073592789	1.207011457
0.057014705	0.082101244	0.001571217	0.068987784	1.233594544
0.051881526	0.074709712	0.001586066	0.06277702	1.054674403
0.02955475	0.042558856	0.001588324	0.035761227	0.358355126
0.162750229	0.234359796	0.001459331	0.196928069	1.235599322
0.133550067	0.19231208	0.001302707	0.161595693	1.119637245
0.073527712	0.105879884	0.001303809	0.088968604	1.025828656
0.100138549	0.144199571	0.001297821	0.121167659	0.934138163
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0.10688306	0.153911606	0.001590041	0.129328502	1.325267703
0.082738917	0.119144017	0.001580036	0.100114063	1.155539363
0.076792645	0.110581396	0.00158558	0.092919065	0.47146457
0.395185478	0.569067149	0.002410454	0.478174501	2.449024242
0.402685179	0.579868463	0.002172176	0.487249016	2.27755559
0.246005165	0.35424769	0.002166358	0.297666155	1.88027112
0.191876266	0.276302231	0.002156004	0.232170014	1.687104416
0.152422582	0.219488437	0.002168033	0.184431857	0.845422336
52.22812218	57.49148054	0.117476985	52.75806179	2357.741275
15.41185842	22.19308074	0.083299917	18.64835108	81.6544921

NOx_g_hp-hr	PM10_g_hp-hr	PM2.5_g_hp-hr	CO2_g_hp-hr	gal/hp-hr
2.396280028	0.157755266	0.14513486	284.8072268	0.027977
2.569294277	0.232594882	0.213987292	284.8072275	0.027977
3.550215291	0.235337217	0.216510239	284.8072268	0.027977
2.468460721	0.170354232	0.156725893	284.8072281	0.027977
2.045638995	0.093732235	0.086233658	256.1869078	0.025166
1.377134386	0.06104556	0.056161917	256.1869071	0.025166
1.699805599	0.088844355	0.081736852	237.3393558	0.023314
1.618970753	0.08529202	0.0784687	237.3393558	0.023314
1.056896234	0.040309386	0.037084724	213.4890887	0.020971
2.439084589	0.115610787	0.106361969	266.8613635	0.026214
1.883942805	0.085799229	0.078935268	266.8613607	0.026214
2.680543396	0.152236717	0.140057763	296.6741935	0.029143
1.959532246	0.08816871	0.081115273	236.8289235	0.023264
1.670830099	0.076864596	0.070715484	236.8289204	0.023264
1.78856937	0.135623554	0.124773742	237.339357	0.023314
2.144435447	0.121789573	0.112046195	237.3393563	0.023314
2.26543017	0.161746644	0.148806951	237.3393566	0.023314
1.951016836	0.08226712	0.075685758	213.4890889	0.020971
1.822177636	0.082609541	0.076000803	213.4890899	0.020971
1.871040813	0.141670796	0.130337184	237.3393589	0.023314
2.148385111	0.123041842	0.113198516	237.3393562	0.023314
2.02726909	0.139823355	0.128637466	237.3393576	0.023314
1.764281197	0.079736689	0.073357783	213.4890914	0.020971
2.251661888	0.127878568	0.117648246	249.2063265	0.02448
1.83266499	0.086111477	0.079222442	224.1635447	0.02202
1.582511662	0.072071364	0.066305581	224.1635444	0.02202
2.025985474	0.114404052	0.105251831	263.2866325	0.025863
2.124366132	0.172678819	0.158864478	263.2866327	0.025863
2.374315244	0.136871298	0.125921613	263.2866341	0.025863
2.437788961	0.176612453	0.162483456	263.2866337	0.025863
2.070903497	0.095935259	0.088260454	236.8289219	0.023264
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1.671386085	0.076498226	0.070378427	236.8289215	0.023264

1.917638637	0.108285656	0.099622841	249.2063203	0.02448
1.891693364	0.143452944	0.131976766	249.2063216	0.02448
2.536269955	0.172698265	0.158882404	249.2063224	0.02448
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1.921868045	0.088177907	0.081123696	224.1635452	0.02202
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2.146281952	0.162748263	0.149728313	284.807233	0.027977
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1.349738532	0.100059358	0.092054697	168.5709675	0.016559
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1.727810186	0.093413106	0.085940027	151.919219	0.014923
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2.689333221	0.225472258	0.20743441	226.3270142	0.022233
2.311634609	0.128713444	0.118416389	225.6829174	0.022169
2.357000765	0.094331616	0.086785128	225.7246549	0.022173
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1.583280435	0.096324794	0.088618863	201.9906148	0.019842
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2.001173602	0.139050171	0.127926158	214.4342705	0.021064
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1.334424718	0.076915451	0.070762352	178.343217	0.017519
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1.004156495	0.054027204	0.049705038	159.3369618	0.015652
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1.313735087	0.086991853	0.080032504	194.3169133	0.019088
1.030622558	0.051860245	0.047711444	193.0941923	0.018968
1.188953983	0.039232916	0.036094266	193.7721778	0.019035
2.39536474	0.188608075	0.173519475	294.5790843	0.028937
4.083190895	0.279732299	0.257353654	265.459243	0.026077
2.717386257	0.208480102	0.191801421	264.747851	0.026007
2.504145569	0.128576708	0.11829046	263.4827878	0.025882
2.314178955	0.092444803	0.085049279	264.9524037	0.026027
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0.00206438
0.001858386
0.001858125
0.001856802
0.001853871
0.002242336
0.002013247
0.002017182
0.002025899
0.002023985
0.001911699
0.001721109
0.001733725
0.001727157
0.001733203
0.00202662
0.001820135
0.001827898
0.0018272
0.001829213
0.002173092
0.001939907
0.001962812
0.001958855
0.001962222
0.002133698
0.001928366
0.001938127
0.001920692
0.001922072
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0.001759212
#DIV/0!
0.001758674
0.002535141

0.002342727
0.002348002
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0.001785799
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0.00179379
0.002718632
0.002448489
0.002446597
0.002436488
0.002451305
0.020744894

0.001603245

Sheet 9: On-Road Vehicle Operational Fuel Efficiency
EMFAC2021 San Joaquin Valley Fuel Efficiency Estimates for 2019

Table 9-1: 2019 San Joaquin Valley Average Vehicle Fuel Efficiency (Gasoline)

Vehicle Class	Population	Vehicle Miles Travelled Per Day	Gallons Per Day	Miles Per Gallon
HHDT	4.96	79.98	28.89	2.77
LDA	250,819.90	9,888,825.19	364,223.86	27.15
LDT1	25,055.36	794,541.98	35,033.70	22.68
LDT2	91,600.64	3,478,170.03	164,008.43	21.21
LHDT1	10,882.17	363,832.44	41,692.95	8.73
LHDT2	1,268.20	44,038.25	5,544.51	7.94
MCY	12,457.33	70,357.98	1,772.29	39.70
MDV	99,430.89	3,421,104.64	194,921.77	17.55
MH	1,909.44	16,666.55	3,783.59	4.40
MHDT	707.42	29,037.18	6,581.58	4.41
OBUS	217.02	10,394.65	2,279.53	4.56
SBUS	131.86	6,962.84	707.46	9.84
UBUS	46.84	3,529.22	751.16	4.70
TOTAL	494,532.04	18,127,540.93	821,329.72	22.07

Table 9-2: 2019 San Joaquin Valley Average Vehicle Fuel Efficiency (Diesel)

Vehicle Class	Population	Vehicle Miles Travelled Per Day	Gallons Per Day	Miles Per Gallon
HHDT	7,630.3	1,128,742.51	195,544.05	5.77
LDA	855.25	29,591.14	709.98	41.68
LDT1	9.96	127.01	5.17	24.57
LDT2	191.72	8,149.45	270.02	30.18
LHDT1	9,629.49	353,141.09	22,397.67	15.77
LHDT2	3,123.56	121,395.98	9,445.02	12.85
MCY	0.00	0.00	0.00	0.00
MDV	1,319.24	55,619.87	2,379.46	23.38
MH	661.40	6,088.22	646.60	9.42
MHDT	5,752.75	257,306.49	30,925.76	8.32
OBUS	85.82	5,710.50	851.57	6.71
SBUS	481.41	11,218.49	1,386.96	8.09
UBUS	105.03	7,613.93	936.60	8.13
TOTAL	29,845.94	1,984,704.67	265498.86	7.48

Table 9-3: 2019 San Joaquin Valley Average Vehicle Fuel Efficiency (Electricity)

Vehicle Class	Population	Vehicle Miles Travelled Per Day	Energy Consumption (kWh/day)	Miles Per kWh
HHDT	0.00	0.00	0.00	0.00
LDA	5,490.94	150,493.25	51,818.93	2.90
LDT1	12.17	244.87	94.27	2.60
LDT2	87.58	2,242.82	686.38	3.27
LHDT1	0.00	0.00	0.00	0.00
LHDT2	0.00	0.00	0.00	0.00
MCY	0.00	0.00	0.00	0.00
MDV	230.11	5,346.08	1,616.73	3.31
MH	0.00	0.00	0.00	0.00
MHDT	0.00	0.00	0.00	0.00
OBUS	0.00	0.00	0.00	0.00
SBUS	0.00	0.00	0.00	0.00
UBUS	17.16	766.36	1,335.95	0.57
TOTAL	5,837.97	159,093.38	55,552.26	2.86

Sheet 10: EMFAC Output

Source: EMFAC2021 (v1.0.2) Emissions Inventory
Region Type: County
Region: San Joaquin
Calendar Year: 2019
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for CVMT and EVMT, trips/day for Trips, kWh/day for Energy Consumption, tons/day for Emissi

Region	Calendar Ye	Vehicle Cat	Model Year	Speed	Fuel	Population	Total VMT	CVMT	EVMT
San Joaquin	2019	HHDT	Aggregate	Aggregate	Gasoline	4.962864	79.97847	79.97847	0
San Joaquin	2019	HHDT	Aggregate	Aggregate	Diesel	7630.297	1128743	1128743	0
San Joaquin	2019	HHDT	Aggregate	Aggregate	Natural Ga	147.2935	10785.66	10785.66	0
San Joaquin	2019	LDA	Aggregate	Aggregate	Gasoline	247576.4	9801060	9801060	0
San Joaquin	2019	LDA	Aggregate	Aggregate	Diesel	855.2539	29591.14	29591.14	0
San Joaquin	2019	LDA	Aggregate	Aggregate	Electricity	2247.417	75732.01	0	75732.01
San Joaquin	2019	LDA	Aggregate	Aggregate	Plug-in Hyb	3243.526	162526.5	87765.25	74761.24
San Joaquin	2019	LDT1	Aggregate	Aggregate	Gasoline	25055.22	794538.2	794538.2	0
San Joaquin	2019	LDT1	Aggregate	Aggregate	Diesel	9.963085	127.0077	127.0077	0
San Joaquin	2019	LDT1	Aggregate	Aggregate	Electricity	12.03766	241.6772	0	241.6772
San Joaquin	2019	LDT1	Aggregate	Aggregate	Plug-in Hyb	0.136498	6.966576	3.77499	3.191586
San Joaquin	2019	LDT2	Aggregate	Aggregate	Gasoline	91516.06	3475742	3475742	0
San Joaquin	2019	LDT2	Aggregate	Aggregate	Diesel	191.7219	8149.449	8149.449	0
San Joaquin	2019	LDT2	Aggregate	Aggregate	Electricity	2.997449	106.8214	0	106.8214
San Joaquin	2019	LDT2	Aggregate	Aggregate	Plug-in Hyb	84.58486	4564.133	2428.133	2136.001
San Joaquin	2019	LHDT1	Aggregate	Aggregate	Gasoline	10882.17	363832.4	363832.4	0
San Joaquin	2019	LHDT1	Aggregate	Aggregate	Diesel	9629.49	353141.1	353141.1	0
San Joaquin	2019	LHDT2	Aggregate	Aggregate	Gasoline	1268.204	44038.25	44038.25	0
San Joaquin	2019	LHDT2	Aggregate	Aggregate	Diesel	3123.565	121396	121396	0
San Joaquin	2019	MCY	Aggregate	Aggregate	Gasoline	12457.33	70357.98	70357.98	0
San Joaquin	2019	MDV	Aggregate	Aggregate	Gasoline	99201.78	3414847	3414847	0
San Joaquin	2019	MDV	Aggregate	Aggregate	Diesel	1319.242	55619.87	55619.87	0
San Joaquin	2019	MDV	Aggregate	Aggregate	Electricity	0.994846	24.40782	0	24.40782
San Joaquin	2019	MDV	Aggregate	Aggregate	Plug-in Hyb	229.1124	11579.09	6257.417	5321.671
San Joaquin	2019	MH	Aggregate	Aggregate	Gasoline	1909.437	16666.55	16666.55	0
San Joaquin	2019	MH	Aggregate	Aggregate	Diesel	661.3999	6088.215	6088.215	0
San Joaquin	2019	MHDT	Aggregate	Aggregate	Gasoline	707.4154	29037.18	29037.18	0
San Joaquin	2019	MHDT	Aggregate	Aggregate	Diesel	5752.752	257306.5	257306.5	0
San Joaquin	2019	MHDT	Aggregate	Aggregate	Natural Ga	36.04625	2326.429	2326.429	0
San Joaquin	2019	OBUS	Aggregate	Aggregate	Gasoline	217.0227	10394.65	10394.65	0
San Joaquin	2019	OBUS	Aggregate	Aggregate	Diesel	85.82029	5710.5	5710.5	0
San Joaquin	2019	OBUS	Aggregate	Aggregate	Natural Ga	1	77.87069	77.87069	0
San Joaquin	2019	SBUS	Aggregate	Aggregate	Gasoline	131.8601	6962.84	6962.84	0
San Joaquin	2019	SBUS	Aggregate	Aggregate	Diesel	481.4091	11218.49	11218.49	0
San Joaquin	2019	SBUS	Aggregate	Aggregate	Natural Ga	77.66497	2017.982	2017.982	0
San Joaquin	2019	UBUS	Aggregate	Aggregate	Gasoline	46.84354	3529.223	3529.223	0

San Joaquin	2019	UBUS	Aggregate	Aggregate	Diesel	105.0276	7613.928	7613.928	0
San Joaquin	2019	UBUS	Aggregate	Aggregate	Electricity	17.15976	766.3601	0	766.3601
San Joaquin	2019	UBUS	Aggregate	Aggregate	Natural Ga	27.65123	1307.033	1307.033	0

ions, 1000 gallons/day for Fuel Consumption

Trips	Energy Con	NOx_RUN	ENOx_IDLE	XNOx_STRE	XNOx_TOTE	PM2.5_RUN	PM2.5_IDL	PM2.5_STR	PM2.5_TOT
99.29698	0	0.002308	0	0.000267	0.002575	1.12E-06	0	2.94E-07	1.41E-06
124369.8	0	5.240832	0.701248	0.255305	6.197385	0.102974	0.001783	0	0.104757
1167.195	0	0.026696	0.002042	0	0.028737	5.31E-05	3.03E-06	0	5.61E-05
1150227	0	0.870713	0	0.441797	1.312511	0.016064	0	0.002922	0.018986
3768.692	0	0.012341	0	0	0.012341	0.000704	0	0	0.000704
11415.47	29238.8	0	0	0	0	0	0	0	0
13411.98	22580.12	0.000679	0	0.001687	0.002366	0.000165	0	3.75E-05	0.000203
108648.3	0	0.239225	0	0.075651	0.314875	0.002499	0	0.000509	0.003008
31.44554	0	0.000214	0	0	0.000214	3.34E-05	0	0	3.34E-05
51.78606	93.30734	0	0	0	0	0	0	0	0
0.564419	0.963954	2.92E-08	0	7.1E-08	1E-07	8.27E-09	0	1.88E-09	1.02E-08
423279.3	0	0.597237	0	0.268177	0.865414	0.006119	0	0.001092	0.007211
906.764	0	0.000942	0	0	0.000942	0.000129	0	0	0.000129
15.55676	41.24187	0	0	0	0	0	0	0	0
349.7584	645.1359	1.88E-05	0	4.4E-05	6.28E-05	5.27E-06	0	1.16E-06	6.42E-06
162128.1	0	0.139569	0.000494	0.13059	0.270653	0.000835	0	9.13E-05	0.000926
121126.9	0	1.108939	0.025819	0	1.134758	0.020992	0.000289	0	0.021281
18894.35	0	0.0147	5.72E-05	0.014834	0.029591	8.88E-05	0	8.26E-06	9.7E-05
39290.51	0	0.283586	0.008227	0	0.291813	0.005751	9.12E-05	0	0.005843
24914.66	0	0.055627	0	0.005229	0.060856	0.000141	0	9.72E-05	0.000238
452349.2	0	0.853481	0	0.383437	1.236918	0.006136	0	0.001283	0.007418
6364.118	0	0.008394	0	0	0.008394	0.000531	0	0	0.000531
4.593302	9.423432	0	0	0	0	0	0	0	0
947.3796	1607.303	4.84E-05	0	0.000119	0.000168	1.38E-05	0	3.17E-06	1.7E-05
191.0201	0	0.01073	0	8.28E-05	0.010813	3.63E-05	0	1.16E-07	3.64E-05
66.13999	0	0.036502	0	0	0.036502	0.000958	0	0	0.000958
14153.97	0	0.047275	6.71E-05	0.007613	0.054955	7.54E-05	0	2.32E-05	9.86E-05
69455.13	0	1.281015	0.176488	0.056651	1.514153	0.03427	0.001277	0	0.035547
344.6077	0	0.000249	0.000251	0	0.000499	3.49E-06	7.63E-07	0	4.25E-06
4342.191	0	0.01138	1.55E-05	0.002129	0.013524	9.76E-06	0	1.28E-06	1.1E-05
1020.08	0	0.044665	0.002505	0.000823	0.047992	0.001644	1.88E-05	0	0.001663
8.9	0	5.02E-06	1.62E-06	0	6.64E-06	1.45E-07	6.13E-09	0	1.51E-07
527.4402	0	0.00436	0.000133	0.000353	0.004846	1.98E-05	0	9.08E-07	2.08E-05
6970.803	0	0.069068	0.013578	0.003029	0.085675	0.000395	1.73E-05	0	0.000412
1124.589	0	0.001129	0.000449	0	0.001578	7.51E-06	1.02E-06	0	8.53E-06
187.3742	0	0.000682	0	0.000178	0.00086	4.25E-06	0	1.92E-07	4.45E-06

420.1104	0	0.031456	0	0	0.031456	6.53E-05	0	0	6.53E-05
68.63904	1335.953	0	0	0	0	0	0	0	0
110.6049	0	0.000979	0	0	0.000979	3.12E-06	0	0	3.12E-06

PM2.5_PM	PM2.5_PM	PM2.5_TOT	PM10_RUN	PM10_IDLE	PM10_STR	PM10_TOT	PM10_PM	PM10_PMB	PM10_TOT
4.41E-07	3.64E-06	5.49E-06	1.22E-06	0	3.2E-07	1.54E-06	1.76E-06	1.04E-05	1.37E-05
0.01101	0.035272	0.15104	0.10763	0.001864	0	0.109494	0.04404	0.100778	0.254312
0.000107	0.000556	0.000719	5.77E-05	3.3E-06	0	6.1E-05	0.000428	0.001589	0.002078
0.021608	0.032323	0.072917	0.01747	0	0.003177	0.020648	0.086431	0.092353	0.199431
6.52E-05	9.79E-05	0.000867	0.000735	0	0	0.000735	0.000261	0.00028	0.001276
0.000167	0.000127	0.000294	0	0	0	0	0.000668	0.000364	0.001032
0.000358	0.000255	0.000816	0.00018	0	4.07E-05	0.000221	0.001433	0.000727	0.002381
0.001752	0.003175	0.007934	0.002717	0	0.000554	0.00327	0.007007	0.009071	0.019348
2.8E-07	5.78E-07	3.42E-05	3.49E-05	0	0	3.49E-05	1.12E-06	1.65E-06	3.76E-05
5.33E-07	4.13E-07	9.45E-07	0	0	0	0	2.13E-06	1.18E-06	3.31E-06
1.54E-08	1.09E-08	3.64E-08	9E-09	0	2.05E-09	1.1E-08	6.14E-08	3.11E-08	1.04E-07
0.007663	0.013322	0.028195	0.006653	0	0.001187	0.00784	0.030651	0.038062	0.076553
1.8E-05	2.97E-05	0.000177	0.000135	0	0	0.000135	7.19E-05	8.5E-05	0.000292
2.36E-07	1.79E-07	4.15E-07	0	0	0	0	9.42E-07	5.12E-07	1.45E-06
1.01E-05	7.13E-06	2.36E-05	5.73E-06	0	1.26E-06	6.99E-06	4.02E-05	2.04E-05	6.76E-05
0.000802	0.010949	0.012677	0.000907	0	9.9E-05	0.001006	0.003208	0.031282	0.035497
0.001168	0.010627	0.033076	0.021941	0.000302	0	0.022243	0.004671	0.030363	0.057278
9.71E-05	0.001546	0.00174	9.66E-05	0	8.98E-06	0.000106	0.000388	0.004417	0.004911
0.000401	0.004262	0.010506	0.006011	9.53E-05	0	0.006107	0.001606	0.012177	0.01989
7.76E-05	0.000326	0.000641	0.00015	0	0.000103	0.000252	0.00031	0.000931	0.001493
0.007528	0.013491	0.028438	0.006669	0	0.001394	0.008063	0.030114	0.038545	0.076721
0.000123	0.000205	0.000859	0.000555	0	0	0.000555	0.00049	0.000586	0.001632
5.38E-08	4.17E-08	9.55E-08	0	0	0	0	2.15E-07	1.19E-07	3.34E-07
2.55E-05	1.81E-05	6.06E-05	1.5E-05	0	3.45E-06	1.84E-05	0.000102	5.17E-05	0.000172
5.51E-05	0.00029	0.000381	3.94E-05	0	1.25E-07	3.95E-05	0.00022	0.000828	0.001088
2.68E-05	0.000105	0.00109	0.001002	0	0	0.001002	0.000107	0.000301	0.00141
9.6E-05	0.000505	0.000699	8.15E-05	0	2.49E-05	0.000106	0.000384	0.001442	0.001932
0.000851	0.004475	0.040873	0.035819	0.001335	0	0.037154	0.003404	0.012785	0.053343
7.69E-06	4.09E-05	5.28E-05	3.79E-06	8.3E-07	0	4.62E-06	3.08E-05	0.000117	0.000152
3.44E-05	0.00018	0.000225	1.06E-05	0	1.39E-06	1.2E-05	0.000137	0.000514	0.000664
1.89E-05	0.000133	0.001814	0.001718	1.96E-05	0	0.001738	7.55E-05	0.000379	0.002193
2.58E-07	1.39E-06	1.79E-06	1.58E-07	6.67E-09	0	1.65E-07	1.03E-06	3.96E-06	5.15E-06
1.54E-05	0.000121	0.000157	2.12E-05	0	9.71E-07	2.22E-05	6.14E-05	0.000345	0.000428
3.71E-05	0.000194	0.000643	0.000412	1.81E-05	0	0.00043	0.000148	0.000555	0.001134
6.67E-06	3.5E-05	5.02E-05	8.17E-06	1.11E-06	0	9.28E-06	2.67E-05	9.99E-05	0.000136
1.17E-05	0.00015	0.000166	4.63E-06	0	2.09E-07	4.84E-06	4.67E-05	0.000428	0.000479

5.99E-05	0.000323	0.000448	6.82E-05	0	0	6.82E-05	0.00024	0.000923	0.001231
7.51E-06	1.63E-05	2.38E-05	0	0	0	0	3E-05	4.65E-05	7.65E-05
4.32E-06	5.52E-05	6.26E-05	3.26E-06	0	0	3.26E-06	1.73E-05	0.000158	0.000178

CO2_RUNE	CO2_IDLEX	CO2_STREX	CO2_TOTE	CH4_RUNE	CH4_IDLEX	CH4_STREX	CH4_TOTE	N2O_RUNE	N2O_IDLEX
0.267761	0	0.005922	0.273683	7.08E-05	0	0	7.08E-05	4.49E-05	0
2062.771	128.2169	0	2190.988	0.007472	0.002536	0	0.010008	0.324698	0.020182
18.58291	1.542974	0	20.12589	0.036272	0.005383	0	0.041655	0.003788	0.000315
3322.225	0	98.59336	3420.818	0.049941	0	0.125205	0.175146	0.077191	0
7.954985	0	0	7.954985	5.84E-05	0	0	5.84E-05	0.001252	0
0	0	0	0	0	0	0	0	0	0
28.85349	0	1.016623	29.87011	0.000103	0	0.000633	0.000735	0.000128	0
319.8256	0	12.08539	331.911	0.012709	0	0.02122	0.033929	0.015613	0
0.057922	0	0	0.057922	2E-06	0	0	2E-06	9.12E-06	0
0	0	0	0	0	0	0	0	0	0
0.001242	0	4.89E-05	0.00129	4.43E-09	0	2.67E-08	3.11E-08	5.52E-09	0
1505.744	0	47.25526	1552.999	0.022863	0	0.056892	0.079755	0.040962	0
3.025503	0	0	3.025503	1.27E-05	0	0	1.27E-05	0.000476	0
0	0	0	0	0	0	0	0	0	0
0.799123	0	0.031907	0.831029	2.86E-06	0	1.66E-05	1.95E-05	3.58E-06	0
388.9938	1.485998	4.522812	395.0026	0.006736	0.001469	0.007406	0.015611	0.007664	3.6E-05
249.4799	1.476414	0	250.9564	0.00446	5.41E-05	0	0.004514	0.03927	0.000232
51.77921	0.199115	0.550837	52.52916	0.000629	0.000173	0.000813	0.001615	0.000821	4.31E-06
105.064	0.763372	0	105.8274	0.001279	1.76E-05	0	0.001297	0.016538	0.00012
15.18541	0	1.605418	16.79083	0.017306	0	0.006133	0.023439	0.003558	0
1783.595	0	60.94442	1844.54	0.03233	0	0.081221	0.113551	0.05386	0
26.6608	0	0	26.6608	5.65E-05	0	0	5.65E-05	0.004197	0
0	0	0	0	0	0	0	0	0	0
2.058474	0	0.10745	2.165924	7.34E-06	0	4.47E-05	5.21E-05	9.13E-06	0
35.83907	0	0.006947	35.84601	0.000442	0	8.76E-06	0.000451	0.000601	0
7.244872	0	0	7.244872	4.49E-05	0	0	4.49E-05	0.00114	0
61.03761	0.434353	0.882522	62.35449	0.00187	0.000172	0.001083	0.003124	0.00194	4.18E-06
331.2167	15.29324	0	346.5099	0.00332	0.000207	0	0.003528	0.052136	0.002407
2.585105	0.217721	0	2.802825	0.001931	0.000645	0	0.002576	0.000527	4.44E-05
21.34139	0.09342	0.16169	21.5965	0.000317	4.51E-05	0.0002	0.000562	0.000501	1.14E-06
9.267422	0.274071	0	9.541492	0.000193	7.35E-06	0	0.0002	0.001459	4.31E-05
0.093309	0.001542	0	0.094851	7.4E-05	3.72E-06	0	7.77E-05	1.9E-05	3.14E-07
6.292691	0.375238	0.034619	6.702548	0.000354	0.000351	5.24E-05	0.000757	0.000224	1.28E-05
14.30201	1.238306	0	15.54031	4.85E-05	4.89E-06	0	5.34E-05	0.002251	0.000195
2.836452	0.360525	0	3.196976	0.007267	0.001283	0	0.00855	0.000578	7.35E-05
7.091139	0	0.025382	7.11652	1.54E-05	0	2.52E-05	4.06E-05	6.55E-05	0

10.4942	0	0	10.4942	2.85E-05	0	0	2.85E-05	0.001652	0
0	0	0	0	0	0	0	0	0	0
1.373591	0	0	1.373591	0.000987	0	0	0.000987	0.00028	0

N2O_STREX	N2O_TOTE	ROG_RUNE	ROG_IDLEX	ROG_STREX	ROG_TOTE	ROG_DIUR	ROG_HOTS	ROG_RUNL	ROG_TOTA
4.75E-06	4.97E-05	0.000477	0	0	0.000477	6.98E-05	1.91E-05	0.000171	0.000737
0	0.344881	0.160866	0.054607	0	0.215474	0	0	0	0.215474
0	0.004103	0.001541	0.000104	0	0.001645	0	0	0	0.001645
0.048513	0.125704	0.209127	0	0.618872	0.827998	0.496988	0.147895	0.365217	1.838098
0	0.001252	0.001257	0	0	0.001257	0	0	0	0.001257
0	0	0	0	0	0	0	0	0	0
0.000317	0.000445	0.000318	0	0.002519	0.002837	0.001981	0.000592	0.000537	0.005947
0.005982	0.021595	0.059599	0	0.119653	0.179252	0.124972	0.033793	0.102341	0.440357
0	9.12E-06	4.31E-05	0	0	4.31E-05	0	0	0	4.31E-05
0	0	0	0	0	0	0	0	0	0
1.34E-08	1.89E-08	1.37E-08	0	1.06E-07	1.2E-07	7.71E-08	2.03E-08	2.1E-08	2.38E-07
0.023066	0.064028	0.099709	0	0.288054	0.387763	0.187736	0.055642	0.139621	0.770763
0	0.000476	0.000273	0	0	0.000273	0	0	0	0.000273
0	0	0	0	0	0	0	0	0	0
8.38E-06	1.2E-05	8.81E-06	0	6.57E-05	7.45E-05	4.14E-05	1.18E-05	1.17E-05	0.000139
0.009521	0.017221	0.035373	0.005657	0.038648	0.079678	0.040457	0.011807	0.056959	0.188902
0	0.039503	0.096023	0.001165	0	0.097188	0	0	0	0.097188
0.001111	0.001936	0.003096	0.000654	0.004149	0.007899	0.004321	0.001179	0.005953	0.019352
0	0.016658	0.027535	0.000378	0	0.027913	0	0	0	0.027913
0.0003	0.003858	0.122035	0	0.047008	0.169043	0.067728	0.098777	0.103222	0.43877
0.028326	0.082186	0.150733	0	0.444752	0.595485	0.229287	0.067733	0.173855	1.06636
0	0.004197	0.001216	0	0	0.001216	0	0	0	0.001216
0	0	0	0	0	0	0	0	0	0
2.25E-05	3.16E-05	2.27E-05	0	0.000178	0.000201	0.000118	3.23E-05	3.35E-05	0.000384
8.16E-06	0.000609	0.002177	0	4.07E-05	0.002218	0.010988	0.00323	6.79E-05	0.016504
0	0.00114	0.000967	0	0	0.000967	0	0	0	0.000967
0.000437	0.002381	0.010663	0.00077	0.0073	0.018732	0.004518	0.001458	0.00966	0.034369
0	0.054544	0.071484	0.004467	0	0.075951	0	0	0	0.075951
0	0.000571	2.76E-05	9.21E-06	0	3.68E-05	0	0	0	3.68E-05
0.000146	0.000648	0.001557	0.000177	0.001093	0.002827	0.000696	0.000181	0.000723	0.004427
0	0.001502	0.004148	0.000158	0	0.004307	0	0	0	0.004307
0	1.93E-05	1.06E-06	5.32E-08	0	1.11E-06	0	0	0	1.11E-06
3.42E-05	0.000271	0.0024	0.001538	0.00033	0.004268	0.00032	0.000123	0.000243	0.004953
0	0.002446	0.001044	0.000105	0	0.001149	0	0	0	0.001149
0	0.000652	0.000104	1.83E-05	0	0.000122	0	0	0	0.000122
1.73E-05	8.28E-05	5.02E-05	0	0.000106	0.000156	2.76E-05	7.42E-06	1.95E-05	0.00021

0	0.001652	0.000614	0	0	0.000614	0	0	0	0.000614
0	0	0	0	0	0	0	0	0	0
0	0.00028	6.61E-05	0	0	6.61E-05	0	0	0	6.61E-05

TOG_RUNE	TOG_IDLEX	TOG_STREX	TOG_TOTE	TOG_DIURN	TOG_HOTS	TOG_RUNL	TOG_TOTA	CO_RUNEX	CO_IDLEX
0.000696	0	0	0.000696	6.98E-05	1.91E-05	0.000171	0.000956	0.02827	0
0.183134	0.062166	0	0.2453	0	0	0	0.2453	0.601934	0.639317
0.038183	0.005525	0	0.043708	0	0	0	0.043708	0.170553	0.010746
0.30494	0	0.677578	0.982519	0.496988	0.147895	0.365217	1.992618	12.84344	0
0.001431	0	0	0.001431	0	0	0	0.001431	0.014078	0
0	0	0	0	0	0	0	0	0	0
0.000465	0	0.002758	0.003223	0.001981	0.000592	0.000537	0.006333	0.048307	0
0.086565	0	0.131	0.217565	0.124972	0.033793	0.102341	0.478671	2.534214	0
4.91E-05	0	0	4.91E-05	0	0	0	4.91E-05	0.000246	0
0	0	0	0	0	0	0	0	0	0
2E-08	0	1.16E-07	1.36E-07	7.71E-08	2.03E-08	2.1E-08	2.55E-07	2.08E-06	0
0.14442	0	0.31537	0.45979	0.187736	0.055642	0.139621	0.842789	5.785256	0
0.000311	0	0	0.000311	0	0	0	0.000311	0.001838	0
0	0	0	0	0	0	0	0	0	0
1.29E-05	0	7.19E-05	8.48E-05	4.14E-05	1.18E-05	1.17E-05	0.00015	0.001341	0
0.0507	0.008247	0.042302	0.10125	0.040457	0.011807	0.056959	0.210473	0.746897	0.04482
0.109316	0.001326	0	0.110642	0	0	0	0.110642	0.28414	0.009657
0.004517	0.000955	0.004542	0.010014	0.004321	0.001179	0.005953	0.021468	0.071108	0.00523
0.031347	0.00043	0	0.031777	0	0	0	0.031777	0.075396	0.003132
0.142731	0	0.05107	0.193801	0.067728	0.098777	0.103222	0.463528	1.313761	0
0.215353	0	0.486907	0.70226	0.229287	0.067733	0.173855	1.173135	6.914948	0
0.001384	0	0	0.001384	0	0	0	0.001384	0.017902	0
0	0	0	0	0	0	0	0	0	0
3.31E-05	0	0.000195	0.000228	0.000118	3.23E-05	3.35E-05	0.000412	0.003451	0
0.003059	0	4.45E-05	0.003103	0.010988	0.00323	6.79E-05	0.017389	0.057985	0
0.001101	0	0	0.001101	0	0	0	0.001101	0.003361	0
0.014922	0.001111	0.007972	0.024004	0.004518	0.001458	0.00966	0.03964	0.247261	0.011459
0.081379	0.005085	0	0.086464	0	0	0	0.086464	0.199972	0.051082
0.001971	0.000658	0	0.002628	0	0	0	0.002628	0.00749	0.001481
0.002272	0.000259	0.001196	0.003727	0.000696	0.000181	0.000723	0.005327	0.035811	0.001374
0.004723	0.00018	0	0.004903	0	0	0	0.004903	0.01052	0.001363
7.55E-05	3.8E-06	0	7.93E-05	0	0	0	7.93E-05	0.000296	1.22E-05
0.003038	0.002224	0.00036	0.005622	0.00032	0.000123	0.000243	0.006307	0.05965	0.01182
0.001188	0.00012	0	0.001308	0	0	0	0.001308	0.003005	0.001971
0.007416	0.00131	0	0.008726	0	0	0	0.008726	0.024135	0.001876
7.32E-05	0	0.000116	0.000189	2.76E-05	7.42E-06	1.95E-05	0.000243	0.000959	0

0.000699	0	0	0.000699	0	0	0	0.000699	0.002324	0
0	0	0	0	0	0	0	0	0	0
0.001066	0	0	0.001066	0	0	0	0.001066	0.006867	0

CO_STREX	CO_TOTEX	SOx_RUNE	SOx_IDLEX	SOx_STREX	SOx_TOTEX	NH3_RUNE	Fuel Consumption
0.000351	0.028622	2.65E-06	0	5.86E-08	2.71E-06	1.95E-06	0.028888
0	1.24125	0.019516	0.001213	0	0.020729	0.222182	195.544
0	0.181299	0	0	0	0	0.010387	2.326246
5.751445	18.59489	0.032875	0	0.000976	0.033851	0.327392	361.071
0	0.014078	7.53E-05	0	0	7.53E-05	0.000101	0.709977
0	0	0	0	0	0	0	0
0.019366	0.067673	0.000286	0	1.01E-05	0.000296	0.003329	3.152822
1.135711	3.669925	0.003165	0	0.00012	0.003284	0.032919	35.03356
0	0.000246	5.48E-07	0	0	5.48E-07	4.34E-07	0.00517
0	0	0	0	0	0	0	0
8.15E-07	2.9E-06	1.23E-08	0	4.84E-10	1.28E-08	1.75E-07	0.000136
2.612784	8.39804	0.0149	0	0.000468	0.015368	0.122861	163.9207
0	0.001838	2.86E-05	0	0	2.86E-05	2.78E-05	0.270024
0	0	0	0	0	0	0	0
0.000505	0.001846	7.91E-06	0	3.16E-07	8.22E-06	0.000111	0.087716
0.52245	1.314168	0.003849	1.47E-05	4.48E-05	0.003909	0.017944	41.69295
0	0.293797	0.002362	1.4E-05	0	0.002376	0.050097	22.39767
0.064495	0.140832	0.000512	1.97E-06	5.45E-06	0.00052	0.002182	5.544509
0	0.078528	0.000995	7.23E-06	0	0.001002	0.020398	9.445018
0.233917	1.547678	0.00015	0	1.59E-05	0.000166	0.000648	1.77229
3.097839	10.01279	0.01765	0	0.000603	0.018253	0.119423	194.6932
0	0.017902	0.000252	0	0	0.000252	0.00019	2.379457
0	0	0	0	0	0	0	0
0.001368	0.004819	2.04E-05	0	1.06E-06	2.14E-05	0.00029	0.228616
0.000815	0.058801	0.000355	0	6.87E-08	0.000355	0.000816	3.783585
0	0.003361	6.86E-05	0	0	6.86E-05	0.000723	0.6466
0.12513	0.38385	0.000604	4.3E-06	8.73E-06	0.000617	0.001413	6.581583
0	0.251053	0.003134	0.000145	0	0.003278	0.037677	30.92576
0	0.008971	0	0	0	0	0.002718	0.323964
0.023072	0.060257	0.000211	9.24E-07	1.6E-06	0.000214	0.000515	2.279533
0	0.011884	8.77E-05	2.59E-06	0	9.03E-05	0.00074	0.851571
0	0.000308	0	0	0	0	9.1E-05	0.010963
0.005926	0.077396	6.23E-05	3.71E-06	3.43E-07	6.63E-05	0.00033	0.707461
0	0.004976	0.000135	1.17E-05	0	0.000147	0.001359	1.386961
0	0.026012	0	0	0	0	0.002358	0.369522
0.002146	0.003105	7.02E-05	0	2.51E-07	7.04E-05	0.000175	0.751156

0	0.002324	9.93E-05	0	0	9.93E-05	0.001084	0.9366
0	0	0	0	0	0	0	0
0	0.006867	0	0	0	0	0.001398	0.158766

Carnegie SVRA RMA EIR

Operational Air Quality Emission Estimates and Transportation Energy Calculations
Prepared by: MIG, Inc.
November 2024

Contents:

Sheet 1: Emission Summary

Table 1-1: 2020 Conditions: Annual Exhaust Emission Totals

Construction Phase / Source	AQ Emissions (short tons)					GHG Emissions (Metric tons)			
	ROG	CO	NOx	PM10 (Exh)	PM2.5 (Exh)	CO2	CH4	N2O	CO2e
Heavy-Duty Off-Road Equipment	0.0	0.3	0.2	0.0	0.0	38.6	0.0	0.0	38.7
Parks-Owned On- and Off-Road Vehicles	0.0	0.2	0.1	0.0	0.0	82.3	0.0	0.0	84.1
Small, Utility Off-Road Equipment	1.6	5.3	0.3	0.0	0.0	35.8	0.0	0.0	36.0
Worker and Vendor Trips	0.4	0.4	0.4	0.4	0.4	3.0	0.3	0.3	96.4
Total	2.0	6.2	0.9	0.4	0.4	159.7	0.3	0.3	255.3

Table 1-2: 2020 Conditions: Average Daily Exhaust Emission Totals

Construction Phase / Source	Emissions (pounds)				
	ROG	CO	NOx	PM10 (Exh)	PM2.5 (Exh)
Heavy-Duty Off-Road Equipment	0.1	2.4	1.4	0.0	0.0
Parks-Owned On- and Off-Road Vehicles	0.2	1.6	0.9	0.0	0.0
Small, Utility Off-Road Equipment	12.2	40.8	2.1	0.1	0.1
Worker and Vendor Trips	2.7	2.7	2.8	2.7	2.7
Total	15.2	47.4	7.2	2.8	2.8

Sheet 2: Off-Road Heavy-Duty Equipment Emissions

Table 2-1: Existing Heavy-Duty Equipment Annual Emissions

Equipment	Annual Runtime	Horsepower	Load Factor	Emission Factor (g/hp-hr)								Emissions (short tons)							
				NOx	CO	ROG	PM10	PM2.5	CO2	CH4	N2O	NOx	CO	ROG	PM10	PM2.5	CO2	CH4	N2O
7130 TRACTOR	149.0	130	0.70	2.32	3.7	0.09	0.112	0.112	256.187	0.021	0.004	0.03	0.06	0.00	0.00	0.00	3.83	0.00	0.00
672G GRADER	68.0	255	0.41	1.29	2.6	0.06	0.009	0.009	514.029	0.021	0.004	0.01	0.02	0.00	0.00	0.00	4.03	0.00	0.00
430E BACKHOE	149.0	95	0.37	2.74	3.7	0.09	0.112	0.112	571.454	0.021	0.004	0.02	0.02	0.00	0.00	0.00	3.30	0.00	0.00
480 TRAIL DOZER	7.0	91	0.43	2.74	3.7	0.09	0.112	0.112	571.454	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00
750J DOZER	8.0	157	0.43	2.32	3.7	0.09	0.112	0.112	514.029	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.31	0.00	0.00
544K LOADER	167.0	163	0.36	2.15	3.7	0.08	0.009	0.009	571.454	0.021	0.004	0.02	0.04	0.00	0.00	0.00	6.17	0.00	0.00
E18B MINI EX	7.0	15	0.38	4.55	4.1	0.09	0.128	0.128	571.454	0.024	0.005	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00
T190 SKID STEER	50.0	61	0.37	2.74	3.7	0.09	0.192	0.192	571.454	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.71	0.00	0.00
500 TRAIL DOZER	0.0	80	0.43	2.74	3.7	0.09	0.192	0.192	571.454	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RENTAL KOBELCO	200.0	175	0.37	2.15	3.7	0.08	0.009	0.009	514.029	0.021	0.004	0.03	0.05	0.00	0.00	0.00	7.34	0.00	0.00
RENTAL KOBELCO	200.0	175	0.37	2.15	3.7	0.08	0.009	0.009	514.029	0.021	0.004	0.03	0.05	0.00	0.00	0.00	7.34	0.00	0.00
RENTAL BACKHOE/LOADER	200.0	100	0.37	2.15	3.7	0.08	0.009	0.009	571.454	0.021	0.004	0.02	0.03	0.00	0.00	0.00	4.66	0.00	0.00
RENTAL BACKHOE/LOADER	200.0	100	0.37	2.15	3.7	0.08	0.009	0.009	571.454	0.021	0.004	0.02	0.03	0.00	0.00	0.00	4.66	0.00	0.00
											Total	0.19	0.31	0.01	0.00	0.00	42.54	0.00	0.00

Sheet 3: Off-Road Heavy-Duty Equipment Emission Factors

Table 3-1: Equipment Category and Emissions Assignment (Default; No Runtime Hour Adjustment)

Equipment	Horsepower	Engine Tier	OFFROAD Category	HP_Bin	Load Factor	Default (Zero Hour) Emission Factors							
						ROG g_hp-hr	CO g_hp-hr	Nox g_hp-hr	PM10 g_hp-hr	PM2_5 g_hp-hr	Co2_g_hp-hr	CH4_g_hp-hr	N2O_g_hp-hr
7130 TRACTOR	130	3	Agricultural - Agricultural Tractors	175	0.70	0.090	3.700	2.320	0.112	0.112	256.1869076	0.021	0.004
672G GRADER	255	4	Construction and Mining - Graders	300	0.41	0.060	2.600	1.290	0.009	0.009	514.03	0.021	0.004
430E BACKHOE	95	3	Construction and Mining - Tractors/Loaders/Back	100	0.37	0.090	3.700	2.740	0.112	0.112	571.4540783	0.021	0.004
480 TRAIL DOZER	91	3	Construction and Mining - Crawler Tractors	100	0.43	0.090	3.700	2.740	0.112	0.112	571.4540783	0.021	0.004
750J DOZER	157	3	Construction and Mining - Crawler Tractors	175	0.43	0.090	3.700	2.320	0.112	0.112	514.0285459	0.021	0.004
544K LOADER	163	4	Construction and Mining - Rubber Tired Loaders	175	0.36	0.080	3.700	2.150	0.009	0.009	571.4540783	0.021	0.004
E18B MINI EX	15	4	Construction and Mining - Excavators	50	0.38	0.090	4.100	4.550	0.128	0.128	571.4540783	0.024	0.005
T190 SKID STEER	61	3	Construction and Mining - Skid Steer Loaders	75	0.37	0.090	3.700	2.740	0.192	0.192	571.4540783	0.021	0.004
500 TRAIL DOZER	80	3	Construction and Mining - Crawler Tractors	75	0.43	0.090	3.700	2.740	0.192	0.192	571.4540783	0.021	0.004
RENTAL KOBELCO	175	4	Construction and Mining - Tractors/Loaders/Back	175	0.37	0.080	3.700	2.150	0.009	0.009	514.0285459	0.021	0.004
RENTAL KOBELCO	175	4	Construction and Mining - Tractors/Loaders/Back	175	0.37	0.080	3.700	2.150	0.009	0.009	514.0285459	0.021	0.004
RENTAL BACKHOE/LOADER	100	4	Construction and Mining - Tractors/Loaders/Back	100	0.37	0.080	3.700	2.150	0.009	0.009	571.4540783	0.021	0.004
RENTAL BACKHOE/LOADER	100	4	Construction and Mining - Tractors/Loaders/Back	100	0.37	0.080	3.700	2.150	0.009	0.009	571.4540783	0.021	0.004

Note: CH4 and N2O emission rates for standard OFFROAD2021 equipment profiles taken from CalEEMod. Load factors from CalEEMod / Carl Moyer.

Table 3-2: Equipment Category and Emissions Assignment (Runtime Hour Adjustment)

Equipment	Existing Runtime Hours on Equipment	Adjusted/Deteriorated Emission Factors							
		ROG g_hp-hr	CO g_hp-hr	Nox g_hp-hr	PM10 g_hp-hr	PM2_5 g_hp-hr	Co2_g_hp-hr	CH4_g_hp-hr	N2O_g_hp-hr
7130 TRACTOR	459.3	0.099	3.700	2.332	0.112	0.112	256.19	0.021	0.004
672G GRADER	1941.5	0.093	2.600	1.323	0.010	0.010	514.03	0.021	0.004
430E BACKHOE	2658.9	0.151	3.700	2.836	0.133	0.133	571.45	0.021	0.004
480 TRAIL DOZER	346.7	0.098	3.700	2.752	0.115	0.115	571.45	0.021	0.004
750J DOZER	4230.4	0.175	3.700	2.434	0.114	0.114	514.03	0.021	0.004
544K LOADER	1672.1	0.113	3.700	2.195	0.010	0.010	571.45	0.021	0.004
E18B MINI EX	2200	0.169	4.100	4.759	0.149	0.149	571.45	0.024	0.005
T190 SKID STEER	2140.9	0.139	3.700	2.817	0.222	0.222	571.45	0.021	0.004
500 TRAIL DOZER	1.4	0.090	3.700	2.740	0.192	0.192	571.45	0.021	0.004
RENTAL KOBELCO	4230.4	0.152	3.700	2.222	0.010	0.010	514.03	0.021	0.004
RENTAL KOBELCO	4230.4	0.152	3.700	2.222	0.010	0.010	514.03	0.021	0.004
RENTAL BACKHOE/LOADER	4230.4	0.165	3.700	2.264	0.011	0.011	571.45	0.021	0.004
RENTAL BACKHOE/LOADER	4230.4	0.165	3.700	2.264	0.011	0.011	571.45	0.021	0.004

Sheet 4: U.S. EPA Tier III and Tier IV Emission Factors

Table 4-1: U.S. EPA Tier III Emission Standards

Maximum Horsepower	Assigned HP Bin	Emission Factors (g/hp-hr)				
		ROG	CO	NOx	PM10	PM2.5
25≤hp<50	50	--	--	--	--	--
50≤hp<75	75	0.09	3.7	2.74	0.192	0.192
75≤hp<100	100	0.09	3.7	2.74	0.112	0.112
100≤hp<175	175	0.09	3.7	2.32	0.112	0.112
175≤hp<300	300	0.09	2.6	2.32	0.088	0.088
300≤hp<600	600	0.09	2.6	2.32	0.088	0.088

CARB 2017 Table D-9 (pg. 235); and CalEEMod v2022.4.0 for CO.

Table 4-2: U.S EPA Tier III Controlled Off-Road Diesel Engine Deterioration Rates

Maximum Horsepower	Assigned HP Bin	Emission Factors (g/hp-hr)		
		ROG	NOx	PM
25≤hp<50	50	--	--	--
50≤hp<75	75	0.000023	0.000036	0.0000141
75≤hp<100	100	0.000023	0.000036	0.0000080
100≤hp<175	175	0.000020	0.000027	0.0000004
175≤hp<300	300	0.000023	0.000030	0.0000046
300≤hp<600	600	0.000023	0.000030	0.0000044

Table 4-3: U.S. EPA Tier IV (Interim) Emission Standards

Maximum Horsepower	Assigned HP Bin	Emission Factors (g/hp-hr)				
		ROG	CO	NOx	PM10	PM2.5
25≤hp<50	50	0.09	4.1	4.55	0.128	0.128
50≤hp<75	75	0.09	3.7	2.74	0.112	0.112
75≤hp<100	100	0.08	3.7	2.15	0.009	0.009
100≤hp<175	175	0.08	3.7	2.15	0.009	0.009
175≤hp<300	300	0.06	2.6	1.29	0.009	0.009
300≤hp<600	600	0.06	2.6	1.29	0.009	0.009

CARB 2017 Table D-9 (pg. 235); EFs for Tier IV (Phase-In or Alt. NOx) Used Where Option Exists and CalEEMod v2022.4.0 for CO.

Table 4-4: U.S. EPA Tier IV (Interim) Controlled Off-Road Diesel Engine Deterioration Rates

Maximum Horsepower	Assigned HP Bin	Emission Factors (g/hp-hr)		
		ROG	NOx	PM
25≤hp<50	50	0.000036	0.000095	0.0000096
50≤hp<75	75	0.000023	0.000036	0.0000080
75≤hp<100	100	0.000021	0.000027	0.0000009
100≤hp<175	175	0.000020	0.000027	0.0000004
175≤hp<300	300	0.000017	0.000017	0.0000003
300≤hp<600	600	0.000017	0.000017	0.0000003

Sheet 5: On-Site, On-Road Vehicles Emission Factors and Emissions

Table 5-1: 2020 On-Road Vehicle Emission Factor Assignment

Make	Model	Gross Vehicle Weight Rating (lbs)	Vehicle Class	Fuel	Emission Factors (tons / mi)							
					ROG	CO	NOx	PM10 (Exh)	PM2.5 (Exh)	CO2	CH4	N2O
RAM	4500 OPERATOR	16,500	MHDT	Diesel	1.52139E-07	5.93601E-07	4.00934E-06	6.96965E-08	6.66815E-08	0.001317844	7.06646E-09	2.07627E-07
INTERNATIONAL	TRANSPORT 9300	50,000	HHDT	Diesel	1.27336E-07	9.36937E-07	4.35968E-06	6.25617E-08	5.98553E-08	0.001942614	5.91444E-09	3.0606E-07
FORD	F350 RESOURCES	10,100 to 14,000	LHDT2	Diesel	2.26767E-07	6.42695E-07	2.30686E-06	4.97898E-08	4.76359E-08	0.000870445	1.05329E-08	1.37139E-07
CHEVROLET	1500 ELIZ	6,700 to 7,300	MDV	Gasoline	3.47119E-07	2.89446E-06	3.48186E-07	2.39595E-09	2.20408E-09	0.000537652	3.44208E-08	2.33577E-08
FORD	F350 r FLATBED	10,100 to 14,000	LHDT2	Gasoline	4.88908E-07	3.34463E-06	7.06533E-07	2.31292E-09	2.12664E-09	0.001185514	3.82499E-08	4.58456E-08
RAM	2500 DAVID	10000	LHDT1	Gasoline	5.71537E-07	3.6554E-06	7.74571E-07	2.61292E-09	2.40332E-09	0.001077662	4.38512E-08	4.88921E-08
INTERNATIONAL	WATER TRUCK	52000	HHDT	Diesel	1.27336E-07	9.36937E-07	4.35968E-06	6.25617E-08	5.98553E-08	0.001942614	5.91444E-09	3.0606E-07
FORD	F350 JOHN M	10,100 to 14,000	LHDT2	Gasoline	4.88908E-07	3.34463E-06	7.06533E-07	2.31292E-09	2.12664E-09	0.001185514	3.82499E-08	4.58456E-08
FORD	F250 ERIC	10,000 to 11,400	LHDT2	Gasoline	4.88908E-07	3.34463E-06	7.06533E-07	2.31292E-09	2.12664E-09	0.001185514	3.82499E-08	4.58456E-08
FORD	F250 JESSE/MIKE	10,000 to 11,400	LHDT2	Gasoline	4.88908E-07	3.34463E-06	7.06533E-07	2.31292E-09	2.12664E-09	0.001185514	3.82499E-08	4.58456E-08
INTERNATIONAL	DUMPTRUCK		HHDT	Diesel	1.27336E-07	9.36937E-07	4.35968E-06	6.25617E-08	5.98553E-08	0.001942614	5.91444E-09	3.0606E-07
FORD	F250 ROBERT	10,000 to 11,400	LHDT2	Gasoline	4.88908E-07	3.34463E-06	7.06533E-07	2.31292E-09	2.12664E-09	0.001185514	3.82499E-08	4.58456E-08
FORD	F350 FLATBED	10,100 to 14,000	LHDT2	Diesel	2.26767E-07	6.42695E-07	2.30686E-06	4.97898E-08	4.76359E-08	0.000870445	1.05329E-08	1.37139E-07

Table 6-2: 2020 On-Road Vehicle Emission Calculations

Make	Model	Annual VMT	Vehicle Class	Fuel	Emissions (tons)							
					ROG	CO	NOx	PM10 (Exh)	PM2.5 (Exh)	CO2	CH4	N2O
RAM	4500 (OPERATOR)	6999	MHDT	Diesel	0.001064821	0.004154614	0.028061352	0.000487806	0.000466703	9.223589079	4.94582E-05	0.00145318
INTERNATIONAL	TRANSPORT 9300	1781	HHDT	Diesel	0.000226786	0.001668686	0.007764595	0.000111422	0.000106602	3.45979504	1.05336E-05	0.000545092
FORD	F350 (RESOURCES)	10144	LHDT2	Diesel	0.002300322	0.0065195	0.023400764	0.000505068	0.000483219	8.829795507	0.000106846	0.001391138
CHEVROLET	1500 (ELIZ)	8944.5	MDV	Gasoline	0.003104807	0.025889454	0.003114348	2.14306E-05	1.97144E-05	4.80902646	0.000307877	0.000208923
FORD	F350 r FLATBED	4341	LHDT2	Gasoline	0.002122351	0.014519056	0.003067061	1.00404E-05	9.23175E-06	5.146316171	0.000166043	0.000199016
RAM	2500 (DAVID)	10158	LHDT1	Gasoline	0.005805672	0.037131559	0.007868088	2.65421E-05	2.4413E-05	10.94689088	0.000445441	0.000496646
INTERNATIONAL	WATER TRUCK	2280	HHDT	Diesel	0.000290327	0.002136217	0.009940076	0.000142641	0.00013647	4.429159288	1.34849E-05	0.000697816
FORD	F350 (JOHN M)	5879	LHDT2	Gasoline	0.002874292	0.019663103	0.004153709	1.35976E-05	1.25025E-05	6.969636667	0.000224871	0.000269526
FORD	F250 (ROBERT)	6797.5	LHDT2	Gasoline	0.003323354	0.02273515	0.00480266	1.57221E-05	1.44559E-05	8.058531254	0.000260004	0.000311635
FORD	F250 (JESSE/MIKE)	6359	LHDT2	Gasoline	0.003108968	0.021268528	0.004492845	1.47078E-05	1.35233E-05	7.538683375	0.000243231	0.000291532
INTERNATIONAL	DUMPTRUCK	445	HHDT	Diesel	5.66647E-05	0.000416937	0.001940059	2.78399E-05	2.66356E-05	0.864463107	2.63193E-06	0.000136197
FORD	F250 (KEITH)	13861	LHDT2	Gasoline	0.006776758	0.046359972	0.009793257	3.20593E-05	2.94774E-05	16.43240923	0.000530182	0.000635466
FORD	F350 FLATBED	4634	LHDT2	Diesel	0.001050837	0.002978249	0.010689978	0.000230726	0.000220745	4.033642782	4.88094E-05	0.000635502
				Total	0.03210596	0.205441025	0.119088791	0.001639602	0.001563693	90.74193884	0.002409413	0.007271668

Sheet 6: On-Site Small Equipment Emission Factors and Emissions

Table 6-1: On-site Small Equipment Category and Emission Factor Assignment

Make	Model	Horsepower	Fuel	OFFROAD Category	HP_Bin	Load Factor	Emission Factors							
							ROG g_hp-hr	CO g_hp-hr	Nox g_hp-hr	PM10 g_hp-hr	PM2_5 g_hp-hr	Co2_g_hp-hr	CH4_g_hp-hr	N2O_g_hp-hr
GATOR 1*	XUV 855D	24.6	Diesel	Agricultural - ATVs	25	1.00	17.612	80.634	71.965	3.654	3.361	10179.997	0.021	0.004
GATOR 2*	XUV 855D	24.6	Diesel	Agricultural - ATVs	25	1.00	17.612	80.634	71.965	3.654	3.361	10179.997	0.021	0.004
KUBOTA 1	RTV-X1100CWL-A	24	Diesel	Agricultural - ATVs	25	0.40	1.107	3.234	2.372	0.154	0.142	284.807	0.021	0.004
KUBOTA 2*	RTV-X1100CWL-A	24	Diesel	Agricultural - ATVs	25	1.00	17.612	80.634	71.965	3.654	3.361	10179.997	0.021	0.004
Gator 855*	XUV 855D	24.6	Diesel	Agricultural - ATVs	25	1.00	17.612	80.634	71.965	3.654	3.361	10179.997	0.021	0.004
Canycom 1	SC75	22.1	Gasoline	Construction and Mining - Paving Equipment	50	0.36	0.825	4.371	3.967	0.227	0.209	571.454	0.018	0.004
Canycom 2	SC75	22.1	Gasoline	Construction and Mining - Paving Equipment	50	0.36	0.825	4.371	3.967	0.227	0.209	571.454	0.018	0.004
Dewalt Generator	DXGNR4000	8	Gasoline	N/A; CalEEMod - Generator Sets	25	0.68	674.990	258.674	3.372	0.284	0.215	429.448	0.018	0.004
Dewalt Generator	DXGNR4000	8	Gasoline	N/A; CalEEMod - Generator Sets	25	0.68	674.990	258.674	3.372	0.284	0.215	429.448	0.018	0.004
Dewalt Generator	DXGNR4000	8	Gasoline	N/A; CalEEMod - Generator Sets	25	0.68	674.990	258.674	3.372	0.284	0.215	429.448	0.018	0.004
Gerenac Generator	GP8000E	13	Gasoline	N/A; CalEEMod - Generator Sets	25	0.68	674.990	258.674	3.372	0.284	0.215	429.448	0.018	0.004
Honda Generator	EU2200I	3.6	Gasoline	N/A; CalEEMod - Generator Sets	25	0.68	674.990	258.674	3.372	0.284	0.215	429.448	0.018	0.004
Honda Generator	EU2200I	3.6	Gasoline	N/A; CalEEMod - Generator Sets	25	0.68	674.990	258.674	3.372	0.284	0.215	429.448	0.018	0.004
Honda Generator	EG 2500	5.5	Gasoline	N/A; CalEEMod - Generator Sets	25	0.68	674.990	258.674	3.372	0.284	0.215	429.448	0.018	0.004
Ryobi Generator	RYI2322VNM	5	Gasoline	N/A; CalEEMod - Generator Sets	25	0.68	674.990	258.674	3.372	0.284	0.215	429.448	0.018	0.004
Ryobi Generator	RYI2322VNM	5	Gasoline	N/A; CalEEMod - Generator Sets	25	0.68	674.990	258.674	3.372	0.284	0.215	429.448	0.018	0.004
Echo Generator	EGI-3600LN	7	Gasoline	N/A; CalEEMod - Generator Sets	25	0.68	674.990	258.674	3.372	0.284	0.215	429.448	0.018	0.004
Honda Generator	EM6500SX	11.7	Gasoline	N/A; CalEEMod - Generator Sets	25	0.68	674.990	258.674	3.372	0.284	0.215	429.448	0.018	0.004
Jumping Jack	MTX-70	2.8	Gasoline	N/A; CalEEMod - Plate Compactor	25	0.55	994.174	229.329	4.855	2.346	1.773	429.441	0.018	0.004
Jumping Jack	MTR-40	2.8	Gasoline	N/A; CalEEMod - Plate Compactor	25	0.55	994.174	229.329	4.855	2.346	1.773	429.441	0.018	0.004
Vibroplate	WP 1550	4.15	Gasoline	N/A; CalEEMod - Plate Compactor	25	0.55	994.174	229.329	4.855	2.346	1.773	429.441	0.018	0.004
John Deere Mower	727A	23	Gasoline	Lawn and Garden - Misc - Rear Engine Riding Aggregate		1.00	49.899	2361.600	24.347	0.319	0.241	4994.210	0.319	0.241

Note: CH4 and N2O emission rates for standard OFFROAD2021 equipment profiles taken from CalEEMod. Load factors from CalEEMod / Carl Moyer.

* - Emission factors for Gator 1, Gator 2, Kubota 2, Gator 855, and John Deere Mower (727A) are based on emissions per gallon of fuel consumed.

Table 6-2: Small Equipment Annual Emissions Estimates

Make	Model	Annual Runtime	Horsepower	Load Factor	Annual Emissions (tons)							
					ROG	CO	NOx	PM10 (Exh)	PM2.5 (Exh)	CO2	CH4	N2O
GATOR 1*	XUV 855D	321	24.6	1.00	0.006232038	0.02853164	0.025464344	0.001292824	0.001189398	3.602112762	7.43069E-06	1.41537E-06
GATOR 2*	XUV 855D	156.75	24.6	1.00	0.003043215	0.01393251	0.012434692	0.000631309	0.000580804	1.758975624	3.62854E-06	6.9115E-07
KUBOTA 1	RTV-X1100CWL-A	4272.4	24	0.40	0.050030078	0.14622138	0.107241974	0.006962205	0.006405229	12.87652764	0.000949439	0.000180846
KUBOTA 2*	RTV-X1100CWL-A	840	24	1.00	0.02	0.07	0.07	0.00	0.00	9.43	0.00	0.00
Gator 855*	XUV 855D	73	24.6	1.00	0.001407548	0.00644406	0.005751293	0.000291993	0.000268634	0.813561293	1.67827E-06	3.19671E-07
Canycom 1	SC75	77	22.1	0.36	0.000556823	0.00295147	0.002679149	0.000153383	0.000141113	0.385897046	1.21552E-05	2.70116E-06
Canycom 2	SC75	47.1	22.1	0.36	0.000340602	0.00180538	0.001638804	9.38228E-05	8.63169E-05	0.236048713	7.4352E-06	1.65227E-06
Dewalt Generator	DXGNR4000	63.8	8	0.68	0.258238824	0.09896394	0.001290066	0.000108653	8.22551E-05	0.164298947	6.88647E-06	1.53033E-06
Dewalt Generator	DXGNR4000	52.6	8	0.68	0.212905363	0.08159096	0.001063596	8.95793E-05	6.78153E-05	0.135456499	5.67756E-06	1.26168E-06
Dewalt Generator	DXGNR4000	6.2	8	0.68	0.025095309	0.00961719	0.000125367	1.05588E-05	7.99344E-06	0.015966355	6.69218E-07	1.48715E-07
Gerenac Generator	GP8000E	18.9	13	0.68	0.124312851	0.04763997	0.000621021	5.23043E-05	3.95965E-05	0.079091402	3.31506E-06	7.3668E-07
Honda Generator	EU2200I	35.4	3.6	0.68	0.064433218	0.02469251	0.000321884	2.71101E-05	2.05235E-05	0.040994261	1.71824E-06	3.81832E-07
Honda Generator	EU2200I	35.4	3.6	0.68	0.064433218	0.02469251	0.000321884	2.71101E-05	2.05235E-05	0.040994261	1.71824E-06	3.81832E-07
Honda Generator	EG 2500	35.4	5.5	0.68	0.098439638	0.03772467	0.000491768	4.14182E-05	3.13553E-05	0.062630121	2.6251E-06	5.83355E-07
Ryobi Generator	RYI2322VNM	35.4	5	0.68	0.08949058	0.03429515	0.000447062	3.76529E-05	2.85048E-05	0.056936474	2.38645E-06	5.30322E-07
Ryobi Generator	RYI2322VNM	35.4	5	0.68	0.08949058	0.03429515	0.000447062	3.76529E-05	2.85048E-05	0.056936474	2.38645E-06	5.30322E-07
Echo Generator	EGI-3600LN	35.4	7	0.68	0.125286812	0.04801322	0.000625887	5.2714E-05	3.99068E-05	0.079711064	3.34103E-06	7.42451E-07
Honda Generator	EM6500SX	35.4	11.7	0.68	0.209407957	0.08025066	0.001046125	8.81078E-05	6.67013E-05	0.133231349	5.58429E-06	1.24095E-06
Jumping Jack	MTX-70	9	2.8	0.55	0.015189037	0.0035037	7.41749E-05	3.58423E-05	2.7088E-05	0.00656102	2.75005E-07	6.11122E-08
Jumping Jack	MTR-40	9	2.8	0.55	0.015189037	0.0035037	7.41749E-05	3.58423E-05	2.7088E-05	0.00656102	2.75005E-07	6.11122E-08
Vibroplate	WP 1550	9	4.15	0.55	0.022512323	0.00519298	0.000109938	5.31234E-05	4.01483E-05	0.009724369	4.07596E-07	9.0577E-08
John Deere Mower*	727A	1725.1	23	1.00	0.09488786	4.49081519	0.046298909	0.000607212	0.000458339	9.496983551	0.000607212	0.000458339
				Total	1.587231049	5.29934018	0.275204842	0.01411351	0.012770282	39.48528971	0.001645689	0.000657949

Note: * - Assumes XUVs, RTVs, and mower consume one gallon of gas per hour runtime.

Sheet 7: Off-site Worker and Vendor Emission Factors

Table 7-1: Worker and Vendor Trips: Emissions Assignment

Trip Source	Reason	Number of Trips	Trip Distance	Total VMT	Vehicle Class	Fuel Type	Percent of Workers by Vehcile Class	Emission Factors (tons / mi)							
								ROG	CO	NOx	PM10 (Exh)	PM2.5 (Exh)	CO2	CH4	N2O
							Worker Trips								
General Workers	N/A	50	19.4	336590	LDA	Agg	0.5	1.991E-07	1.991E-07	1.991E-07	1.991E-07	1.991E-07	1.991E-07	1.991E-07	1.991E-07
					LDT1	Agg	0.25	6.042E-07	6.042E-07	6.042E-07	6.042E-07	6.042E-07	6.042E-07	6.042E-07	6.042E-07
					LDT2	Agg	0.25	2.4E-07	2.4E-07	2.4E-07	2.4E-07	2.4E-07	2.4E-07	2.4E-07	2.4E-07
							Vendor Trips								
Harkrader and Sons Trucking	3/4 in Road Base	19	60	1140	HHDT	Diesel	0.5	1.273E-07	9.369E-07	4.36E-06	6.256E-08	5.986E-08	0.0019426	5.914E-09	3.061E-07
Harkrader and Sons Trucking	Sand	6	60	360	HHDT	Diesel	0.5	1.273E-07	9.369E-07	4.36E-06	6.256E-08	5.986E-08	0.0019426	5.914E-09	3.061E-07

Table 7-2: Worker and Vendor Trips: Emissions Calculations

Trip Source	Reason	Number of Trips	Trip Distance	Total VMT	Vehicle Class	Fuel Type	Percent of Workers by Vehcile Class	Emissions (tons)							
								ROG	CO	NOx	PM10 (Exh)	PM2.5 (Exh)	CO2	CH4	N2O
							Worker Trips								
General Workers	N/A	50	19.4	336590	LDA	Agg	0.5	0.0670204	0.0670204	0.0670204	0.0670204	0.0670204	0.0670204	0.0670204	0.0670204
					LDT1	Agg	0.25	0.2033757	0.2033757	0.2033757	0.2033757	0.2033757	0.2033757	0.2033757	0.2033757
					LDT2	Agg	0.25	0.0807738	0.0807738	0.0807738	0.0807738	0.0807738	0.0807738	0.0807738	0.0807738
							Worker Sub-Total	**0.3511699**	**0.3511699**	**0.3511699**	**0.3511699**	**0.3511699**	**0.3511699**	**0.3511699**	**0.3511699**
							Vendor Trips								
Harkrader and Sons Trucking	3/4 in Road Base	19	60	1140	HHDT	Diesel	0.5	0.0001452	0.0010681	0.00497	7.132E-05	6.824E-05	2.2145796	6.742E-06	0.0003489
Harkrader and Sons Trucking	Sand	6	60	360	HHDT	Diesel	0.5	4.584E-05	0.0003373	0.0015695	2.252E-05	2.155E-05	0.6993409	2.129E-06	0.0001102
							Vendor Sub-Total	**0.000191**	**0.0014054**	**0.0065395**	**9.384E-05**	**8.978E-05**	**2.9139206**	**8.872E-06**	**0.0004591**
							Total	**0.3513609**	**0.3525753**	**0.3577094**	**0.3512637**	**0.3512596**	**3.2650904**	**0.3511787**	**0.351629**

Sheet 8: OFFROAD Output

Model Output: OFFROAD2021 (v1.0.7) Emissions Inventory
Region Type: County
Region: San Joaquin
Calendar Year: 2020
Scenario: All Adopted Rules - Exhaust
Vehicle Classification: OFFROAD2021 Equipment Types
Units: tons/day for Emissions, gallons/year for Fuel, hours/year for Activity, Horsepower-hours/year for Horse

Region	Calendar Year	Vehicle Category	Model Year
San Joaquin	2020	Agricultural - Agricultural Tractors	Aggregate
San Joaquin	2020	Agricultural - Agricultural Tractors	Aggregate
San Joaquin	2020	Agricultural - Agricultural Tractors	Aggregate
San Joaquin	2020	Agricultural - Agricultural Tractors	Aggregate
San Joaquin	2020	Agricultural - Agricultural Tractors	Aggregate
San Joaquin	2020	Agricultural - Agricultural Tractors	Aggregate
San Joaquin	2020	Agricultural - ATVs	Aggregate
San Joaquin	2020	Agricultural - ATVs	Aggregate
San Joaquin	2020	Agricultural - ATVs	Aggregate
San Joaquin	2020	Agricultural - Bale Wagons (Self Propelled)	Aggregate
San Joaquin	2020	Agricultural - Bale Wagons (Self Propelled)	Aggregate
San Joaquin	2020	Agricultural - Balers (Self Propelled)	Aggregate
San Joaquin	2020	Agricultural - Combine Harvesters	Aggregate
San Joaquin	2020	Agricultural - Combine Harvesters	Aggregate
San Joaquin	2020	Agricultural - Construction Equipment	Aggregate
San Joaquin	2020	Agricultural - Construction Equipment	Aggregate
San Joaquin	2020	Agricultural - Construction Equipment	Aggregate
San Joaquin	2020	Agricultural - Construction Equipment	Aggregate
San Joaquin	2020	Agricultural - Construction Equipment	Aggregate
San Joaquin	2020	Agricultural - Forklifts	Aggregate
San Joaquin	2020	Agricultural - Forklifts	Aggregate
San Joaquin	2020	Agricultural - Forklifts	Aggregate
San Joaquin	2020	Agricultural - Forklifts	Aggregate
San Joaquin	2020	Agricultural - Hay Squeeze/Stack Retriever	Aggregate
San Joaquin	2020	Agricultural - Hay Squeeze/Stack Retriever	Aggregate
San Joaquin	2020	Agricultural - Hay Squeeze/Stack Retriever	Aggregate
San Joaquin	2020	Agricultural - Nut Harvester	Aggregate
San Joaquin	2020	Agricultural - Nut Harvester	Aggregate
San Joaquin	2020	Agricultural - Nut Harvester	Aggregate
San Joaquin	2020	Agricultural - Nut Harvester	Aggregate
San Joaquin	2020	Agricultural - Nut Harvester	Aggregate
San Joaquin	2020	Agricultural - Nut Harvester	Aggregate
San Joaquin	2020	Agricultural - Other Harvesters	Aggregate
San Joaquin	2020	Agricultural - Other Harvesters	Aggregate
San Joaquin	2020	Agricultural - Other Harvesters	Aggregate
San Joaquin	2020	Agricultural - Other Harvesters	Aggregate

San Joaquin	2020	Agricultural - Sprayers/Spray Rigs	Aggregate
San Joaquin	2020	Agricultural - Sprayers/Spray Rigs	Aggregate
San Joaquin	2020	Agricultural - Sprayers/Spray Rigs	Aggregate
San Joaquin	2020	Agricultural - Sprayers/Spray Rigs	Aggregate
San Joaquin	2020	Agricultural - Sprayers/Spray Rigs	Aggregate
San Joaquin	2020	Agricultural - Sprayers/Spray Rigs	Aggregate
San Joaquin	2020	Agricultural - Swathers/Windrowers/Hay Conditioners	Aggregate
San Joaquin	2020	Agricultural - Swathers/Windrowers/Hay Conditioners	Aggregate
San Joaquin	2020	Agricultural - Swathers/Windrowers/Hay Conditioners	Aggregate
San Joaquin	2020	Agricultural - Swathers/Windrowers/Hay Conditioners	Aggregate
San Joaquin	2020	Agricultural - Swathers/Windrowers/Hay Conditioners	Aggregate
San Joaquin	2020	Construction and Mining - Bore/Drill Rigs	Aggregate
San Joaquin	2020	Construction and Mining - Bore/Drill Rigs	Aggregate
San Joaquin	2020	Construction and Mining - Bore/Drill Rigs	Aggregate
San Joaquin	2020	Construction and Mining - Bore/Drill Rigs	Aggregate
San Joaquin	2020	Construction and Mining - Bore/Drill Rigs	Aggregate
San Joaquin	2020	Construction and Mining - Cranes	Aggregate
San Joaquin	2020	Construction and Mining - Cranes	Aggregate
San Joaquin	2020	Construction and Mining - Cranes	Aggregate
San Joaquin	2020	Construction and Mining - Cranes	Aggregate
San Joaquin	2020	Construction and Mining - Cranes	Aggregate
San Joaquin	2020	Construction and Mining - Cranes	Aggregate
San Joaquin	2020	Construction and Mining - Crawler Tractors	Aggregate
San Joaquin	2020	Construction and Mining - Crawler Tractors	Aggregate
San Joaquin	2020	Construction and Mining - Crawler Tractors	Aggregate
San Joaquin	2020	Construction and Mining - Crawler Tractors	Aggregate
San Joaquin	2020	Construction and Mining - Crawler Tractors	Aggregate
San Joaquin	2020	Construction and Mining - Excavators	Aggregate
San Joaquin	2020	Construction and Mining - Excavators	Aggregate
San Joaquin	2020	Construction and Mining - Excavators	Aggregate
San Joaquin	2020	Construction and Mining - Excavators	Aggregate
San Joaquin	2020	Construction and Mining - Excavators	Aggregate
San Joaquin	2020	Construction and Mining - Excavators	Aggregate
San Joaquin	2020	Construction and Mining - Graders	Aggregate
San Joaquin	2020	Construction and Mining - Graders	Aggregate
San Joaquin	2020	Construction and Mining - Graders	Aggregate
San Joaquin	2020	Construction and Mining - Graders	Aggregate
San Joaquin	2020	Construction and Mining - Graders	Aggregate
San Joaquin	2020	Construction and Mining - Misc - Bore/Drill Rigs	Aggregate
San Joaquin	2020	Construction and Mining - Misc - Cement And Mortar Mixers	Aggregate
San Joaquin	2020	Construction and Mining - Misc - Concrete/Industrial Saws	Aggregate
San Joaquin	2020	Construction and Mining - Misc - Concrete/Industrial Saws	Aggregate
San Joaquin	2020	Construction and Mining - Misc - Dumpers/Tenders	Aggregate
San Joaquin	2020	Construction and Mining - Misc - Excavators	Aggregate
San Joaquin	2020	Construction and Mining - Misc - Other	Aggregate
San Joaquin	2020	Construction and Mining - Misc - Pavers	Aggregate
San Joaquin	2020	Construction and Mining - Misc - Paving Equipment	Aggregate

San Joaquin	2020	Construction and Mining - Misc - Rollers	Aggregate
San Joaquin	2020	Construction and Mining - Misc - Rubber Tired Loaders	Aggregate
San Joaquin	2020	Construction and Mining - Misc - Signal Boards	Aggregate
San Joaquin	2020	Construction and Mining - Misc - Skid Steer Loaders	Aggregate
San Joaquin	2020	Construction and Mining - Misc - Tractors/Loaders/Backhoes	Aggregate
San Joaquin	2020	Construction and Mining - Misc - Trenchers	Aggregate
San Joaquin	2020	Construction and Mining - Off-Highway Tractors	Aggregate
San Joaquin	2020	Construction and Mining - Off-Highway Tractors	Aggregate
San Joaquin	2020	Construction and Mining - Off-Highway Tractors	Aggregate
San Joaquin	2020	Construction and Mining - Off-Highway Tractors	Aggregate
San Joaquin	2020	Construction and Mining - Off-Highway Tractors	Aggregate
San Joaquin	2020	Construction and Mining - Off-Highway Trucks	Aggregate
San Joaquin	2020	Construction and Mining - Off-Highway Trucks	Aggregate
San Joaquin	2020	Construction and Mining - Off-Highway Trucks	Aggregate
San Joaquin	2020	Construction and Mining - Off-Highway Trucks	Aggregate
San Joaquin	2020	Construction and Mining - Off-Highway Trucks	Aggregate
San Joaquin	2020	Construction and Mining - Pavers	Aggregate
San Joaquin	2020	Construction and Mining - Pavers	Aggregate
San Joaquin	2020	Construction and Mining - Pavers	Aggregate
San Joaquin	2020	Construction and Mining - Pavers	Aggregate
San Joaquin	2020	Construction and Mining - Pavers	Aggregate
San Joaquin	2020	Construction and Mining - Paving Equipment	Aggregate
San Joaquin	2020	Construction and Mining - Paving Equipment	Aggregate
San Joaquin	2020	Construction and Mining - Paving Equipment	Aggregate
San Joaquin	2020	Construction and Mining - Paving Equipment	Aggregate
San Joaquin	2020	Construction and Mining - Paving Equipment	Aggregate
San Joaquin	2020	Construction and Mining - Rollers	Aggregate
San Joaquin	2020	Construction and Mining - Rollers	Aggregate
San Joaquin	2020	Construction and Mining - Rollers	Aggregate
San Joaquin	2020	Construction and Mining - Rollers	Aggregate
San Joaquin	2020	Construction and Mining - Rollers	Aggregate
San Joaquin	2020	Construction and Mining - Rough Terrain Forklifts	Aggregate
San Joaquin	2020	Construction and Mining - Rough Terrain Forklifts	Aggregate
San Joaquin	2020	Construction and Mining - Rough Terrain Forklifts	Aggregate
San Joaquin	2020	Construction and Mining - Rough Terrain Forklifts	Aggregate
San Joaquin	2020	Construction and Mining - Rough Terrain Forklifts	Aggregate
San Joaquin	2020	Construction and Mining - Rubber Tired Dozers	Aggregate
San Joaquin	2020	Construction and Mining - Rubber Tired Dozers	Aggregate
San Joaquin	2020	Construction and Mining - Rubber Tired Dozers	Aggregate
San Joaquin	2020	Construction and Mining - Rubber Tired Dozers	Aggregate
San Joaquin	2020	Construction and Mining - Rubber Tired Dozers	Aggregate
San Joaquin	2020	Construction and Mining - Rubber Tired Loaders	Aggregate
San Joaquin	2020	Construction and Mining - Rubber Tired Loaders	Aggregate
San Joaquin	2020	Construction and Mining - Rubber Tired Loaders	Aggregate
San Joaquin	2020	Construction and Mining - Rubber Tired Loaders	Aggregate
San Joaquin	2020	Construction and Mining - Rubber Tired Loaders	Aggregate
San Joaquin	2020	Construction and Mining - Scrapers	Aggregate

San Joaquin	2020	Construction and Mining - Scrapers	Aggregate
San Joaquin	2020	Construction and Mining - Scrapers	Aggregate
San Joaquin	2020	Construction and Mining - Scrapers	Aggregate
San Joaquin	2020	Construction and Mining - Scrapers	Aggregate
San Joaquin	2020	Construction and Mining - Skid Steer Loaders	Aggregate
San Joaquin	2020	Construction and Mining - Skid Steer Loaders	Aggregate
San Joaquin	2020	Construction and Mining - Skid Steer Loaders	Aggregate
San Joaquin	2020	Construction and Mining - Skid Steer Loaders	Aggregate
San Joaquin	2020	Construction and Mining - Skid Steer Loaders	Aggregate
San Joaquin	2020	Construction and Mining - Surfacing Equipment	Aggregate
San Joaquin	2020	Construction and Mining - Surfacing Equipment	Aggregate
San Joaquin	2020	Construction and Mining - Surfacing Equipment	Aggregate
San Joaquin	2020	Construction and Mining - Surfacing Equipment	Aggregate
San Joaquin	2020	Construction and Mining - Surfacing Equipment	Aggregate
San Joaquin	2020	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate
San Joaquin	2020	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate
San Joaquin	2020	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate
San Joaquin	2020	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate
San Joaquin	2020	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate
San Joaquin	2020	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate
San Joaquin	2020	Construction and Mining - Trenchers	Aggregate
San Joaquin	2020	Construction and Mining - Trenchers	Aggregate
San Joaquin	2020	Construction and Mining - Trenchers	Aggregate
San Joaquin	2020	Construction and Mining - Trenchers	Aggregate
San Joaquin	2020	Construction and Mining - Trenchers	Aggregate
San Joaquin	2020	Lawn and Garden - Misc - Rear Engine Riding Mowers	Aggregate
San Joaquin	2020	Agricultural - ATVs	Aggregate

epower-hours

Horsepowe	Fuel	HC_tpd	ROG_tpd	TOG_tpd	CO_tpd	NOx_tpd	CO2_tpd	PM10_tpd
25	Diesel	0.004869	0.005892	0.007012	0.017219	0.012629	1.516375	0.00082
50	Diesel	0.109542	0.132545	0.15774	0.403659	0.325092	36.65575	0.029063
75	Diesel	0.060973	0.073778	0.087802	0.295798	0.498459	40.88907	0.032814
100	Diesel	0.092588	0.112032	0.133327	0.6358	0.8257	100.0423	0.057313
175	Diesel	0.058044	0.070234	0.083584	0.51549	0.637662	85.24025	0.029178
300	Diesel	0.030541	0.036955	0.04398	0.170295	0.326558	67.96037	0.014448
25	Diesel	0.001759	0.002128	0.002532	0.009742	0.008695	1.229967	0.000441
50	Diesel	0.00285	0.003449	0.004105	0.019058	0.017675	2.671437	0.000888
175	Diesel	5.72E-05	6.92E-05	8.24E-05	0.000836	0.000687	0.152282	2.61E-05
175	Diesel	0.001485	0.001797	0.002139	0.011673	0.01631	1.868693	0.000774
300	Diesel	0.000167	0.000202	0.000241	0.000866	0.001842	0.275699	8.4E-05
75	Diesel	6.97E-05	8.43E-05	0.0001	0.000451	0.000622	0.070669	3.47E-05
175	Diesel	0.00067	0.000811	0.000965	0.005674	0.007356	0.933731	0.000331
300	Diesel	0.001231	0.00149	0.001773	0.00617	0.013274	2.002508	0.000614
50	Diesel	0.000168	0.000203	0.000241	0.000714	0.000585	0.079031	4.33E-05
75	Diesel	0.000478	0.000578	0.000688	0.003094	0.004265	0.484825	0.000238
100	Diesel	0.00209	0.002529	0.00301	0.012914	0.017975	1.965625	0.001289
175	Diesel	0.005523	0.006682	0.007952	0.044253	0.0646	7.544762	0.002726
300	Diesel	0.000951	0.001151	0.001369	0.004467	0.010831	1.341204	0.000493
50	Diesel	0.002329	0.002818	0.003354	0.009935	0.008406	1.088643	0.000621
75	Diesel	0.006438	0.00779	0.00927	0.041594	0.057385	6.518711	0.003228
100	Diesel	0.002127	0.002574	0.003063	0.014342	0.01823	2.236969	0.001268
175	Diesel	0.000412	0.000498	0.000593	0.003486	0.004503	0.57248	0.000203
75	Diesel	2.65E-05	3.21E-05	3.82E-05	0.000172	0.000236	0.02688	1.32E-05
175	Diesel	0.000388	0.000469	0.000558	0.0033	0.00412	0.531795	0.000194
300	Diesel	0.000656	0.000794	0.000945	0.0034	0.007233	1.082814	0.00033
25	Diesel	0.000649	0.000785	0.000934	0.002765	0.002334	0.305903	0.00013
50	Diesel	0.002845	0.003443	0.004097	0.011688	0.009484	1.198085	0.000755
75	Diesel	0.001071	0.001296	0.001542	0.006966	0.009541	1.087712	0.000539
100	Diesel	0.00885	0.010709	0.012745	0.055851	0.075398	8.479599	0.0055
175	Diesel	0.004015	0.004858	0.005782	0.032607	0.044095	5.287264	0.002044
300	Diesel	0.002634	0.003188	0.003794	0.012464	0.028453	3.550003	0.001366
75	Diesel	0.000907	0.001098	0.001306	0.005874	0.008097	0.92038	0.000452
100	Diesel	0.004045	0.004895	0.005825	0.026554	0.034518	4.104412	0.002447
175	Diesel	0.004057	0.004909	0.005842	0.033237	0.044562	5.408078	0.002051
300	Diesel	0.001442	0.001745	0.002077	0.007352	0.015725	2.362905	0.000722

25 Diesel	2.25E-05	2.72E-05	3.24E-05	9.59E-05	8.1E-05	0.010614	4.5E-06
50 Diesel	0.00109	0.001319	0.00157	0.004651	0.003823	0.513277	0.000283
75 Diesel	0.017665	0.021375	0.025438	0.102506	0.150125	15.18198	0.010082
100 Diesel	0.000861	0.001042	0.001239	0.00568	0.007347	0.879954	0.000519
175 Diesel	0.002745	0.003322	0.003953	0.022624	0.030133	3.687037	0.001383
300 Diesel	0.002389	0.002891	0.003441	0.011458	0.025883	3.322718	0.001234
50 Diesel	0.000794	0.00096	0.001143	0.003383	0.002769	0.374298	0.000205
75 Diesel	0.000513	0.000621	0.000739	0.003325	0.004577	0.520474	0.000256
100 Diesel	0.001895	0.002293	0.002729	0.012928	0.01621	2.015399	0.001133
175 Diesel	0.000431	0.000522	0.000621	0.003434	0.004733	0.552512	0.000223
300 Diesel	0.000899	0.001087	0.001294	0.004557	0.009766	1.467378	0.00045
50 Diesel	0.000121	0.000146	0.000174	0.00061	0.000527	0.06232	4.17E-05
75 Diesel	0.00017	0.000206	0.000245	0.001522	0.001671	0.240537	9.44E-05
100 Diesel	0.00021	0.000254	0.000303	0.001265	0.00161	0.181861	0.000141
175 Diesel	0.001208	0.001462	0.00174	0.008406	0.011022	1.299223	0.000631
300 Diesel	0.001311	0.001587	0.001888	0.004652	0.013601	1.524831	0.000714
25 Diesel	1.39E-06	1.68E-06	2E-06	3.39E-06	2.33E-06	0.00019	2.53E-07
50 Diesel	1.26E-05	1.53E-05	1.82E-05	4.39E-05	4.3E-05	0.004594	3.97E-06
75 Diesel	3.67E-05	4.44E-05	5.28E-05	0.000144	0.000293	0.018876	2.59E-05
100 Diesel	9.09E-05	0.00011	0.000131	0.000408	0.000745	0.05517	6.38E-05
175 Diesel	0.000648	0.000784	0.000933	0.003582	0.006622	0.511468	0.000406
300 Diesel	0.00135	0.001634	0.001944	0.006334	0.014759	1.878771	0.000852
50 Diesel	0.000118	0.000142	0.000169	0.000372	0.000311	0.03031	3.89E-05
75 Diesel	0.000417	0.000505	0.000601	0.001713	0.003194	0.22183	0.000287
100 Diesel	0.00127	0.001536	0.001828	0.006277	0.009469	0.888136	0.000813
175 Diesel	0.002686	0.00325	0.003868	0.02183	0.026232	3.37883	0.001516
300 Diesel	0.00296	0.003581	0.004262	0.013034	0.030526	4.088515	0.001745
25 Diesel	7.15E-07	8.65E-07	1.03E-06	1.78E-06	1.36E-06	0.000111	1.48E-07
50 Diesel	0.003593	0.004348	0.005174	0.029455	0.026556	3.965203	0.001337
75 Diesel	0.001435	0.001736	0.002066	0.018698	0.017925	3.147862	0.000564
100 Diesel	0.001665	0.002015	0.002398	0.015169	0.015035	2.38989	0.001193
175 Diesel	0.00752	0.009099	0.010829	0.083359	0.069513	13.5473	0.003507
300 Diesel	0.007546	0.009131	0.010867	0.033944	0.075884	14.30609	0.00358
50 Diesel	4.75E-05	5.75E-05	6.84E-05	0.000136	0.000111	0.010015	1.52E-05
75 Diesel	9.15E-05	0.000111	0.000132	0.000276	0.000646	0.030372	6.52E-05
100 Diesel	0.000227	0.000275	0.000327	0.000725	0.001644	0.081209	0.000159
175 Diesel	0.002446	0.00296	0.003523	0.010421	0.023927	1.336186	0.001551
300 Diesel	0.002639	0.003194	0.003801	0.012488	0.030505	5.098009	0.001451
25 Diesel	2.18E-05	2.63E-05	3.14E-05	8.96E-05	0.000166	0.00024	5.57E-06
25 Diesel	6.56E-06	7.89E-06	9.42E-06	2.62E-05	4.87E-05	7.1E-05	1.84E-06
25 Diesel	4.3E-06	5.17E-06	6.18E-06	1.77E-05	3.27E-05	4.72E-05	1.1E-06
50 Diesel	1.56E-05	1.86E-05	2.25E-05	0.000129	0.000119	0.016383	5.99E-06
25 Diesel	3.09E-06	3.72E-06	4.45E-06	1.27E-05	2.35E-05	3.4E-05	8.03E-07
25 Diesel	2.22E-05	2.67E-05	3.19E-05	9.1E-05	0.000169	0.000244	5.67E-06
25 Diesel	1.15E-05	1.38E-05	1.65E-05	4.72E-05	8.74E-05	0.000126	2.94E-06
25 Diesel	5.82E-06	7E-06	8.37E-06	2.39E-05	4.43E-05	6.39E-05	1.53E-06
25 Diesel	9.91E-06	1.19E-05	1.43E-05	4.07E-05	7.53E-05	0.000109	2.53E-06

25 Diesel	6.97E-05	8.39E-05	0.0001	0.000286	0.00053	0.000766	1.78E-05
25 Diesel	3.65E-06	4.39E-06	5.25E-06	1.5E-05	2.77E-05	4.01E-05	9.33E-07
50 Diesel	6.84E-06	8.13E-06	9.84E-06	5.56E-05	5.17E-05	0.007294	2.57E-06
25 Diesel	0.001168	0.001405	0.001679	0.004755	0.008827	0.01277	0.00031
25 Diesel	0.000106	0.000127	0.000152	0.000435	0.000805	0.001163	2.73E-05
25 Diesel	0.000103	0.000124	0.000148	0.000423	0.000783	0.001132	2.63E-05
50 Diesel	0.001848	0.002237	0.002662	0.007404	0.006007	0.619197	0.000562
75 Diesel	0.000737	0.000892	0.001062	0.003835	0.00524	0.540301	0.000431
100 Diesel	0.000623	0.000754	0.000898	0.003796	0.004658	0.53988	0.000394
175 Diesel	0.001678	0.00203	0.002416	0.019353	0.014194	2.975713	0.000785
300 Diesel	0.000987	0.001194	0.001421	0.0039	0.009619	1.285885	0.000524
50 Diesel	5.41E-05	6.54E-05	7.78E-05	0.000296	0.000253	0.027915	1.93E-05
75 Diesel	4.13E-05	5E-05	5.95E-05	0.000202	0.000334	0.02766	2.85E-05
100 Diesel	2E-05	2.42E-05	2.87E-05	0.000103	0.000128	0.01422	8.91E-06
175 Diesel	0.000707	0.000855	0.001018	0.005045	0.006083	0.729022	0.000397
300 Diesel	0.001759	0.002129	0.002533	0.006409	0.017392	1.615973	0.001045
50 Diesel	0.000191	0.000231	0.000274	0.000656	0.000542	0.057454	5.51E-05
75 Diesel	0.000333	0.000403	0.000479	0.001989	0.002633	0.299098	0.000183
100 Diesel	0.000328	0.000397	0.000472	0.002213	0.002626	0.32775	0.000203
175 Diesel	0.000808	0.000977	0.001163	0.006885	0.007242	1.104008	0.000383
300 Diesel	0.000582	0.000704	0.000838	0.002918	0.00591	1.354864	0.000258
50 Diesel	0.000185	0.000224	0.000267	0.001187	0.001078	0.15522	6.17E-05
75 Diesel	0.000104	0.000126	0.00015	0.000732	0.000882	0.112634	5.28E-05
100 Diesel	0.000185	0.000224	0.000266	0.001182	0.001501	0.17407	0.00012
175 Diesel	0.000644	0.000779	0.000928	0.007645	0.005921	1.240179	0.000307
300 Diesel	0.000294	0.000356	0.000423	0.001308	0.003101	0.55052	0.000146
50 Diesel	0.002762	0.003342	0.003977	0.012902	0.011491	1.448816	0.000872
75 Diesel	0.000507	0.000614	0.00073	0.003744	0.004728	0.592431	0.000292
100 Diesel	0.001083	0.001311	0.00156	0.006051	0.008412	0.873626	0.000703
175 Diesel	0.003297	0.003989	0.004747	0.032818	0.030529	5.298454	0.001578
300 Diesel	0.000411	0.000497	0.000592	0.001567	0.004547	0.429451	0.000254
50 Diesel	4.91E-05	5.94E-05	7.07E-05	0.000334	0.000319	0.048635	1.8E-05
75 Diesel	0.000657	0.000795	0.000946	0.01102	0.010526	1.944533	0.000234
100 Diesel	0.000997	0.001206	0.001435	0.007996	0.009086	1.275703	0.000664
175 Diesel	0.003933	0.004759	0.005663	0.050946	0.040055	8.595035	0.001828
300 Diesel	5.44E-05	6.58E-05	7.83E-05	0.000239	0.000572	0.062232	3.4E-05
50 Diesel	3.99E-05	4.83E-05	5.75E-05	0.000111	8.93E-05	0.007781	1.11E-05
75 Diesel	4.87E-05	5.89E-05	7.01E-05	0.000196	0.000352	0.02552	3.2E-05
100 Diesel	9.27E-05	0.000112	0.000134	0.000428	0.000673	0.059245	6.67E-05
175 Diesel	0.000207	0.000251	0.000299	0.001318	0.001987	0.194116	0.00012
300 Diesel	0.000215	0.00026	0.00031	0.000968	0.002025	0.237643	0.000134
50 Diesel	0.000251	0.000304	0.000361	0.000948	0.000767	0.08404	7.94E-05
75 Diesel	0.00067	0.000811	0.000965	0.004525	0.00567	0.688811	0.000376
100 Diesel	0.001257	0.001521	0.001811	0.007632	0.009591	1.100736	0.000795
175 Diesel	0.007524	0.009103	0.010834	0.057113	0.06908	8.57308	0.004093
300 Diesel	0.009081	0.010988	0.013076	0.04105	0.088345	16.36544	0.004423
50 Diesel	1.05E-05	1.27E-05	1.51E-05	2.62E-05	2.15E-05	0.001792	2.84E-06

75	Diesel	3.59E-05	4.35E-05	5.17E-05	0.000172	0.000276	0.025427	2.23E-05
100	Diesel	3.4E-05	4.12E-05	4.9E-05	0.000204	0.000283	0.030151	2.15E-05
175	Diesel	0.000496	0.0006	0.000714	0.002107	0.004823	0.222973	0.000341
300	Diesel	0.004495	0.005438	0.006472	0.017211	0.04878	3.615654	0.002959
50	Diesel	0.002712	0.003281	0.003905	0.012698	0.011067	1.428258	0.000821
75	Diesel	0.005501	0.006656	0.007922	0.063454	0.063345	10.62982	0.002232
100	Diesel	0.003296	0.003988	0.004746	0.033657	0.032001	5.350417	0.002215
175	Diesel	0.00043	0.00052	0.000619	0.009182	0.004251	1.603114	0.000147
300	Diesel	6.95E-05	8.41E-05	0.0001	0.000334	0.000651	0.128338	3.51E-05
50	Diesel	5.02E-05	6.07E-05	7.22E-05	0.000172	0.00014	0.013835	1.47E-05
75	Diesel	2.47E-05	2.99E-05	3.56E-05	0.000166	0.000217	0.024908	1.46E-05
100	Diesel	4.1E-05	4.96E-05	5.9E-05	0.000216	0.000308	0.030157	3.14E-05
175	Diesel	0.000117	0.000141	0.000168	0.000913	0.00106	0.139158	6.39E-05
300	Diesel	0.000141	0.000171	0.000203	0.000514	0.001419	0.157986	7.99E-05
25	Diesel	2.8E-07	3.39E-07	4.04E-07	2.9E-06	2.54E-06	0.000363	1.78E-07
50	Diesel	0.004163	0.005038	0.005995	0.015376	0.012789	1.393957	0.001255
75	Diesel	0.006442	0.007795	0.009277	0.043498	0.055053	6.701576	0.003503
100	Diesel	0.015654	0.018942	0.022542	0.105022	0.122914	15.69111	0.009555
175	Diesel	0.009503	0.011498	0.013684	0.105228	0.088626	17.05367	0.004549
300	Diesel	0.003698	0.004475	0.005325	0.017544	0.036747	7.186884	0.001819
50	Diesel	0.000878	0.001062	0.001264	0.003957	0.003637	0.447963	0.000279
75	Diesel	0.000211	0.000255	0.000303	0.00099	0.001637	0.139472	0.000138
100	Diesel	0.000306	0.000371	0.000441	0.001181	0.002083	0.156559	0.000185
175	Diesel	0.000311	0.000376	0.000447	0.001823	0.002926	0.258892	0.000177
300	Diesel	0.000182	0.00022	0.000262	0.000651	0.002025	0.157573	0.000114
Aggregate	Gasoline	0.083792	0.084597	0.092233	4.003773	0.041278	8.467009	0.000541
25	Diesel	0.001759	0.002128	0.002532	0.009742	0.008695	1.229967	0.000441

PM2.5_tpd	SOx_tpd	NH3_tpd	Fuel Consumption	Total_Activity_hpy	Total_Populati	Horsepowe
0.000754	1.37E-05	1.24E-05	49322.79207	32336.7209	128.6437067	1762967
0.026738	0.000332	0.0003	1192293.286	138007.2576	1554.355142	42616693
0.030189	0.000372	0.000335	1329989.464	148174.8158	1170.471618	47538431
0.052728	0.000912	0.000819	3254051.624	150645.2637	1689.705949	1.16E+08
0.026844	0.000778	0.000697	2772590.116	194410.7548	1006.39554	1.1E+08
0.013292	0.000621	0.000556	2210531.436	123934.5975	322.6108551	87839007
0.000406	1.12E-05	1.01E-05	40006.84272	41329.12384	114.0314997	1715980
0.000817	2.43E-05	2.19E-05	86893.205	37362.3758	160.8029079	3727037
2.4E-05	1.39E-06	1.25E-06	4953.253277	4040.99067	2.385364406	236190.5
0.000712	1.7E-05	1.53E-05	60782.54439	28322.21621	17.52909393	2318680
7.73E-05	2.52E-06	2.26E-06	8967.584279	10168.4084	2.251971837	342087.7
3.19E-05	6.44E-07	5.78E-07	2298.630909	1973.877334	1.316970804	78874.59
0.000304	8.52E-06	7.64E-06	30371.26954	2858.379648	11.30262176	1305497
0.000565	1.83E-05	1.64E-05	65135.12296	14707.03171	12.08231688	2799807
3.98E-05	7.18E-07	6.47E-07	2570.61675	4628.499485	2.577402761	110259.3
0.000219	4.42E-06	3.97E-06	15769.78324	14915.74838	13.13470416	676400
0.001186	1.79E-05	1.61E-05	63935.43	28077.90377	41.67060746	2742329
0.002508	6.88E-05	6.17E-05	245406.7459	36622.93413	158.0516922	11701956
0.000453	1.22E-05	1.1E-05	43625.05109	19809.02867	10.92432015	2080214
0.000571	9.89E-06	8.91E-06	35410.0499	40744.36699	47.88418101	1518813
0.00297	5.94E-05	5.33E-05	212032.6318	76150.15861	167.5388994	9094537
0.001167	2.04E-05	1.83E-05	72761.37238	50911.01167	45.48639586	3120892
0.000187	5.22E-06	4.68E-06	18620.92939	11646.67984	9.013765514	887918.9
1.21E-05	2.45E-07	2.2E-07	874.3133206	7891.435399	0.596341093	35715.41
0.000178	4.85E-06	4.35E-06	17297.57829	12150.02589	7.25445621	785539.4
0.000303	9.88E-06	8.86E-06	35220.45638	9611.012022	9.118145351	1599476
0.000119	2.78E-06	2.5E-06	9950.031615	1969.803633	24.52669063	384718.7
0.000695	1.09E-05	9.8E-06	38969.84553	27484.72461	44.74615992	1506772
0.000496	9.92E-06	8.9E-06	35379.76003	17209.30143	22.15210239	1367961
0.00506	7.73E-05	6.94E-05	275813.9656	81685.95616	142.2795592	10664367
0.00188	4.82E-05	4.33E-05	171977.614	67113.35996	70.79270493	7392389
0.001257	3.24E-05	2.9E-05	115470.1299	18737.87615	23.14204662	4963438
0.000416	8.39E-06	7.53E-06	29936.9816	20171.80006	19.3177318	1157516
0.002252	3.74E-05	3.36E-05	133503.2647	54939.13946	65.78233967	5161914
0.001887	4.93E-05	4.43E-05	175907.3179	60085.94278	70.5851722	7561306
0.000664	2.16E-05	1.93E-05	76857.65751	13328.01498	14.01694681	3303696

4.14E-06	9.64E-08	8.69E-08	345.2474287	5445.61209	1.037796952	14103.24
0.00026	4.66E-06	4.2E-06	16695.22865	28221.62453	21.99855427	681994.7
0.009275	0.000138	0.000124	493820.8551	35908.90002	444.1102102	20172421
0.000477	8.02E-06	7.2E-06	28622.06828	10019.59449	15.99055599	1169202
0.001272	3.36E-05	3.02E-05	119927.4023	58584.49374	46.02028459	5446294
0.001135	3.03E-05	2.72E-05	108077.2822	41771.34271	23.92456758	4908142
0.000189	3.4E-06	3.06E-06	12174.69192	2858.379648	11.30262179	435165.7
0.000236	4.75E-06	4.26E-06	16929.32443	6214.521304	11.75189261	605112.7
0.001042	1.84E-05	1.65E-05	65554.42592	18052.15365	29.08890482	2343142
0.000205	5.04E-06	4.52E-06	17971.43215	13683.56138	5.896762278	714123.6
0.000414	1.34E-05	1.2E-05	47729.06956	14585.29971	9.516763779	1896591
3.84E-05	5.9E-07	0	2025.10412	1818.780778	3.800875972	36110.69
8.69E-05	2.28E-06	0	7816.285748	4378.614699	8.853259886	139376.3
0.00013	1.72E-06	0	5909.605748	2399.934968	4.681566746	105377.3
0.000581	1.23E-05	0	42218.47718	11960.04399	18.5408584	836922.1
0.000657	1.44E-05	0	49549.63717	8690.342859	14.5082217	982252.1
2.33E-07	1.8E-09	0	6.175065362	17.45712376	0.092704292	110.1108
3.66E-06	4.35E-08	0	149.2698393	228.9505544	1.205155796	2661.708
2.38E-05	1.79E-07	0	613.3676836	615.3486545	3.569115242	10937.28
5.87E-05	5.23E-07	0	1792.752763	1286.876036	6.999174046	31967.51
0.000374	4.85E-06	0	16620.25091	7814.464424	31.47310713	329473.2
0.000784	1.78E-05	0	61050.99456	17464.91051	70.82607909	1210250
3.58E-05	2.87E-07	0	984.9294896	1045.412953	3.986284556	17562.79
0.000264	2.1E-06	0	7208.395069	4488.943169	15.80608179	128536.6
0.000748	8.41E-06	0	28860.13241	13617.0809	39.77014127	514620.1
0.001395	3.2E-05	0	109795.667	37398.00204	81.67248125	2176545
0.001605	3.87E-05	0	132857.0014	27879.6674	66.14451234	2633704
1.36E-07	1.05E-09	0	3.61796982	21.2216793	0.046352146	64.51391
0.00123	3.76E-05	0	128849.9712	170326.9838	346.3895871	2297591
0.000519	2.98E-05	0	102290.3392	77797.95634	143.2744833	1823992
0.001097	2.26E-05	0	77659.89018	40672.68765	75.41494154	1384794
0.003226	0.000128	0	440221.8471	156661.228	214.285971	8726781
0.003293	0.000136	0	464879.001	103171.0724	159.6367908	9215575
1.4E-05	9.49E-08	0	325.4539065	393.4132147	1.715029402	5803.338
6E-05	2.88E-07	0	986.9437899	702.3217058	3.291002366	17598.71
0.000146	7.69E-07	0	2638.895607	1349.584515	5.701313958	47055.52
0.001427	1.27E-05	0	43419.61168	14523.50858	48.53069686	860732.9
0.001335	4.83E-05	0	165660.6859	35320.61317	90.85020616	3283991
4.21E-06	2.28E-09	1.96E-09	7.803629719	0	1.227770123	0
1.39E-06	6.74E-10	5.8E-10	2.309017475	0	0.86751199	0
8.3E-07	4.48E-10	3.86E-10	1.536795319	0	0.321403354	0
5.51E-06	2.08E-07	1.34E-07	532.9	386.9	0.66	12767.7
6.07E-07	3.23E-10	2.78E-10	1.105445512	0	0.446780632	0
4.28E-06	2.31E-09	1.99E-09	7.92515596	0	0.704484038	0
2.22E-06	1.2E-09	1.03E-09	4.108511942	0	0.919065147	0
1.16E-06	6.07E-10	5.23E-10	2.079623046	0	0.276845044	0
1.91E-06	1.03E-09	8.9E-10	3.54294592	0	0.690449575	0

1.35E-05	7.27E-09	6.26E-09	24.91609607	0	5.481570573	0
7.05E-07	3.81E-10	3.28E-10	1.304286035	0	0.164239868	0
2.37E-06	9.18E-08	5.97E-08	237.25	146	0.26	5402
0.000234	1.21E-07	1.04E-07	415.3600357	0	72.97465961	0
2.06E-05	1.1E-08	9.51E-09	37.84121263	0	5.166245795	0
1.99E-05	1.07E-08	9.25E-09	36.81691856	0	3.692165006	0
0.000517	5.87E-06	0	20120.90867	22398.5109	37.26712538	358786.4
0.000397	5.12E-06	0	17557.17245	12266.4381	20.11683136	313071.1
0.000363	5.11E-06	0	17543.48651	8486.584558	13.3030659	312827
0.000723	2.82E-05	0	96696.32403	30417.08766	29.43361271	1916869
0.000482	1.22E-05	0	41785.04569	8877.13759	11.49533221	828330
1.78E-05	2.64E-07	0	907.10591	1514.153557	2.410311592	16175.08
2.62E-05	2.62E-07	0	898.802903	622.6339707	1.205155796	16027.02
8.2E-06	1.35E-07	0	462.0815318	253.6722887	0.417169314	8239.617
0.000365	6.91E-06	0	23689.68911	7828.119782	8.992316324	469614.9
0.000961	1.53E-05	0	52511.31897	11907.34737	17.84557621	1040963
5.07E-05	5.44E-07	0	1866.968805	2139.947297	6.164835418	33290.89
0.000168	2.83E-06	0	9719.244351	6235.847695	15.99149037	173308.9
0.000187	3.1E-06	0	10650.29677	5398.90825	12.28331869	189911
0.000352	1.05E-05	0	35874.93223	12099.03043	21.73915647	711170.2
0.000237	1.28E-05	0	44026.53521	9123.587571	16.08419466	872764.4
5.68E-05	1.47E-06	0	5043.910584	6778.360065	17.05758973	89940.6
4.86E-05	1.07E-06	0	3660.054562	2767.433691	6.72106117	65264.34
0.00011	1.65E-06	0	5656.423945	3245.881928	7.64810409	100862.6
0.000282	1.17E-05	0	40299.84567	16432.89715	24.70569382	798888
0.000134	5.21E-06	0	17889.24828	4216.974577	7.833512674	354629.3
0.000803	1.37E-05	0	47079.5383	63205.06448	173.357026	839499.8
0.000269	5.61E-06	0	19251.13286	13368.06075	35.22763096	343277
0.000647	8.28E-06	0	28388.61834	15531.02836	41.80963569	506212.2
0.001452	5.02E-05	0	172174.1809	67656.77136	113.2846448	3413112
0.000234	4.07E-06	0	13955.07604	3257.791944	7.509047652	276639.8
1.66E-05	4.61E-07	0	1580.395098	1593.956407	5.747666104	28180.85
0.000216	1.84E-05	0	63187.92628	40030.43651	117.4099858	1126737
0.000611	1.21E-05	0	41454.19434	21460.85877	67.2106117	739191.3
0.001682	8.14E-05	0	279297.1517	114377.575	235.8397188	5536675
3.13E-05	5.9E-07	0	2022.239168	478.7882177	1.436916526	40088.06
1.02E-05	7.37E-08	0	252.8546476	290.345575	0.834338628	4508.783
2.94E-05	2.42E-07	0	829.268895	599.6688765	1.39056438	14787.13
6.14E-05	5.61E-07	0	1925.162266	989.9622811	2.3176073	34328.57
0.00011	1.84E-06	0	6307.819224	2189.870984	3.847228118	125043.7
0.000123	2.25E-06	0	7722.248892	1677.678429	3.105593782	153082.8
7.3E-05	7.96E-07	0	2730.902802	3431.690341	7.138230484	48696.15
0.000346	6.52E-06	0	22383.02038	16688.77491	31.8439243	399123.3
0.000731	1.04E-05	0	35768.61127	20521.93029	38.65768976	637808.7
0.003765	8.12E-05	0	278583.7339	104059.6088	144.3869348	5522532
0.004069	0.000155	0	531797.7826	129909.071	182.7665117	10542146
2.61E-06	1.7E-08	0	58.21766147	52.21201044	0.23176073	1038.109

2.05E-05	2.41E-07	0	826.2477049	473.2332935	1.807733694	14733.25
1.97E-05	2.86E-07	0	979.7507566	441.399146	1.436916526	17470.45
0.000314	2.11E-06	0	7245.534198	2000.066424	8.714203448	143632.6
0.002722	3.43E-05	0	117491.2918	20283.57192	68.69388037	2329100
0.000755	1.35E-05	0	46411.48849	53286.9721	136.3680135	827587.4
0.002053	0.000101	0	345417.9782	248347.3683	531.2882975	6159328
0.002038	5.07E-05	0	173862.7366	100010.4885	207.3331491	3100237
0.000136	1.52E-05	0	52093.48059	24920.44586	35.92291315	1032680
3.23E-05	1.22E-06	0	4170.353077	1073.444066	1.946790132	82671.4
1.35E-05	1.31E-07	0	449.5578422	726.6702068	1.575972964	8016.3
1.34E-05	2.36E-07	0	809.3800173	752.3757061	1.529620818	14432.48
2.89E-05	2.86E-07	0	979.9427093	674.2108056	1.436916526	17473.87
5.88E-05	1.32E-06	0	4521.948327	2248.568547	3.47641095	89641.29
7.35E-05	1.5E-06	0	5133.791008	1423.274029	2.642072322	101770.2
1.63E-07	3.44E-09	0	11.79431804	24.7133526	0.092704292	210.3106
0.001155	1.32E-05	0	45296.8846	58409.93115	149.7174316	807712.4
0.003223	6.35E-05	0	217768.8971	158588.1354	353.6205218	3883151
0.008791	0.000149	0	509885.4126	280829.8113	587.0962812	9092032
0.004185	0.000162	0	554161.9887	234738.3121	348.290025	10985485
0.001674	6.81E-05	0	233539.0382	57095.78754	95.85623793	4629584
0.000257	4.24E-06	0	14556.62492	12442.28027	40.23366273	259566.8
0.000127	1.32E-06	0	4532.180769	2612.234843	8.80690774	80815.68
0.000171	1.48E-06	0	5087.406986	2074.681297	7.230934776	90716.2
0.000163	2.45E-06	0	8412.749717	2684.403901	7.230934776	166771
0.000105	1.49E-06	0	5120.350978	904.4587316	2.78112876	101503.8
0.000409	0.000144	0.000199	561373.3663	0	6318.542912	0

0.000406	1.12E-05	1.01E-05	40006.84272	41329.12384	114.0314997	1715980

Table 23-1: Conversions

Days/YR	lbs / ton	grams / lbs
365	2000	453.59237

er_Hours_hhpy	HC_g_hp-hr	TOG_g_hp-hr	NH3_g_hp-hr	ROG_g_hp-hr	CO_g_hp-hr
	0.914530198	1.316923483	0.002330495	1.106581539	3.234171959
	0.851114203	1.225604456	0.002330495	1.029848185	3.136346075
	0.424701483	0.611570136	0.002330495	0.513888794	2.060337494
	0.263586394	0.379564408	0.002330495	0.318939538	1.81004018
	0.174450588	0.251208846	0.002096303	0.211085211	1.549289089
	0.115130217	0.165787512	0.002096303	0.139307563	0.641954121
	0.339357309	0.488674524	0.001942079	0.410622343	1.879919513
	0.253235885	0.364659675	0.001942079	0.306415421	1.693208872
	0.08020362	0.115493214	0.00174692	0.09704638	1.171722009
	0.212098755	0.305422208	0.002183649	0.256639494	1.667034575
	0.161700295	0.232848425	0.002183649	0.195657356	0.83798004
	0.292448725	0.421126164	0.002427599	0.353862954	1.893263132
	0.170021628	0.244831145	0.001937903	0.205726171	1.43925503
	0.145627723	0.20970392	0.001937903	0.176209544	0.729737996
	0.50334186	0.724812275	0.001942079	0.609043649	2.144898336
	0.233958981	0.336900933	0.001942079	0.283090368	1.514610497
	0.252362711	0.363402302	0.001942079	0.305358881	1.559305452
	0.156266909	0.225024348	0.00174692	0.189082959	1.252198635
	0.151367799	0.217969631	0.00174692	0.183155036	0.71101066
	0.507825798	0.731269148	0.001942079	0.614469216	2.165972789
	0.234393365	0.337526445	0.001942079	0.283615971	1.514409136
	0.225664668	0.324957123	0.001942079	0.273054248	1.521714033
	0.153499711	0.221039585	0.00174692	0.185734651	1.300085808
	0.245656939	0.353745995	0.002039183	0.297244898	1.590341033
	0.163428726	0.235337365	0.001834266	0.197748758	1.390827237
	0.135828252	0.195592682	0.001834266	0.164352184	0.703903243
	0.558369992	0.804052786	0.002154398	0.675627693	2.379390602
	0.625285222	0.900410719	0.002154398	0.75659512	2.568472484
	0.259236968	0.373301233	0.002154398	0.31367673	1.686096027
	0.274798807	0.395710282	0.002154398	0.332506555	1.734145005
	0.179845252	0.258977164	0.001937903	0.217612756	1.460565301
	0.17574886	0.253078359	0.001937903	0.21265612	0.831490822
	0.259536711	0.373732865	0.002154398	0.314039422	1.680196285
	0.259488783	0.373663848	0.002154398	0.313981428	1.703393907
	0.177657787	0.255827213	0.001937903	0.214965922	1.455504601
	0.144545296	0.208145226	0.001937903	0.174899809	0.736836485

0.52850894	0.761052873	0.002039183	0.63949582	2.252143229
0.529296851	0.762187463	0.002039183	0.640449188	2.25796358
0.289967006	0.417552489	0.002039183	0.350860077	1.682592183
0.243767971	0.351025879	0.002039183	0.294959246	1.608707745
0.166904934	0.240343105	0.001834266	0.20195497	1.375469987
0.161200391	0.232128564	0.001834266	0.195052473	0.772999552
0.604010175	0.86977465	0.002330495	0.730852307	2.573877861
0.280742233	0.404268817	0.002330495	0.3396981	1.819508977
0.267803954	0.385637693	0.002330495	0.324042784	1.826938139
0.199887044	0.287837344	0.002096303	0.241863323	1.592128473
0.156880731	0.225908254	0.002096303	0.189825685	0.795522143
1.107728669	1.595129283	0	1.340351689	5.592857896
0.404813182	0.582930981	0	0.48982395	3.616985428
0.660503734	0.951125377	0	0.799209518	3.975990849
0.478071693	0.688423238	0	0.578466748	3.325885344
0.442039847	0.636537379	0	0.534868214	1.568177832
4.176966906	6.014832345	0	5.054129956	10.20201801
1.569765805	2.260462759	0	1.899416624	5.456567088
1.110824438	1.599587191	0	1.34409757	4.354121435
0.941887565	1.356318094	0	1.139683954	4.228632687
0.651472308	0.938120124	0	0.788281493	3.599762057
0.369366871	0.531888294	0	0.446933914	1.732890462
2.217760504	3.193575125	0	2.683490209	7.016560011
1.074274	1.54695456	0	1.29987154	4.413833833
0.816946216	1.17640255	0	0.988504921	4.039112744
0.408633462	0.588432185	0	0.494446489	3.321066153
0.372101366	0.535825967	0	0.450242653	1.638639587
3.669962342	5.284745772	0	4.440654434	9.139906214
0.517810043	0.745646462	0	0.626550152	4.245033205
0.260510015	0.375134422	0	0.315217118	3.394373266
0.398147168	0.573331922	0	0.481758074	3.627072091
0.285335403	0.41088298	0	0.345255837	3.16289956
0.271148935	0.390454466	0	0.328090211	1.219623038
2.711933604	3.905184389	0	3.281439661	7.774729153
1.721308893	2.478684806	0	2.08278376	5.185041546
1.600337813	2.304486451	0	1.936408754	5.102814092
0.941144413	1.355247955	0	1.13878474	4.008973901
0.266126193	0.383221717	0	0.322012693	1.259122648
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0.405778877	0.584321584	0.003476787	0.4829104	3.337867643
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0.418980676	0.603332173	0.003658446	0.49862163	3.407298607
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
1.705935642	2.456547324	0	2.064182126	6.832713927
0.779677785	1.122736011	0	0.94341012	4.056392049
0.659782479	0.950086769	0	0.798336799	4.017734848
0.289870516	0.417413542	0	0.350743324	3.343108534
0.394538074	0.568134827	0	0.47739107	1.55894852
1.106476332	1.593325918	0	1.338836362	6.063275085
0.854086288	1.229884255	0	1.033444409	4.17637038
0.802310234	1.155326738	0	0.970795384	4.12216659
0.498413154	0.717714942	0	0.603079917	3.557389753
0.559576122	0.805789616	0	0.677087108	2.038811536
1.895093753	2.728935004	0	2.293063441	6.529083986
0.635735367	0.915458929	0	0.769239794	3.8004948
0.572014704	0.823701174	0	0.692137792	3.858287855
0.376039488	0.541496862	0	0.45500778	3.205525444
0.220893279	0.318086321	0	0.267280867	1.107248233
0.681462647	0.981306212	0	0.824569803	4.370665504
0.528638076	0.761238829	0	0.639652072	3.711734365
0.607375786	0.874621132	0	0.734924701	3.880412084
0.266993873	0.384471177	0	0.323062586	3.168567071
0.27434062	0.395050492	0	0.33195215	1.22112459
1.089246889	1.56851552	0	1.317988736	5.089022545
0.48915726	0.704386455	0	0.591880285	3.611225669
0.708559619	1.020325852	0	0.85735714	3.957939755
0.319844049	0.46057543	0	0.387011299	3.183786204
0.491847001	0.708259682	0	0.595134872	1.876099649
0.576844862	0.830656601	0	0.697982283	3.923043983
0.193139662	0.278121113	0	0.233698991	3.2385366
0.446483518	0.642936266	0	0.540245057	3.581939312
0.235203453	0.338692973	0	0.284596178	3.046838145
0.449397176	0.647131934	0	0.543770583	1.976398807
2.932875009	4.223340013	0	3.548778761	8.178609462
1.089633008	1.569071532	0	1.31845594	4.387569819
0.894577804	1.288192038	0	1.082439143	4.124745964
0.548992483	0.790549176	0	0.664280905	3.491290807
0.464903358	0.669460836	0	0.562533063	2.094511382
1.705817009	2.456376494	0	2.064038581	6.448892867
0.555999642	0.800639485	0	0.672759567	3.753915159
0.652739054	0.939944238	0	0.789814255	3.961970518
0.451100477	0.649584688	0	0.545831578	3.424392797
0.285225436	0.410724628	0	0.345122778	1.289360146
3.347948346	4.821045618	0	4.051017498	8.360206297

0.807454231	1.162734092	0	0.977019619	3.86933466
0.645097484	0.928940377	0	0.780567956	3.870085454
1.142814393	1.645652727	0	1.382805416	4.856474013
0.638982519	0.920134827	0	0.773168847	2.446813918
1.084999772	1.562399672	0	1.312849724	5.08042933
0.295735292	0.42585882	0	0.357839703	3.411260708
0.352046203	0.506946532	0	0.425975906	3.594728248
0.137812808	0.198450443	0	0.166753497	2.944115631
0.278460279	0.400982802	0	0.336936937	1.339441036
2.071525349	2.982996503	0	2.506545672	7.108905364
0.56766388	0.817435987	0	0.686873295	3.802441057
0.776672439	1.118408312	0	0.939773651	4.088841942
0.431021227	0.620670566	0	0.521535684	3.372511868
0.458490756	0.660226689	0	0.554773815	1.672924517
0.441300831	0.635473196	0	0.533974005	4.570974992
1.706737839	2.457702488	0	2.065152785	6.303546179
0.549356967	0.791074033	0	0.66472193	3.709136397
0.570108919	0.820956843	0	0.689831792	3.824806021
0.286430224	0.412459523	0	0.346580571	3.171766854
0.2644913	0.380867472	0	0.320034473	1.254830835
1.119884189	1.612633232	0	1.355059868	5.048219797
0.863092313	1.242852931	0	1.044341699	4.056848801
1.117971786	1.609879372	0	1.352745861	4.312200122
0.616848894	0.888262408	0	0.746387162	3.620045376
0.59256467	0.853293125	0	0.717003251	2.123227384
49.42410741	54.40279942	0.117423119	49.89899041	2361.599724

14.55576721	20.96030473	0.083299976	17.6124783	80.63380419

NOx_g_hp-hr	PM10_g_hp-hr	PM2.5_g_hp-hr	CO2_g_hp-hr	gal/hp-hr
2.372012881	0.153992326	0.14167294	284.8072279	0.027977
2.525897676	0.225812161	0.207747188	284.8072276	0.027977
3.471946078	0.22856291	0.210277878	284.8072276	0.027977
2.350659157	0.163162453	0.150109456	284.8072275	0.027977
1.916471693	0.087694339	0.080678792	256.1869076	0.025166
1.231008221	0.054465068	0.050107862	256.1869074	0.025166
1.677818408	0.085182793	0.07836817	237.339356	0.023314
1.57032078	0.078897955	0.072586119	237.3393564	0.023314
0.963138246	0.036523447	0.033601572	213.4890884	0.020971
2.329192029	0.110539289	0.101696146	266.8613611	0.026214
1.782697098	0.081279991	0.074777592	266.8613621	0.026214
2.610130479	0.145642285	0.133990902	296.6741976	0.029143
1.865706257	0.08387639	0.07716628	236.8289195	0.023264
1.569873128	0.072662397	0.066849405	236.828921	0.023264
1.755820968	0.129979656	0.119581283	237.3393579	0.023314
2.088104359	0.116513831	0.107192725	237.3393527	0.023314
2.170439737	0.155684633	0.143229863	237.339357	0.023314
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1.497465601	0.068275195	0.062813179	224.1635429	0.02202
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1.898136689	0.091133327	0.083842661	236.8289223	0.023264
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1.951458683	0.089831961	0.082645404	236.8289215	0.023264
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1.856156443	0.137392966	0.126401529	249.2063227	0.02448
2.464238782	0.165490387	0.152251156	249.2063225	0.02448
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1.832018021	0.084058824	0.077334118	224.1635447	0.02202
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3.969061012	0.224355168	0.206406755	571.4540783	0.05608
5.058616077	0.444570658	0.409005005	571.4540783	0.05608
4.360602089	0.249720303	0.229742679	514.0285459	0.050445
4.584896407	0.240609162	0.221360429	514.0285459	0.050445
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7.717420676	0.661183207	0.60828855	571.4540783	0.05608
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4.038094451	0.233240565	0.21458132	514.0285459	0.050445
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12.15691897	1.226851877	1.128703727	571.4540783	0.05608
11.56506188	1.120209874	1.030593084	571.4540783	0.05608
9.204500522	0.596629438	0.548899083	514.0285459	0.050445
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2.45186715	0.135676551	0.124822427	514.0285459	0.050445
3.845225609	0.209450767	0.192694706	514.0285459	0.050445
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6.910615701	0.589415531	0.542262289	571.4540783	0.05608
5.127622315	0.358168312	0.329514847	571.4540783	0.05608
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6.605951706	0.372957239	0.34312066	514.0285459	0.050445
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Sheet 9: On-Road Vehicle Operational Fuel Efficiency
EMFAC2021 San Joaquin Valley Fuel Efficiency Estimates for 2020

Table 9-1: 2020 San Joaquin Valley Average Vehicle Fuel Efficiency (Gasoline)

Vehicle Class	Population	Vehicle Miles Travelled Per Day	Gallons Per Day	Miles Per Gallon
HHDT	3.89	54.75	19.61	2.79
LDA	250,197.75	8,380,893.35	307,044.09	27.30
LDT1	24,119.17	651,886.14	28,647.85	22.76
LDT2	92,856.38	3,019,032.21	140,532.86	21.48
LHDT1	10,571.19	300,636.48	34,163.76	8.80
LHDT2	1,243.71	36,404.43	4,550.95	8.00
MCY	12,337.65	57,751.87	1,481.41	38.98
MDV	98,169.15	2,862,897.76	162,195.15	17.65
MH	1,800.61	13,244.67	3,005.56	4.41
MHDT	643.55	23,577.18	5,308.73	4.44
OBUS	206.27	8,117.68	1,779.72	4.56
SBUS	122.62	5,540.51	557.32	9.94
UBUS	47.50	3,578.82	761.73	4.70
TOTAL	492,319.43	15,363,615.85	690,048.73	22.26

Table 9-2: 2020 San Joaquin Valley Average Vehicle Fuel Efficiency (Diesel)

Vehicle Class	Population	Vehicle Miles Travelled Per Day	Gallons Per Day	Miles Per Gallon
HHDT	7,769.0	1,132,184.89	196,471.34	5.76
LDA	819.51	23,667.13	565.47	41.85
LDT1	8.87	93.14	3.80	24.54
LDT2	207.06	7,467.18	245.00	30.48
LHDT1	9,457.34	288,320.75	18,313.87	15.74
LHDT2	3,141.52	101,322.22	7,878.46	12.86
MCY	0.00	0.00	0.00	0.00
MDV	1,339.25	46,817.04	1,996.64	23.45
MH	656.04	5,028.04	534.14	9.41
MHDT	5,620.84	258,788.81	30,465.26	8.49
OBUS	83.86	5,756.09	837.64	6.87
SBUS	482.44	11,166.50	1,378.91	8.10
UBUS	104.43	7,124.18	835.03	8.53
TOTAL	29,690.20	1,887,735.98	259525.56	7.27

Table 9-3: 2020 San Joaquin Valley Average Vehicle Fuel Efficiency (Electricity)

Vehicle Class	Population	Vehicle Miles Travelled Per Day	Energy Consumption (kWh/day)	Miles Per kWh
HHDT	0.00	0.00	0.00	0.00
LDA	7,015.47	184,546.12	65,094.21	2.84
LDT1	12.59	258.67	98.02	2.64
LDT2	162.36	3,599.39	1,116.43	3.22
LHDT1	0.00	0.00	0.00	0.00
LHDT2	0.00	0.00	0.00	0.00
MCY	0.00	0.00	0.00	0.00
MDV	285.76	5,788.71	1,810.70	3.20
MH	0.00	0.00	0.00	0.00
MHDT	0.00	0.00	0.00	0.00
OBUS	0.00	0.00	0.00	0.00
SBUS	0.00	0.00	0.00	0.00
UBUS	17.16	766.36	1,335.95	0.57
TOTAL	7,493.34	194,959.24	69,455.30	2.81

Sheet 10: EMFAC Output

Source: EMFAC2021 (v1.0.2) Emissions Inventory
Region Type: County
Region: San Joaquin
Calendar Year: 2020
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for CVMT and EVMT, trips/day for Trips, kWh/day for Energy Consumption, tons/day for Emissi

Region	Calendar Ye	Vehicle Cat	Model Year	Speed	Fuel	Population	Total VMT	CVMT	EVMT
San Joaquin	2020	HHDT	Aggregate	Aggregate	Gasoline	3.888482	54.75296	54.75296	0
San Joaquin	2020	HHDT	Aggregate	Aggregate	Diesel	7769.04	1132185	1132185	0
San Joaquin	2020	HHDT	Aggregate	Aggregate	Natural Ga	171.2461	11983.22	11983.22	0
San Joaquin	2020	LDA	Aggregate	Aggregate	Gasoline	246442.7	8295815	8295815	0
San Joaquin	2020	LDA	Aggregate	Aggregate	Diesel	819.5131	23667.13	23667.13	0
San Joaquin	2020	LDA	Aggregate	Aggregate	Electricity	3260.427	111308.5	0	111308.5
San Joaquin	2020	LDA	Aggregate	Aggregate	Plug-in Hyb	3755.042	158315.9	85078.21	73237.66
San Joaquin	2020	LDT1	Aggregate	Aggregate	Gasoline	24118.18	651862.2	651862.2	0
San Joaquin	2020	LDT1	Aggregate	Aggregate	Diesel	8.87498	93.14199	93.14199	0
San Joaquin	2020	LDT1	Aggregate	Aggregate	Electricity	11.60602	236.686	0	236.686
San Joaquin	2020	LDT1	Aggregate	Aggregate	Plug-in Hyb	0.983017	45.89318	23.91371	21.97947
San Joaquin	2020	LDT2	Aggregate	Aggregate	Gasoline	92705.57	3015418	3015418	0
San Joaquin	2020	LDT2	Aggregate	Aggregate	Diesel	207.0582	7467.18	7467.18	0
San Joaquin	2020	LDT2	Aggregate	Aggregate	Electricity	11.56052	348.6524	0	348.6524
San Joaquin	2020	LDT2	Aggregate	Aggregate	Plug-in Hyb	150.804	6864.747	3614.013	3250.734
San Joaquin	2020	LHDT1	Aggregate	Aggregate	Gasoline	10571.19	300636.5	300636.5	0
San Joaquin	2020	LHDT1	Aggregate	Aggregate	Diesel	9457.339	288320.8	288320.8	0
San Joaquin	2020	LHDT2	Aggregate	Aggregate	Gasoline	1243.708	36404.43	36404.43	0
San Joaquin	2020	LHDT2	Aggregate	Aggregate	Diesel	3141.516	101322.2	101322.2	0
San Joaquin	2020	MCY	Aggregate	Aggregate	Gasoline	12337.65	57751.87	57751.87	0
San Joaquin	2020	MDV	Aggregate	Aggregate	Gasoline	97908.04	2857016	2857016	0
San Joaquin	2020	MDV	Aggregate	Aggregate	Diesel	1339.252	46817.04	46817.04	0
San Joaquin	2020	MDV	Aggregate	Aggregate	Electricity	24.64348	741.6242	0	741.6242
San Joaquin	2020	MDV	Aggregate	Aggregate	Plug-in Hyb	261.1117	10929.27	5882.188	5047.083
San Joaquin	2020	MH	Aggregate	Aggregate	Gasoline	1800.614	13244.67	13244.67	0
San Joaquin	2020	MH	Aggregate	Aggregate	Diesel	656.0405	5028.045	5028.045	0
San Joaquin	2020	MHDT	Aggregate	Aggregate	Gasoline	643.5474	23577.18	23577.18	0
San Joaquin	2020	MHDT	Aggregate	Aggregate	Diesel	5620.841	258788.8	258788.8	0
San Joaquin	2020	MHDT	Aggregate	Aggregate	Natural Ga	40.4475	2432.171	2432.171	0
San Joaquin	2020	OBUS	Aggregate	Aggregate	Gasoline	206.267	8117.675	8117.675	0
San Joaquin	2020	OBUS	Aggregate	Aggregate	Diesel	83.86442	5756.088	5756.088	0
San Joaquin	2020	OBUS	Aggregate	Aggregate	Natural Ga	1.39016	90.13768	90.13768	0
San Joaquin	2020	SBUS	Aggregate	Aggregate	Gasoline	122.6152	5540.506	5540.506	0
San Joaquin	2020	SBUS	Aggregate	Aggregate	Diesel	482.4362	11166.5	11166.5	0
San Joaquin	2020	SBUS	Aggregate	Aggregate	Natural Ga	80.3734	2069.97	2069.97	0
San Joaquin	2020	UBUS	Aggregate	Aggregate	Gasoline	47.50185	3578.821	3578.821	0

San Joaqui	2020	UBUS	Aggregate	Aggregate	Diesel	104.4255	7124.181	7124.181	0
San Joaqui	2020	UBUS	Aggregate	Aggregate	Electricity	17.15976	766.3601	0	766.3601
San Joaqui	2020	UBUS	Aggregate	Aggregate	Natural Ga	30.35904	1932.919	1932.919	0

ions, 1000 gallons/day for Fuel Consumption

Trips	Energy Con	NOx_RUNE	NOx_IDLEX	NOx_STREX	NOx_TOTE	PM2.5_RU	PM2.5_IDL	PM2.5_STF	PM2.5_TOT
77.80075	0	0.001454	0	0.000157	0.001611	7.27E-07	0	2.26E-07	9.53E-07
127111.8	0	3.920952	0.712906	0.30211	4.935967	0.066732	0.001036	0	0.067767
1384.798	0	0.025874	0.002335	0	0.028209	5.23E-05	3.8E-06	0	5.61E-05
1142654	0	0.644405	0	0.414743	1.059148	0.01353	0	0.002836	0.016366
3582.981	0	0.009028	0	0	0.009028	0.00053	0	0	0.00053
16527.13	42974.25	0	0	0	0	0	0	0	0
15527.1	22119.96	0.00066	0	0.001953	0.002613	0.00016	0	4.33E-05	0.000203
104367.4	0	0.178001	0	0.06922	0.247221	0.001935	0	0.000462	0.002398
27.51718	0	0.000156	0	0	0.000156	2.44E-05	0	0	2.44E-05
49.7959	91.38033	0	0	0	0	0	0	0	0
4.064777	6.638455	1.85E-07	0	5.11E-07	6.97E-07	3.92E-08	0	1.02E-08	4.94E-08
428686.1	0	0.448837	0	0.248503	0.69734	0.005239	0	0.001076	0.006316
978.3727	0	0.000765	0	0	0.000765	0.000105	0	0	0.000105
59.78584	134.6086	0	0	0	0	0	0	0	0
623.5746	981.8185	2.8E-05	0	7.84E-05	0.000106	7.06E-06	0	1.85E-06	8.91E-06
157495	0	0.106349	0.000475	0.12604	0.232864	0.000644	0	7.8E-05	0.000723
118961.4	0	0.870545	0.025013	0	0.895558	0.016922	0.000282	0	0.017204
18529.39	0	0.011237	5.54E-05	0.014429	0.025721	6.99E-05	0	7.5E-06	7.74E-05
39516.32	0	0.225617	0.008119	0	0.233736	0.004735	9.17E-05	0	0.004827
24675.3	0	0.04522	0	0.005027	0.050247	0.000116	0	9.31E-05	0.000209
444993.5	0	0.642305	0	0.352467	0.994772	0.005072	0	0.001225	0.006297
6408.079	0	0.006584	0	0	0.006584	0.000435	0	0	0.000435
127.2962	286.3281	0	0	0	0	0	0	0	0
1079.697	1524.37	4.56E-05	0	0.000136	0.000181	1.27E-05	0	3.54E-06	1.62E-05
180.1334	0	0.007981	0	7.89E-05	0.00806	2.71E-05	0	9.63E-08	2.72E-05
65.60405	0	0.029707	0	0	0.029707	0.000773	0	0	0.000773
12876.1	0	0.033198	6.14E-05	0.006839	0.040098	4.87E-05	0	1.19E-05	6.06E-05
67977.07	0	0.820961	0.134809	0.081801	1.037572	0.016641	0.000615	0	0.017256
367.1865	0	0.000254	0.000288	0	0.000542	3.71E-06	9.03E-07	0	4.62E-06
4126.99	0	0.008523	1.47E-05	0.002031	0.010569	7.69E-06	0	1.23E-06	8.91E-06
995.3751	0	0.029539	0.001974	0.001196	0.032708	0.000768	7.23E-06	0	0.000775
12.37242	0	5.81E-06	2.25E-06	0	8.06E-06	1.68E-07	8.52E-09	0	1.77E-07
490.4608	0	0.001462	0.000125	0.000346	0.001933	6.1E-06	0	3.51E-07	6.45E-06
6985.676	0	0.066126	0.013403	0.003163	0.082692	0.000362	1.57E-05	0	0.000377
1163.807	0	0.001125	0.000464	0	0.001589	7.71E-06	1.07E-06	0	8.78E-06
190.0074	0	0.000773	0	0.000191	0.000964	4.32E-06	0	1.95E-07	4.52E-06

417.7021	0	0.016128	0	0	0.016128	5.5E-05	0	0	5.5E-05
68.63904	1335.953	0	0	0	0	0	0	0	0
121.4361	0	0.000446	0	0	0.000446	7.02E-07	0	0	7.02E-07

PM2.5_PM	PM2.5_PM	PM2.5_TO	PM10_RUN	PM10_IDL	PM10_STR	PM10_TO	PM10_PM	PM10_PM	PM10_TO
3.02E-07	2.45E-06	3.7E-06	7.9E-07	0	2.46E-07	1.04E-06	1.21E-06	6.99E-06	9.23E-06
0.011043	0.034623	0.113433	0.069749	0.001082	0	0.070831	0.044172	0.098923	0.213927
0.000119	0.00061	0.000785	5.68E-05	4.14E-06	0	6.1E-05	0.000476	0.001742	0.002279
0.018289	0.027466	0.062121	0.014715	0	0.003084	0.017799	0.073157	0.078474	0.169429
5.22E-05	7.89E-05	0.000661	0.000554	0	0	0.000554	0.000209	0.000225	0.000988
0.000245	0.000187	0.000433	0	0	0	0	0.000982	0.000535	0.001517
0.000349	0.000249	0.000801	0.000174	0	4.71E-05	0.000221	0.001396	0.00071	0.002327
0.001437	0.002617	0.006452	0.002105	0	0.000503	0.002607	0.005748	0.007478	0.015834
2.05E-07	4.25E-07	2.51E-05	2.55E-05	0	0	2.55E-05	8.21E-07	1.21E-06	2.76E-05
5.22E-07	4.04E-07	9.26E-07	0	0	0	0	2.09E-06	1.15E-06	3.24E-06
1.01E-07	7.19E-08	2.22E-07	4.26E-08	0	1.11E-08	5.37E-08	4.05E-07	2.05E-07	6.64E-07
0.006648	0.011599	0.024562	0.005698	0	0.00117	0.006868	0.026591	0.03314	0.0666
1.65E-05	2.76E-05	0.000149	0.00011	0	0	0.00011	6.58E-05	7.87E-05	0.000254
7.69E-07	5.85E-07	1.35E-06	0	0	0	0	3.07E-06	1.67E-06	4.75E-06
1.51E-05	1.08E-05	3.48E-05	7.67E-06	0	2.02E-06	9.69E-06	6.05E-05	3.07E-05	0.000101
0.000663	0.009047	0.010432	0.000701	0	8.48E-05	0.000786	0.002651	0.025849	0.029286
0.000953	0.008676	0.026834	0.017688	0.000295	0	0.017982	0.003814	0.02479	0.046586
8.03E-05	0.001278	0.001436	7.6E-05	0	8.16E-06	8.42E-05	0.000321	0.003652	0.004057
0.000335	0.003557	0.008719	0.004949	9.58E-05	0	0.005045	0.00134	0.010164	0.016549
6.37E-05	0.000267	0.00054	0.000123	0	9.86E-05	0.000222	0.000255	0.000764	0.00124
0.006299	0.011363	0.023959	0.005514	0	0.001332	0.006845	0.025195	0.032465	0.064505
0.000103	0.000176	0.000714	0.000454	0	0	0.000454	0.000413	0.000504	0.001371
1.64E-06	1.24E-06	2.88E-06	0	0	0	0	6.54E-06	3.55E-06	1.01E-05
2.41E-05	1.71E-05	5.75E-05	1.38E-05	0	3.84E-06	1.76E-05	9.64E-05	4.9E-05	0.000163
4.38E-05	0.00023	0.000301	2.94E-05	0	1.04E-07	2.96E-05	0.000175	0.000658	0.000862
2.22E-05	8.7E-05	0.000882	0.000808	0	0	0.000808	8.87E-05	0.000249	0.001145
7.8E-05	0.00041	0.000548	5.29E-05	0	1.3E-05	6.59E-05	0.000312	0.001171	0.001549
0.000856	0.004501	0.022613	0.017394	0.000643	0	0.018037	0.003423	0.012859	0.034319
8.04E-06	4.28E-05	5.55E-05	4.04E-06	9.82E-07	0	5.02E-06	3.22E-05	0.000122	0.00016
2.68E-05	0.000141	0.000176	8.36E-06	0	1.33E-06	9.69E-06	0.000107	0.000402	0.000519
1.9E-05	0.000132	0.000926	0.000802	7.55E-06	0	0.00081	7.61E-05	0.000376	0.001263
2.98E-07	1.6E-06	2.08E-06	1.83E-07	9.27E-09	0	1.92E-07	1.19E-06	4.58E-06	5.97E-06
1.22E-05	9.6E-05	0.000115	6.64E-06	0	3.82E-07	7.02E-06	4.89E-05	0.000274	0.00033
3.69E-05	0.000194	0.000608	0.000378	1.64E-05	0	0.000394	0.000148	0.000553	0.001095
6.85E-06	3.59E-05	5.15E-05	8.38E-06	1.17E-06	0	9.55E-06	2.74E-05	0.000102	0.000139
1.18E-05	0.000152	0.000168	4.7E-06	0	2.12E-07	4.91E-06	4.73E-05	0.000434	0.000486

5.48E-05	0.000302	0.000412	5.75E-05	0	0	5.75E-05	0.000219	0.000864	0.00114
7.51E-06	1.63E-05	2.38E-05	0	0	0	0	3E-05	4.65E-05	7.65E-05
1.04E-05	8.18E-05	9.29E-05	7.34E-07	0	0	7.34E-07	4.16E-05	0.000234	0.000276

CO2_RUNE	CO2_IDLEX	CO2_STRE	CO2_TOTE	CH4_RUNE	CH4_IDLEX	CH4_STRE	CH4_TOTE	N2O_RUNE	N2O_IDLEX
0.181235	0	0.004758	0.185993	4.72E-05	0	3.01E-09	4.72E-05	2.87E-05	0
2064.966	134.4314	0	2199.398	0.004141	0.002555	0	0.006696	0.325336	0.02118
20.3458	1.819101	0	22.1649	0.036934	0.006199	0	0.043133	0.004148	0.000371
2786.204	0	96.35895	2882.563	0.036708	0	0.115221	0.151929	0.058552	0
6.330123	0	0	6.330123	4.47E-05	0	0	4.47E-05	0.000997	0
0	0	0	0	0	0	0	0	0	0
28.05028	0	1.172132	29.22241	9.81E-05	0	0.000717	0.000815	0.000119	0
260.2689	0	11.39843	271.6673	0.009263	0	0.01898	0.028243	0.01164	0
0.042488	0	0	0.042488	1.47E-06	0	0	1.47E-06	6.69E-06	0
0	0	0	0	0	0	0	0	0	0
0.007896	0	0.000341	0.008237	2.78E-08	0	1.89E-07	2.17E-07	3.41E-08	0
1284.679	0	46.78426	1331.463	0.017091	0	0.053132	0.070223	0.031281	0
2.742691	0	0	2.742691	1.08E-05	0	0	1.08E-05	0.000432	0
0	0	0	0	0	0	0	0	0	0
1.192894	0	0.056495	1.249388	4.19E-06	0	2.9E-05	3.32E-05	5.14E-06	0
318.131	1.439968	4.41359	323.9845	0.004986	0.001397	0.0068	0.013183	0.005736	3.39E-05
203.5717	1.442888	0	205.0146	0.003598	5.31E-05	0	0.003651	0.032073	0.000227
42.42549	0.194787	0.537676	43.15796	0.000463	0.000165	0.000764	0.001392	0.000619	4.07E-06
87.43219	0.763246	0	88.19543	0.00105	1.77E-05	0	0.001067	0.013775	0.00012
12.48196	0	1.566638	14.0486	0.013988	0	0.005915	0.019903	0.002895	0
1476.958	0	59.12144	1536.08	0.02411	0	0.074231	0.098341	0.040539	0
22.35135	0	0	22.35135	4.74E-05	0	0	4.74E-05	0.003521	0
0	0	0	0	0	0	0	0	0	0
1.940324	0	0.122111	2.062435	6.77E-06	0	4.98E-05	5.66E-05	8.24E-06	0
28.49608	0	0.006445	28.50253	0.000315	0	7.9E-06	0.000323	0.000454	0
5.979373	0	0	5.979373	3.7E-05	0	0	3.7E-05	0.000942	0
49.21657	0.394181	0.733434	50.34418	0.001191	0.00016	0.000794	0.002145	0.001367	3.96E-06
326.3255	14.7177	0	341.0432	0.001707	0.000122	0	0.001829	0.051413	0.002319
2.719582	0.252402	0	2.971984	0.002054	0.00073	0	0.002785	0.000554	5.15E-05
16.63549	0.088757	0.153305	16.87756	0.000235	4.22E-05	0.000185	0.000462	0.000372	1.06E-06
9.11228	0.264701	0	9.376981	9.95E-05	4.99E-06	0	0.000104	0.001436	4.17E-05
0.107932	0.002138	0	0.11007	8.57E-05	5.17E-06	0	9.08E-05	2.2E-05	4.36E-07
4.907368	0.34756	0.030311	5.285239	3.72E-05	0.000331	3.45E-05	0.000403	0.000102	1.24E-05
14.19681	1.239349	0	15.43616	4.69E-05	4.72E-06	0	5.17E-05	0.002237	0.000195
2.897633	0.374346	0	3.271979	0.007363	0.001318	0	0.008681	0.000591	7.63E-05
7.197869	0	0.025787	7.223657	1.56E-05	0	2.71E-05	4.26E-05	7.21E-05	0

9.347792	0	0	9.347792	2.48E-05	0	0	2.48E-05	0.001473	0
0	0	0	0	0	0	0	0	0	0
2.261124	0	0	2.261124	0.004011	0	0	0.004011	0.000461	0

N2O_STRE	N2O_TOTE	ROG_RUNI	ROG_IDLEX	ROG_STRE	ROG_TOTE	ROG_DIUR	ROG_HOTS	ROG_RUNI	ROG_TOTA
2.87E-06	3.16E-05	0.000318	0	1.64E-08	0.000318	5.44E-05	1.49E-05	0.000134	0.000521
0	0.346516	0.089162	0.055006	0	0.144168	0	0	0	0.144168
0	0.004518	0.001471	0.000114	0	0.001585	0	0	0	0.001585
0.046048	0.1046	0.153179	0	0.569826	0.723004	0.485368	0.140845	0.35329	1.702506
0	0.000997	0.000962	0	0	0.000962	0	0	0	0.000962
0	0	0	0	0	0	0	0	0	0
0.000353	0.000473	0.00031	0	0.002916	0.003226	0.002218	0.000698	0.000615	0.006758
0.005508	0.017148	0.043446	0	0.107638	0.151084	0.11756	0.030965	0.094455	0.394065
0	6.69E-06	3.16E-05	0	0	3.16E-05	0	0	0	3.16E-05
0	0	0	0	0	0	0	0	0	0
9.4E-08	1.28E-07	8.72E-08	0	7.63E-07	8.51E-07	4.08E-07	1.23E-07	1.22E-07	1.5E-06
0.021775	0.053056	0.0733	0	0.269291	0.342591	0.189932	0.053818	0.140341	0.726681
0	0.000432	0.000233	0	0	0.000233	0	0	0	0.000233
0	0	0	0	0	0	0	0	0	0
1.44E-05	1.95E-05	1.32E-05	0	0.000117	0.00013	6.85E-05	2.02E-05	2E-05	0.000239
0.008929	0.014699	0.025861	0.005443	0.035604	0.066908	0.039247	0.010966	0.054704	0.171825
0	0.0323	0.077467	0.001144	0	0.078612	0	0	0	0.078612
0.001046	0.001669	0.002284	0.000634	0.003944	0.006863	0.004155	0.001115	0.005666	0.017798
0	0.013895	0.022596	0.00038	0	0.022977	0	0	0	0.022977
0.000286	0.003181	0.09871	0	0.045573	0.144283	0.067523	0.09787	0.102812	0.412488
0.026194	0.066733	0.112834	0	0.409643	0.522477	0.230488	0.065561	0.173199	0.991725
0	0.003521	0.00102	0	0	0.00102	0	0	0	0.00102
0	0	0	0	0	0	0	0	0	0
2.45E-05	3.28E-05	2.14E-05	0	0.000203	0.000224	0.000133	3.75E-05	3.85E-05	0.000433
7.91E-06	0.000462	0.001494	0	3.55E-05	0.00153	0.01038	0.002917	6.32E-05	0.01489
0	0.000942	0.000797	0	0	0.000797	0	0	0	0.000797
0.000402	0.001773	0.006356	0.000699	0.004902	0.011956	0.00377	0.00101	0.007946	0.024682
0	0.053732	0.036746	0.002626	0	0.039372	0	0	0	0.039372
0	0.000606	2.94E-05	1.04E-05	0	3.98E-05	0	0	0	3.98E-05
0.000136	0.000509	0.001166	0.000168	0.001025	0.00236	0.000693	0.000176	0.000721	0.003951
0	0.001477	0.002141	0.000108	0	0.002249	0	0	0	0.002249
0	2.24E-05	1.22E-06	7.39E-08	0	1.3E-06	0	0	0	1.3E-06
3.37E-05	0.000148	0.000176	0.001435	0.000194	0.001805	0.000142	3.94E-05	8.92E-05	0.002075
0	0.002432	0.00101	0.000102	0	0.001112	0	0	0	0.001112
0	0.000667	0.000105	1.88E-05	0	0.000124	0	0	0	0.000124
1.8E-05	9.01E-05	5.09E-05	0	0.000114	0.000165	2.98E-05	7.99E-06	2.08E-05	0.000224

0	0.001473	0.000534	0	0	0.000534	0	0	0	0.000534
0	0	0	0	0	0	0	0	0	0
0	0.000461	7.47E-05	0	0	7.47E-05	0	0	0	7.47E-05

TOG_RUNE	TOG_IDLEX	TOG_STRE	TOG_TOTE	TOG_DIUR	TOG_HOTS	TOG_RUNI	TOG_TOTA	CO_RUNEX	CO_IDLEX
0.000464	0	1.79E-08	0.000464	5.44E-05	1.49E-05	0.000134	0.000667	0.019004	0
0.101504	0.062621	0	0.164125	0	0	0	0.164125	0.354372	0.706414
0.038769	0.006355	0	0.045124	0	0	0	0.045124	0.180646	0.012376
0.223408	0	0.623882	0.84729	0.485368	0.140845	0.35329	1.826792	10.03744	0
0.001096	0	0	0.001096	0	0	0	0.001096	0.011107	0
0	0	0	0	0	0	0	0	0	0
0.000453	0	0.003193	0.003646	0.002218	0.000698	0.000615	0.007177	0.046947	0
0.063347	0	0.117849	0.181196	0.11756	0.030965	0.094455	0.424176	1.907136	0
3.59E-05	0	0	3.59E-05	0	0	0	3.59E-05	0.00018	0
0	0	0	0	0	0	0	0	0	0
1.27E-07	0	8.36E-07	9.63E-07	4.08E-07	1.23E-07	1.22E-07	1.62E-06	1.33E-05	0
0.106895	0	0.294838	0.401733	0.189932	0.053818	0.140341	0.785824	4.555007	0
0.000266	0	0	0.000266	0	0	0	0.000266	0.00165	0
0	0	0	0	0	0	0	0	0	0
1.92E-05	0	0.000128	0.000147	6.85E-05	2.02E-05	2E-05	0.000256	0.002001	0
0.037542	0.007941	0.038979	0.084462	0.039247	0.010966	0.054704	0.189378	0.552459	0.043589
0.088191	0.001303	0	0.089494	0	0	0	0.089494	0.228929	0.009484
0.003333	0.000926	0.004319	0.008577	0.004155	0.001115	0.005666	0.019513	0.054023	0.005134
0.025725	0.000433	0	0.026157	0	0	0	0.026157	0.061969	0.00315
0.115791	0	0.049515	0.165306	0.067523	0.09787	0.102812	0.433511	1.068053	0
0.161708	0	0.448477	0.610185	0.230488	0.065561	0.173199	1.079433	5.395237	0
0.001161	0	0	0.001161	0	0	0	0.001161	0.015505	0
0	0	0	0	0	0	0	0	0	0
3.13E-05	0	0.000222	0.000253	0.000133	3.75E-05	3.85E-05	0.000462	0.003251	0
0.002134	0	3.88E-05	0.002173	0.01038	0.002917	6.32E-05	0.015533	0.038856	0
0.000908	0	0	0.000908	0	0	0	0.000908	0.002765	0
0.009274	0.001019	0.005367	0.015661	0.00377	0.00101	0.007946	0.028387	0.140176	0.010493
0.041832	0.00299	0	0.044822	0	0	0	0.044822	0.109146	0.044471
0.002097	0.000745	0	0.002842	0	0	0	0.002842	0.007883	0.00176
0.001702	0.000246	0.001122	0.00307	0.000693	0.000176	0.000721	0.004661	0.026675	0.001306
0.002438	0.000122	0	0.00256	0	0	0	0.00256	0.005709	0.001237
8.74E-05	5.28E-06	0	9.27E-05	0	0	0	9.27E-05	0.000343	1.7E-05
0.000257	0.002094	0.000212	0.002563	0.000142	3.94E-05	8.92E-05	0.002834	0.004141	0.011098
0.00115	0.000116	0	0.001266	0	0	0	0.001266	0.002928	0.002017
0.007514	0.001345	0	0.008859	0	0	0	0.008859	0.024328	0.001986
7.43E-05	0	0.000125	0.000199	2.98E-05	7.99E-06	2.08E-05	0.000258	0.001035	0

0.000608	0	0	0.000608	0	0	0	0.000608	0.001575	0
0	0	0	0	0	0	0	0	0	0
0.004113	0	0	0.004113	0	0	0	0.004113	0.043867	0

CO_STREX	CO_TOTEX	SOx_RUNE	SOx_IDLEX	SOx_STREX	SOx_TOTEX	NH3_RUNE	Fuel Consumption
0.000349	0.019353	1.79E-06	0	4.7E-08	1.84E-06	1.4E-06	0.019613
0	1.060786	0.019554	0.001273	0	0.020827	0.240509	196.4713
0	0.193021	0	0	0	0	0.011611	2.561924
5.32668	15.36412	0.027544	0	0.000953	0.028497	0.283276	303.9626
0	0.011107	6E-05	0	0	6E-05	8.09E-05	0.565467
0	0	0	0	0	0	0	0
0.02242	0.069367	0.000277	0	1.16E-05	0.000289	0.003345	3.081466
1.016648	2.923783	0.002573	0	0.000113	0.002686	0.02679	28.64698
0	0.00018	4.03E-07	0	0	4.03E-07	3.18E-07	0.003795
0	0	0	0	0	0	0	0
5.87E-06	1.91E-05	7.81E-08	0	3.37E-09	8.14E-08	1.11E-06	0.000869
2.453874	7.008881	0.0127	0	0.000463	0.013163	0.109226	140.4011
0	0.00165	2.6E-05	0	0	2.6E-05	2.55E-05	0.245003
0	0	0	0	0	0	0	0
0.0009	0.002902	1.18E-05	0	5.59E-07	1.24E-05	0.000166	0.131746
0.502899	1.098947	0.003145	1.42E-05	4.36E-05	0.003203	0.014839	34.16376
0	0.238413	0.001929	1.37E-05	0	0.001943	0.042114	18.31387
0.062602	0.121759	0.000419	1.93E-06	5.32E-06	0.000427	0.001804	4.550953
0	0.065119	0.000828	7.23E-06	0	0.000836	0.017462	7.878463
0.231522	1.299574	0.000123	0	1.55E-05	0.000139	0.000534	1.481407
2.874266	8.269503	0.014601	0	0.000584	0.015186	0.101325	161.9777
0	0.015505	0.000212	0	0	0.000212	0.00016	1.996637
0	0	0	0	0	0	0	0
0.001559	0.00481	1.92E-05	0	1.21E-06	2.04E-05	0.000272	0.217481
0.000747	0.039603	0.000282	0	6.37E-08	0.000282	0.00065	3.005556
0	0.002765	5.67E-05	0	0	5.67E-05	0.000617	0.534135
0.113064	0.263733	0.000487	3.9E-06	7.25E-06	0.000498	0.001159	5.308731
0	0.153617	0.00309	0.000139	0	0.003229	0.047071	30.46526
0	0.009644	0	0	0	0	0.002842	0.343516
0.02173	0.049711	0.000164	8.77E-07	1.52E-06	0.000167	0.000402	1.779717
0	0.006947	8.63E-05	2.51E-06	0	8.88E-05	0.000986	0.837642
0	0.00036	0	0	0	0	0.000105	0.012722
0.005076	0.020315	4.85E-05	3.44E-06	3E-07	5.22E-05	0.000275	0.557322
0	0.004945	0.000134	1.17E-05	0	0.000146	0.001402	1.378906
0	0.026314	0	0	0	0	0.002419	0.378191
0.002176	0.003211	7.12E-05	0	2.55E-07	7.14E-05	0.000178	0.761726

0	0.001575	8.86E-05	0	0	8.86E-05	0.001108	0.835035
0	0	0	0	0	0	0	0
0	0.043867	0	0	0	0	0.002067	0.261351

Carnegie SVRA RMA EIR

Operational Air Quality Emission Estimates and Transportation Energy Calculations
Prepared by: MIG, Inc.
November 2024

Contents:

Sheet 1: Emissions Summary

Table 1-1: 2021 Conditions: Annual Exhaust Emission Totals

Construction Phase / Source	AQ Emissions (short tons)					GHG Emissions (Metric tons)			
	ROG	CO	NOx	PM10 (Exh)	PM2.5 (Exh)	CO2	CH4	N2O	CO2e
Heavy-Duty Off-Road Equipment	0.0	0.2	0.1	0.0	0.0	30.4	0.0	0.0	30.5
Parks-Owned On- and Off-Road Vehicles	0.0	0.1	0.1	0.0	0.0	63.8	0.0	0.0	65.3
Small, Utility Off-Road Equipment	0.1	0.3	0.0	0.0	0.0	5.0	0.0	0.0	5.0
Worker and Vendor Trips	0.3	0.3	0.3	0.3	0.3	2.9	0.3	0.3	79.8
Total	0.4	0.9	0.6	0.3	0.3	102.1	0.3	0.3	180.6

Table 1-2: 2021 Conditions: Average Daily Exhaust Emission Totals

Construction Phase / Source	Emissions (pounds)				
	ROG	CO	NOx	PM10 (Exh)	PM2.5 (Exh)
Heavy-Duty Off-Road Equipment	0.0	1.9	1.1	0.0	0.0
Parks-Owned On- and Off-Road Vehicles	0.2	1.1	0.7	0.0	0.0
Small, Utility Off-Road Equipment	0.5	2.0	0.3	0.0	0.0
Worker and Vendor Trips	2.2	2.2	2.3	2.2	2.2
Total	2.9	7.1	4.4	2.3	2.3

Sheet 2: Off-Road Heavy-Duty Equipment Emissions

Table 2-1: Existing Heavy-Duty Equipment Emissions

Equipment	Annual Runtime	Horsepower	Load Factor	Emission Factor (g/hp-hr)								Emissions (short tons)							
				NOx	CO	ROG	PM10	PM2.5	CO2	CH4	N2O	NOx	CO	ROG	PM10	PM2.5	CO2	CH4	N2O
7130 TRACTOR	149.0	130	0.70	2.32	3.7	0.09	0.112	0.112	256.19	0.021	0.004	0.03	0.06	0.00	0.00	0.00	3.83	0.00	0.00
672G GRADER	152.2	255	0.41	1.29	2.6	0.06	0.009	0.009	514.03	0.021	0.004	0.02	0.05	0.00	0.00	0.00	9.02	0.00	0.00
430E BACKHOE	149.0	95	0.37	2.74	3.7	0.09	0.112	0.112	571.45	0.021	0.004	0.02	0.02	0.00	0.00	0.00	3.30	0.00	0.00
480 TRAIL DOZER	2.4	91	0.43	2.74	3.7	0.09	0.112	0.112	571.45	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00
750J DOZER	155.3	157	0.43	2.32	3.7	0.09	0.112	0.112	514.03	0.021	0.004	0.03	0.04	0.00	0.00	0.00	5.94	0.00	0.00
544K LOADER	167.0	163	0.36	2.15	3.7	0.08	0.009	0.009	571.45	0.021	0.004	0.02	0.04	0.00	0.00	0.00	6.17	0.00	0.00
E18B MINI EX	7.0	15	0.38	4.55	4.1	0.09	0.128	0.128	571.45	0.024	0.005	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00
T190 SKID STEER	50.0	61	0.37	2.74	3.7	0.09	0.192	0.192	571.45	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.71	0.00	0.00
500 TRAIL DOZER	0.0	80	0.43	2.74	3.7	0.09	0.192	0.192	571.45	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
KOBELCO	200.0	106	0.37	2.15	3.7	0.08	0.009	0.009	514.03	0.021	0.004	0.02	0.03	0.00	0.00	0.00	4.44	0.00	0.00
											Total	0.15	0.24	0.01	0.00	0.00	33.50	0.00	0.00

Sheet 3: Off-Road Heavy-Duty Equipment Emission Factors

Table 3-1: Equipment Category and Emissions Assignment (Default; No Runtime Hour Adjustment)

Equipment	Horsepower	Engine Tier	OFFROAD Category	HP_Bin	Load Factor	Default Emission Factors							
						ROG g_hp-hr	CO g_hp-hr	Nox g_hp-hr	PM10 g_hp-hr	PM2_5 g_hp-hr	Co2_g_hp-hr	CH4_g_hp-hr	N2O_g_hp-hr
7130 TRACTOR	130	3	Agricultural - Agricultural Tractors	175	0.70	0.090	3.700	2.320	0.112	0.112	256.1869073	0.021	0.004
672G GRADER	255	4	Construction and Mining - Graders	300	0.41	0.060	2.600	1.290	0.009	0.009	514.03	0.021	0.004
430E BACKHOE	95	3	Construction and Mining - Tractors/Loaders/Bac	100	0.37	0.090	3.700	2.740	0.112	0.112	571.4540783	0.021	0.004
480 TRAIL DOZER	91	3	Construction and Mining - Crawler Tractors	100	0.43	0.090	3.700	2.740	0.112	0.112	571.4540783	0.021	0.004
750J DOZER	157	3	Construction and Mining - Crawler Tractors	175	0.43	0.090	3.700	2.320	0.112	0.112	514.0285459	0.021	0.004
544K LOADER	163	4	Construction and Mining - Rubber Tired Loaders	175	0.36	0.080	3.700	2.150	0.009	0.009	571.4540783	0.021	0.004
E18B MINI EX	15	4	Construction and Mining - Excavators	50	0.38	0.090	4.100	4.550	0.128	0.128	571.4540783	0.024	0.005
T190 SKID STEER	61	3	Construction and Mining - Skid Steer Loaders	75	0.37	0.090	3.700	2.740	0.192	0.192	571.4540783	0.021	0.004
500 TRAIL DOZER	80	3	Construction and Mining - Crawler Tractors	75	0.43	0.090	3.700	2.740	0.192	0.192	571.4540783	0.021	0.004
KOBELCO	106	4	Construction and Mining - Tractors/Loaders/Bac	175	0.37	0.080	3.700	2.150	0.009	0.009	514.0285459	0.021	0.004

Note: CH4 and N2O emission rates for standard OFFROAD2021 equipment profiles taken from CalEEMod. Load factors from CalEEMod / Carl Moyer.

Table 3-2: Equipment Category and Emissions Assignment (Runtime Hour Adjustment)

Equipment	Existing Runtime Hours on Equipment	Adjusted Emission Factors							
		ROG g_hp-hr	CO g_hp-hr	Nox g_hp-hr	PM10 g_hp-hr	PM2_5 g_hp-hr	Co2_g_hp-hr	CH4_g_hp-hr	N2O_g_hp-hr
7130 TRACTOR	459.3	0.099	3.700	2.332	0.112	0.112	256.19	0.021	0.004
672G GRADER	1941.5	0.093	2.600	1.323	0.010	0.010	514.03	0.021	0.004
430E BACKHOE	2658.9	0.151	3.700	2.836	0.133	0.133	571.45	0.021	0.004
480 TRAIL DOZER	346.7	0.098	3.700	2.752	0.115	0.115	571.45	0.021	0.004
750J DOZER	4230.4	0.175	3.700	2.434	0.114	0.114	514.03	0.021	0.004
544K LOADER	1672.1	0.113	3.700	2.195	0.010	0.010	571.45	0.021	0.004
E18B MINI EX	2200	0.169	4.100	4.759	0.149	0.149	571.45	0.024	0.005
T190 SKID STEER	2140.9	0.139	3.700	2.817	0.222	0.222	571.45	0.021	0.004
500 TRAIL DOZER	1.4	0.090	3.700	2.740	0.192	0.192	571.45	0.021	0.004
KOBELCO	4230.4	0.165	3.700	2.264	0.011	0.011	514.03	0.021	0.004

Sheet 4: U.S. EPA Tier III and Tier IV Emission Factors

Table 4-1: U.S. EPA Tier III Emission Standards

Maximum Horsepower	Assigned HP Bin	Emission Factors (g/hp-hr)				
		ROG	CO	NOx	PM10	PM2.5
25≤hp<50	50	--	--	--	--	--
50≤hp<75	75	0.09	3.7	2.74	0.192	0.192
75≤hp<100	100	0.09	3.7	2.74	0.112	0.112
100≤hp<175	175	0.09	3.7	2.32	0.112	0.112
175≤hp<300	300	0.09	2.6	2.32	0.088	0.088
300≤hp<600	600	0.09	2.6	2.32	0.088	0.088

CARB 2017 Table D-9 (pg. 235); and CalEEMod v2022.4.0 for CO.

Table 4-2: U.S EPA Tier III Controlled Off-Road Diesel Engine Deterioration Rates

Maximum Horsepower	Assigned HP Bin	Emission Factors (g/hp-hr)		
		ROG	NOx	PM
25≤hp<50	50	--	--	--
50≤hp<75	75	0.000023	0.000036	0.0000141
75≤hp<100	100	0.000023	0.000036	0.0000080
100≤hp<175	175	0.000020	0.000027	0.0000004
175≤hp<300	300	0.000023	0.000030	0.0000046
300≤hp<600	600	0.000023	0.000030	0.0000044

Table 4-3: U.S. EPA Tier IV (Interim) Emission Standards

Maximum Horsepower	Assigned HP Bin	Emission Factors (g/hp-hr)				
		ROG	CO	NOx	PM10	PM2.5
25≤hp<50	50	0.09	4.1	4.55	0.128	0.128
50≤hp<75	75	0.09	3.7	2.74	0.112	0.112
75≤hp<100	100	0.08	3.7	2.15	0.009	0.009
100≤hp<175	175	0.08	3.7	2.15	0.009	0.009
175≤hp<300	300	0.06	2.6	1.29	0.009	0.009
300≤hp<600	600	0.06	2.6	1.29	0.009	0.009

CARB 2017 Table D-9 (pg. 235); EFs for Tier IV (Phase-In or Alt. NOx) Used Where Option Exists and CalEEMod v2022.4.0 for CO.

Table 4-4: U.S. EPA Tier IV (Interim) Controlled Off-Road Diesel Engine Deterioration Rates

Maximum Horsepower	Assigned HP Bin	Emission Factors (g/hp-hr)		
		ROG	NOx	PM
25≤hp<50	50	0.000036	0.000095	0.0000096
50≤hp<75	75	0.000023	0.000036	0.0000080
75≤hp<100	100	0.000021	0.000027	0.0000009
100≤hp<175	175	0.000020	0.000027	0.0000004
175≤hp<300	300	0.000017	0.000017	0.0000003
300≤hp<600	600	0.000017	0.000017	0.0000003

Sheet 5: On-Site, On-Road Vehicles Emission Factors and Emissions

Table 5-1: 2021 On-road Vehicle Emission Factor Assignment

Make	Model	Gross Vehicle Weight Rating (lbs)	Vehicle Class	Fuel	Emission Factors (tons / mi)							
					ROG	CO	NOx	PM10 (Exh)	PM2.5 (Exh)	CO2	CH4	N2O
RAM	4500 OPERATOR	16,500	MHDT	Diesel	8.11085E-08	3.91151E-07	2.98681E-06	3.29318E-08	3.15072E-08	0.001313344	3.76728E-09	2.06918E-07
INTERNATIONAL	TRANSPORT 9300	50,000	HHDT	Diesel	9.60502E-08	8.57475E-07	3.72967E-06	4.52476E-08	4.32902E-08	0.001932167	4.46128E-09	3.04414E-07
FORD	F350 RESOURCES	10,100 to 14,000	LHDT2	Diesel	2.22674E-07	6.29592E-07	2.19283E-06	4.90812E-08	4.6958E-08	0.000867193	1.03428E-08	1.36627E-07
CHEVROLET	1500 ELIZ	6,700 to 7,300	MDV	Gasoline	2.93562E-07	2.56323E-06	2.98979E-07	2.27982E-09	2.097E-09	0.000528301	2.90412E-08	2.08218E-08
FORD	F350 r FLATBED	10,100 to 14,000	LHDT2	Gasoline	4.24483E-07	2.95664E-06	6.24105E-07	2.17361E-09	1.99855E-09	0.001170662	3.33371E-08	4.1632E-08
RAM	2500 DAVID	10000	LHDT1	Gasoline	4.91944E-07	3.25948E-06	6.80269E-07	2.43205E-09	2.23618E-09	0.001060739	3.8252E-08	4.41007E-08
INTERNATIONAL	WATER TRUCK	52000	HHDT	Diesel	9.60502E-08	8.57475E-07	3.72967E-06	4.52476E-08	4.32902E-08	0.001932167	4.46128E-09	3.04414E-07
FORD	F350 JOHN M	10,100 to 14,000	LHDT2	Gasoline	4.24483E-07	2.95664E-06	6.24105E-07	2.17361E-09	1.99855E-09	0.001170662	3.33371E-08	4.1632E-08
FORD	F250 ERIC	10,000 to 11,400	LHDT2	Gasoline	4.24483E-07	2.95664E-06	6.24105E-07	2.17361E-09	1.99855E-09	0.001170662	3.33371E-08	4.1632E-08
FORD	F250 JESSE/MIKE	10,000 to 11,400	LHDT2	Gasoline	4.24483E-07	2.95664E-06	6.24105E-07	2.17361E-09	1.99855E-09	0.001170662	3.33371E-08	4.1632E-08
INTERNATIONAL	DUMPTRUCK		HHDT	Diesel	9.60502E-08	8.57475E-07	3.72967E-06	4.52476E-08	4.32902E-08	0.001932167	4.46128E-09	3.04414E-07
FORD	F250 ROBERT	10,000 to 11,400	LHDT2	Gasoline	4.24483E-07	2.95664E-06	6.24105E-07	2.17361E-09	1.99855E-09	0.001170662	3.33371E-08	4.1632E-08
FORD	F350 FLATBED	10,100 to 14,000	LHDT2	Diesel	2.22674E-07	6.29592E-07	2.19283E-06	4.90812E-08	4.6958E-08	0.000867193	1.03428E-08	1.36627E-07

Table 5-2: 2021 On-road Vehicle Emission Calculations

Make	Model	Annual VMT	Vehicle Class	Fuel	Emissions (tons)							
					ROG	CO	NOx	PM10 (Exh)	PM2.5 (Exh)	CO2	CH4	N2O
RAM	4500 (OPERATOR)	3623	MHDT	Diesel	0.000293856	0.001417139	0.010821228	0.000119312	0.000114151	4.758246565	1.36489E-05	0.000749664
INTERNATIONAL	TRANSPORT 9300	495	HHDT	Diesel	4.75449E-05	0.00042445	0.001846185	2.23976E-05	2.14287E-05	0.95642268	2.20834E-06	0.000150685
FORD	F350 (RESOURCES)	11164	LHDT2	Diesel	0.002485934	0.007028768	0.024480794	0.000547943	0.000524239	9.681337266	0.000115467	0.001525299
CHEVROLET	1500 (ELIZ)	8193	MDV	Gasoline	0.002405155	0.02100054	0.002449536	1.86786E-05	1.71808E-05	4.32836713	0.000237935	0.000170593
FORD	F350 r FLATBED	1827	LHDT2	Gasoline	0.00077553	0.005401788	0.001140239	3.97119E-06	3.65136E-06	2.138799866	6.09069E-05	7.60617E-05
RAM	2500 (DAVID)	7819	LHDT1	Gasoline	0.003846509	0.02548584	0.005319026	1.90162E-05	1.74847E-05	8.293918779	0.000299093	0.000344823
INTERNATIONAL	WATER TRUCK	2012	HHDT	Diesel	0.000193253	0.001725239	0.007504088	9.10382E-05	8.71E-05	3.887520065	8.9761E-06	0.00061248
FORD	F350 (JOHN M)	4784	LHDT2	Gasoline	0.002030725	0.014144582	0.002985716	1.03986E-05	9.56109E-06	5.600448033	0.000159485	0.000199168
FORD	F250 (ROBERT)	4299	LHDT2	Gasoline	0.001824851	0.01271061	0.002683026	9.34435E-06	8.59179E-06	5.032676859	0.000143316	0.000178976
FORD	F250 (JESSE/MIKE)	5415	LHDT2	Gasoline	0.002298574	0.016010224	0.003379526	1.17701E-05	1.08222E-05	6.339135891	0.00018052	0.000225437
INTERNATIONAL	DUMPTRUCK	426	HHDT	Diesel	4.09174E-05	0.000365284	0.001588838	1.92755E-05	1.84416E-05	0.823103155	1.90051E-06	0.00012968
FORD	F250 (KEITH)	9352.4	LHDT2	Gasoline	0.003969932	0.027651712	0.005836876	2.03285E-05	1.86913E-05	10.94850129	0.000311782	0.000389359
FORD	F350 FLATBED	8723	LHDT2	Diesel	0.001942386	0.005491933	0.019128087	0.000428136	0.000409615	7.564520331	9.02201E-05	0.001191793
				Total	0.022155169	0.138858109	0.089163165	0.001321609	0.001260958	70.35299791	0.001625458	0.00594402

Sheet 6: On-Site Small Equipment Emission Factors and Emissions

Table 6-1: On-site Small Equipment Category and Emission Factor Assignment

Make	Model	Horsepower	Fuel	OFFROAD Category	HP_Bin	Load Factor	Emission Factors							
							ROG g_hp-hr	CO g_hp-hr	Nox g_hp-hr	PM10 g_hp-hr	PM2_5 g_hp-hr	Co2_g_hp-hr	CH4_g_hp-hr	N2O_g_hp-hr
GATOR 1*	XUV 855D	24.6	Diesel	Agricultural - ATVs	25	1.00	16.747	79.890	71.171	3.521	3.239	10179.997	0.021	0.004
GATOR 2*	XUV 855D	24.6	Diesel	Agricultural - ATVs	25	1.00	16.747	79.890	71.171	3.521	3.239	10179.997	0.021	0.004
Gator 855*	XUV 855D	24.6	Diesel	Agricultural - ATVs	25	1.00	16.747	79.890	71.171	3.521	3.239	10179.997	0.021	0.004
Canycom 1	SC75	22.1	Gasoline	Construction and Mining - Paving Equipme	50	0.36	0.784	4.371	3.903	0.213	0.196	571.454	0.018	0.004
Canycom 2	SC75	22.1	Gasoline	Construction and Mining - Paving Equipme	50	0.36	0.784	4.371	3.903	0.213	0.196	571.454	0.018	0.004
Jumping Jack	MTX-70	2.8	Gasoline	N/A; CalEEMod - Plate Compactor	25	0.55	994.174	229.329	4.855	2.346	1.773	429.441	0.018	0.004
Jumping Jack	MTR-40	2.8	Gasoline	N/A; CalEEMod - Plate Compactor	25	0.55	994.174	229.329	4.855	2.346	1.773	429.441	0.018	0.004
Vibroplate	WP 1550	4.15	Gasoline	N/A; CalEEMod - Plate Compactor	25	0.55	994.174	229.329	4.855	2.346	1.773	429.441	0.018	0.004
John Deere Mower	727A	23	Gasoline	Lawn and Garden - Misc - Rear Engine Rid	Aggregate	1.00	47.504	2365.534	23.540	0.276	0.208	4996.466	0.276	0.208

Note: CH4 and N2O emission rates for standard OFFROAD2021 equipment profiles taken from CalEEMod. Load factors from CalEEMod / Carl Moyer.

* - Emission factors for Gator 1, Gator 2, Gator 855, and John Deere Mower (727A) are based on emissions per gallon of gasoline consumed.

Table 6-2: Small Equipment Annual Emissions Estimates

Make	Model	Annual Runtime	Horsepower	Load Factor	Annual Emissions (tons)							
					ROG	CO	NOx	PM10 (Exh)	PM2.5 (Exh)	CO2	CH4	N2O
GATOR 1*	XUV 855D	135	24.6	1.00	0.002492	0.011889	0.010591126	0.000523942	0.000482027	1.514907236	3.12506E-06	5.95249E-07
GATOR 2*	XUV 855D	257.3	24.6	1.00	0.00475	0.022659	0.020185902	0.000998595	0.000918707	2.887300977	5.95612E-06	1.1345E-06
Gator 855*	XUV 855D	2	24.6	1.00	3.14E-05	0.00015	0.00013337	6.59779E-06	6.06996E-06	0.01907661	3.93525E-08	7.49572E-09
Canycom 1	SC75	77	22.1	0.36	0.00053	0.002952	0.002635794	0.000143996	0.000132476	0.385897046	1.21552E-05	2.70116E-06
Canycom 2	SC75	47.1	22.1	0.36	0.000324	0.001806	0.001612284	8.80805E-05	8.10341E-05	0.236048713	7.4352E-06	1.65227E-06
Jumping Jack	MTX-70	9	2.8	0.55	0.015189	0.003504	7.41749E-05	3.58423E-05	2.7088E-05	0.00656102	2.75005E-07	6.11122E-08
Jumping Jack	MTR-40	9	2.8	0.55	0.015189	0.003504	7.41749E-05	3.58423E-05	2.7088E-05	0.00656102	2.75005E-07	6.11122E-08
Vibroplate	WP 1550	9	4.15	0.55	0.022512	0.005193	0.000109938	5.31234E-05	4.01483E-05	0.009724369	4.07596E-07	9.0577E-08
John Deere Mower*	727A	78.0	23	1.00	0.004084	0.203389	0.002024012	2.37042E-05	1.78959E-05	0.429597882	2.37042E-05	1.78959E-05
				Total	0.065102	0.255045	0.037440776	0.001909723	0.001732534	5.495674872	5.33727E-05	2.41994E-05

Note: * - Assumes XUVs and mower consume one gallon of gas per hour runtime.

Sheet 7: Off-site Worker and Vendor Emission Factors

Table 7-1: Worker and Vendor Trips: Emissions Assignment

Trip Source	Reason	Number of Trips	Trip Distance	Total VMT	Vehicle Class	Fuel Type	Percent of Workers by Vehcile Class	Emission Factors (tons / mi)							
								ROG	CO	NOx	PM10 (Exh)	PM2.5 (Exh)	CO2	CH4	N2O
center							*Worker Trips*								
General Workers	N/A	50	19.4	336590	LDA	Agg	0.5	1.631E-07	1.631E-07	1.631E-07	1.631E-07	1.631E-07	1.631E-07	1.631E-07	1.631E-07
					LDT1	Agg	0.25	4.992E-07	4.992E-07	4.992E-07	4.992E-07	4.992E-07	4.992E-07	4.992E-07	4.992E-07
					LDT2	Agg	0.25	1.965E-07	1.965E-07	1.965E-07	1.965E-07	1.965E-07	1.965E-07	1.965E-07	1.965E-07
center							*Vendor Trips*								
Harkrader and Sons Trucking	3/4 in Road Base	19	20	380	HHDT	Diesel	0.5	9.605E-08	8.575E-07	3.73E-06	4.525E-08	4.329E-08	0.0019322	4.461E-09	3.044E-07
Harkrader and Sons Trucking	Sand	6	20	120	HHDT	Diesel	0.5	9.605E-08	8.575E-07	3.73E-06	4.525E-08	4.329E-08	0.0019322	4.461E-09	3.044E-07

Table 7-2: Worker and Vendor Trips: Emissions Calculations

Trip Source	Reason	Number of Trips	Trip Distance	Total VMT	Vehicle Class	Fuel Type	Percent of Workers by Vehcile Class	Emissions (tons)							
								ROG	CO	NOx	PM10 (Exh)	PM2.5 (Exh)	CO2	CH4	N2O
center							*Worker Trips*								
General Workers	N/A	50	19.4	336590	LDA	Agg	0.5	0.0548915	0.0548915	0.0548915	0.0548915	0.0548915	0.0548915	0.0548915	0.0548915
					LDT1	Agg	0.25	0.1680129	0.1680129	0.1680129	0.1680129	0.1680129	0.1680129	0.1680129	0.1680129
					LDT2	Agg	0.25	0.0661327	0.0661327	0.0661327	0.0661327	0.0661327	0.0661327	0.0661327	0.0661327
							Worker Sub-Total	0.2890371	0.2890371	0.2890371	0.2890371	0.2890371	0.2890371	0.2890371	0.2890371
center							*Vendor Trips*								
Harkrader and Sons Trucking	3/4 in Road Base	19	60	1140	HHDT	Diesel	0.5	0.0001095	0.0009775	0.0042518	5.158E-05	4.935E-05	2.2026704	5.086E-06	0.000347
Harkrader and Sons Trucking	Sand	6	60	360	HHDT	Diesel	0.5	3.458E-05	0.0003087	0.0013427	1.629E-05	1.558E-05	0.6955801	1.606E-06	0.0001096
							Vendor Sub-Total	0.0001441	0.0012862	0.0055945	6.787E-05	6.494E-05	2.8982505	6.692E-06	0.0004566
							Total	0.2891812	0.2903233	0.2946316	0.289105	0.289102	3.1872877	0.2890438	0.2894937

Sheet 8: OFFROAD Output

Model Output: OFFROAD2021 (v1.0.7) Emissions Inventory
Region Type: County
Region: San Joaquin
Calendar Year: 2021
Scenario: All Adopted Rules - Exhaust
Vehicle Classification: OFFROAD2021 Equipment Types
Units: tons/day for Emissions, gallons/year for Fuel, hours/year for Activity, Horsepower-hours/year for Horse

Region	Calendar Year	Vehicle Category	Model Year
San Joaquin	2021	Agricultural - Agricultural Tractors	Aggregate
San Joaquin	2021	Agricultural - Agricultural Tractors	Aggregate
San Joaquin	2021	Agricultural - Agricultural Tractors	Aggregate
San Joaquin	2021	Agricultural - Agricultural Tractors	Aggregate
San Joaquin	2021	Agricultural - Agricultural Tractors	Aggregate
San Joaquin	2021	Agricultural - Agricultural Tractors	Aggregate
San Joaquin	2021	Agricultural - ATVs	Aggregate
San Joaquin	2021	Agricultural - ATVs	Aggregate
San Joaquin	2021	Agricultural - ATVs	Aggregate
San Joaquin	2021	Agricultural - Bale Wagons (Self Propelled)	Aggregate
San Joaquin	2021	Agricultural - Bale Wagons (Self Propelled)	Aggregate
San Joaquin	2021	Agricultural - Balers (Self Propelled)	Aggregate
San Joaquin	2021	Agricultural - Combine Harvesters	Aggregate
San Joaquin	2021	Agricultural - Combine Harvesters	Aggregate
San Joaquin	2021	Agricultural - Construction Equipment	Aggregate
San Joaquin	2021	Agricultural - Construction Equipment	Aggregate
San Joaquin	2021	Agricultural - Construction Equipment	Aggregate
San Joaquin	2021	Agricultural - Construction Equipment	Aggregate
San Joaquin	2021	Agricultural - Construction Equipment	Aggregate
San Joaquin	2021	Agricultural - Forklifts	Aggregate
San Joaquin	2021	Agricultural - Forklifts	Aggregate
San Joaquin	2021	Agricultural - Forklifts	Aggregate
San Joaquin	2021	Agricultural - Forklifts	Aggregate
San Joaquin	2021	Agricultural - Hay Squeeze/Stack Retriever	Aggregate
San Joaquin	2021	Agricultural - Hay Squeeze/Stack Retriever	Aggregate
San Joaquin	2021	Agricultural - Hay Squeeze/Stack Retriever	Aggregate
San Joaquin	2021	Agricultural - Nut Harvester	Aggregate
San Joaquin	2021	Agricultural - Nut Harvester	Aggregate
San Joaquin	2021	Agricultural - Nut Harvester	Aggregate
San Joaquin	2021	Agricultural - Nut Harvester	Aggregate
San Joaquin	2021	Agricultural - Nut Harvester	Aggregate
San Joaquin	2021	Agricultural - Nut Harvester	Aggregate
San Joaquin	2021	Agricultural - Other Harvesters	Aggregate
San Joaquin	2021	Agricultural - Other Harvesters	Aggregate
San Joaquin	2021	Agricultural - Other Harvesters	Aggregate
San Joaquin	2021	Agricultural - Other Harvesters	Aggregate

San Joaquin	2021	Agricultural - Sprayers/Spray Rigs	Aggregate
San Joaquin	2021	Agricultural - Sprayers/Spray Rigs	Aggregate
San Joaquin	2021	Agricultural - Sprayers/Spray Rigs	Aggregate
San Joaquin	2021	Agricultural - Sprayers/Spray Rigs	Aggregate
San Joaquin	2021	Agricultural - Sprayers/Spray Rigs	Aggregate
San Joaquin	2021	Agricultural - Sprayers/Spray Rigs	Aggregate
San Joaquin	2021	Agricultural - Swathers/Windrowers/Hay Conditioners	Aggregate
San Joaquin	2021	Agricultural - Swathers/Windrowers/Hay Conditioners	Aggregate
San Joaquin	2021	Agricultural - Swathers/Windrowers/Hay Conditioners	Aggregate
San Joaquin	2021	Agricultural - Swathers/Windrowers/Hay Conditioners	Aggregate
San Joaquin	2021	Agricultural - Swathers/Windrowers/Hay Conditioners	Aggregate
San Joaquin	2021	Construction and Mining - Bore/Drill Rigs	Aggregate
San Joaquin	2021	Construction and Mining - Bore/Drill Rigs	Aggregate
San Joaquin	2021	Construction and Mining - Bore/Drill Rigs	Aggregate
San Joaquin	2021	Construction and Mining - Bore/Drill Rigs	Aggregate
San Joaquin	2021	Construction and Mining - Bore/Drill Rigs	Aggregate
San Joaquin	2021	Construction and Mining - Cranes	Aggregate
San Joaquin	2021	Construction and Mining - Cranes	Aggregate
San Joaquin	2021	Construction and Mining - Cranes	Aggregate
San Joaquin	2021	Construction and Mining - Cranes	Aggregate
San Joaquin	2021	Construction and Mining - Cranes	Aggregate
San Joaquin	2021	Construction and Mining - Cranes	Aggregate
San Joaquin	2021	Construction and Mining - Crawler Tractors	Aggregate
San Joaquin	2021	Construction and Mining - Crawler Tractors	Aggregate
San Joaquin	2021	Construction and Mining - Crawler Tractors	Aggregate
San Joaquin	2021	Construction and Mining - Crawler Tractors	Aggregate
San Joaquin	2021	Construction and Mining - Crawler Tractors	Aggregate
San Joaquin	2021	Construction and Mining - Excavators	Aggregate
San Joaquin	2021	Construction and Mining - Excavators	Aggregate
San Joaquin	2021	Construction and Mining - Excavators	Aggregate
San Joaquin	2021	Construction and Mining - Excavators	Aggregate
San Joaquin	2021	Construction and Mining - Excavators	Aggregate
San Joaquin	2021	Construction and Mining - Excavators	Aggregate
San Joaquin	2021	Construction and Mining - Graders	Aggregate
San Joaquin	2021	Construction and Mining - Graders	Aggregate
San Joaquin	2021	Construction and Mining - Graders	Aggregate
San Joaquin	2021	Construction and Mining - Graders	Aggregate
San Joaquin	2021	Construction and Mining - Graders	Aggregate
San Joaquin	2021	Construction and Mining - Misc - Bore/Drill Rigs	Aggregate
San Joaquin	2021	Construction and Mining - Misc - Cement And Mortar Mixers	Aggregate
San Joaquin	2021	Construction and Mining - Misc - Concrete/Industrial Saws	Aggregate
San Joaquin	2021	Construction and Mining - Misc - Concrete/Industrial Saws	Aggregate
San Joaquin	2021	Construction and Mining - Misc - Dumpers/Tenders	Aggregate
San Joaquin	2021	Construction and Mining - Misc - Excavators	Aggregate
San Joaquin	2021	Construction and Mining - Misc - Other	Aggregate
San Joaquin	2021	Construction and Mining - Misc - Pavers	Aggregate
San Joaquin	2021	Construction and Mining - Misc - Paving Equipment	Aggregate

San Joaquin	2021	Construction and Mining - Misc - Rollers	Aggregate
San Joaquin	2021	Construction and Mining - Misc - Rubber Tired Loaders	Aggregate
San Joaquin	2021	Construction and Mining - Misc - Signal Boards	Aggregate
San Joaquin	2021	Construction and Mining - Misc - Skid Steer Loaders	Aggregate
San Joaquin	2021	Construction and Mining - Misc - Tractors/Loaders/Backhoes	Aggregate
San Joaquin	2021	Construction and Mining - Misc - Trenchers	Aggregate
San Joaquin	2021	Construction and Mining - Off-Highway Tractors	Aggregate
San Joaquin	2021	Construction and Mining - Off-Highway Tractors	Aggregate
San Joaquin	2021	Construction and Mining - Off-Highway Tractors	Aggregate
San Joaquin	2021	Construction and Mining - Off-Highway Tractors	Aggregate
San Joaquin	2021	Construction and Mining - Off-Highway Tractors	Aggregate
San Joaquin	2021	Construction and Mining - Off-Highway Trucks	Aggregate
San Joaquin	2021	Construction and Mining - Off-Highway Trucks	Aggregate
San Joaquin	2021	Construction and Mining - Off-Highway Trucks	Aggregate
San Joaquin	2021	Construction and Mining - Off-Highway Trucks	Aggregate
San Joaquin	2021	Construction and Mining - Off-Highway Trucks	Aggregate
San Joaquin	2021	Construction and Mining - Pavers	Aggregate
San Joaquin	2021	Construction and Mining - Pavers	Aggregate
San Joaquin	2021	Construction and Mining - Pavers	Aggregate
San Joaquin	2021	Construction and Mining - Pavers	Aggregate
San Joaquin	2021	Construction and Mining - Pavers	Aggregate
San Joaquin	2021	Construction and Mining - Paving Equipment	Aggregate
San Joaquin	2021	Construction and Mining - Paving Equipment	Aggregate
San Joaquin	2021	Construction and Mining - Paving Equipment	Aggregate
San Joaquin	2021	Construction and Mining - Paving Equipment	Aggregate
San Joaquin	2021	Construction and Mining - Paving Equipment	Aggregate
San Joaquin	2021	Construction and Mining - Rollers	Aggregate
San Joaquin	2021	Construction and Mining - Rollers	Aggregate
San Joaquin	2021	Construction and Mining - Rollers	Aggregate
San Joaquin	2021	Construction and Mining - Rollers	Aggregate
San Joaquin	2021	Construction and Mining - Rollers	Aggregate
San Joaquin	2021	Construction and Mining - Rough Terrain Forklifts	Aggregate
San Joaquin	2021	Construction and Mining - Rough Terrain Forklifts	Aggregate
San Joaquin	2021	Construction and Mining - Rough Terrain Forklifts	Aggregate
San Joaquin	2021	Construction and Mining - Rough Terrain Forklifts	Aggregate
San Joaquin	2021	Construction and Mining - Rough Terrain Forklifts	Aggregate
San Joaquin	2021	Construction and Mining - Rubber Tired Dozers	Aggregate
San Joaquin	2021	Construction and Mining - Rubber Tired Dozers	Aggregate
San Joaquin	2021	Construction and Mining - Rubber Tired Dozers	Aggregate
San Joaquin	2021	Construction and Mining - Rubber Tired Dozers	Aggregate
San Joaquin	2021	Construction and Mining - Rubber Tired Dozers	Aggregate
San Joaquin	2021	Construction and Mining - Rubber Tired Loaders	Aggregate
San Joaquin	2021	Construction and Mining - Rubber Tired Loaders	Aggregate
San Joaquin	2021	Construction and Mining - Rubber Tired Loaders	Aggregate
San Joaquin	2021	Construction and Mining - Rubber Tired Loaders	Aggregate
San Joaquin	2021	Construction and Mining - Rubber Tired Loaders	Aggregate
San Joaquin	2021	Construction and Mining - Scrapers	Aggregate

San Joaquin	2021	Construction and Mining - Scrapers	Aggregate
San Joaquin	2021	Construction and Mining - Scrapers	Aggregate
San Joaquin	2021	Construction and Mining - Scrapers	Aggregate
San Joaquin	2021	Construction and Mining - Scrapers	Aggregate
San Joaquin	2021	Construction and Mining - Skid Steer Loaders	Aggregate
San Joaquin	2021	Construction and Mining - Skid Steer Loaders	Aggregate
San Joaquin	2021	Construction and Mining - Skid Steer Loaders	Aggregate
San Joaquin	2021	Construction and Mining - Skid Steer Loaders	Aggregate
San Joaquin	2021	Construction and Mining - Skid Steer Loaders	Aggregate
San Joaquin	2021	Construction and Mining - Surfacing Equipment	Aggregate
San Joaquin	2021	Construction and Mining - Surfacing Equipment	Aggregate
San Joaquin	2021	Construction and Mining - Surfacing Equipment	Aggregate
San Joaquin	2021	Construction and Mining - Surfacing Equipment	Aggregate
San Joaquin	2021	Construction and Mining - Surfacing Equipment	Aggregate
San Joaquin	2021	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate
San Joaquin	2021	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate
San Joaquin	2021	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate
San Joaquin	2021	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate
San Joaquin	2021	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate
San Joaquin	2021	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate
San Joaquin	2021	Construction and Mining - Trenchers	Aggregate
San Joaquin	2021	Construction and Mining - Trenchers	Aggregate
San Joaquin	2021	Construction and Mining - Trenchers	Aggregate
San Joaquin	2021	Construction and Mining - Trenchers	Aggregate
San Joaquin	2021	Construction and Mining - Trenchers	Aggregate
San Joaquin	2021	Lawn and Garden - Misc - Rear Engine Riding Mowers	Aggregate
San Joaquin	2021	Agricultural - ATVs	Aggregate

power-hours

Horsepower	Fuel	HC_tpd	ROG_tpd	TOG_tpd	CO_tpd	NOx_tpd	CO2_tpd	PM10_tpd
25	Diesel	0.004715	0.005705	0.006789	0.016936	0.012392	1.503002	0.000793
50	Diesel	0.10544	0.127583	0.151834	0.396205	0.316359	36.29554	0.027885
75	Diesel	0.058926	0.0713	0.084853	0.291817	0.48341	40.56592	0.031577
100	Diesel	0.086667	0.104867	0.1248	0.626581	0.775747	99.29199	0.054177
175	Diesel	0.054648	0.066124	0.078693	0.508714	0.590594	84.47107	0.027078
300	Diesel	0.028608	0.034616	0.041196	0.164333	0.293757	67.16307	0.013077
25	Diesel	0.001662	0.002011	0.002393	0.009594	0.008547	1.22251	0.000423
50	Diesel	0.002672	0.003233	0.003847	0.018805	0.017157	2.659757	0.000822
175	Diesel	5.33E-05	6.45E-05	7.67E-05	0.000828	0.000623	0.150743	2.37E-05
175	Diesel	0.001409	0.001704	0.002028	0.011413	0.015252	1.835411	0.000726
300	Diesel	0.000158	0.000191	0.000228	0.000829	0.001719	0.271967	7.83E-05
75	Diesel	6.62E-05	8.01E-05	9.53E-05	0.00044	0.000593	0.069316	3.25E-05
175	Diesel	0.000635	0.000768	0.000915	0.00553	0.006838	0.915854	0.000308
300	Diesel	0.001165	0.001409	0.001677	0.005931	0.012278	1.971734	0.000571
50	Diesel	0.000163	0.000198	0.000235	0.000709	0.000575	0.079077	4.13E-05
75	Diesel	0.000455	0.000551	0.000656	0.003024	0.004081	0.476708	0.000223
100	Diesel	0.001964	0.002376	0.002828	0.01269	0.016995	1.94277	0.001225
175	Diesel	0.005092	0.006161	0.007332	0.043331	0.05944	7.427744	0.00251
300	Diesel	0.000909	0.0011	0.001309	0.004329	0.010193	1.336495	0.000466
50	Diesel	0.002213	0.002678	0.003187	0.009693	0.008124	1.073649	0.000583
75	Diesel	0.006154	0.007446	0.008862	0.040862	0.055134	6.443973	0.003043
100	Diesel	0.002008	0.00243	0.002892	0.014041	0.017079	2.203461	0.001199
175	Diesel	0.000394	0.000477	0.000568	0.003437	0.004232	0.567927	0.000192
75	Diesel	2.54E-05	3.08E-05	3.66E-05	0.000169	0.000228	0.026606	1.25E-05
175	Diesel	0.000369	0.000446	0.000531	0.003246	0.003844	0.525821	0.000181
300	Diesel	0.000619	0.000749	0.000892	0.003245	0.006734	1.065281	0.000307
25	Diesel	0.000633	0.000765	0.000911	0.002748	0.002318	0.306382	0.000127
50	Diesel	0.002754	0.003332	0.003965	0.011577	0.009302	1.197434	0.000723
75	Diesel	0.001028	0.001244	0.001481	0.006874	0.009212	1.080149	0.00051
100	Diesel	0.008485	0.010267	0.012219	0.055446	0.072077	8.461026	0.005295
175	Diesel	0.003871	0.004684	0.005574	0.032378	0.041834	5.278373	0.001944
300	Diesel	0.002513	0.00304	0.003618	0.012014	0.026724	3.509547	0.001288
75	Diesel	0.000872	0.001055	0.001256	0.005791	0.007816	0.91309	0.000428
100	Diesel	0.003866	0.004678	0.005567	0.026233	0.032728	4.077617	0.002341
175	Diesel	0.003863	0.004674	0.005562	0.032582	0.041729	5.330947	0.001927
300	Diesel	0.001367	0.001654	0.001969	0.007064	0.014641	2.333119	0.000674

25	Diesel	2.17E-05	2.63E-05	3.13E-05	9.43E-05	7.96E-05	0.010514	4.34E-06
50	Diesel	0.001053	0.001274	0.001517	0.004585	0.003732	0.510229	0.000268
75	Diesel	0.01686	0.020401	0.024279	0.1008	0.144112	14.99439	0.009529
100	Diesel	0.000824	0.000997	0.001187	0.005621	0.006975	0.875689	0.000497
175	Diesel	0.002637	0.00319	0.003797	0.022367	0.02845	3.666285	0.001309
300	Diesel	0.00228	0.002758	0.003283	0.011049	0.024323	3.289551	0.001163
50	Diesel	0.000758	0.000917	0.001092	0.003293	0.002669	0.367131	0.000192
75	Diesel	0.000487	0.000589	0.000701	0.003239	0.004364	0.510076	0.00024
100	Diesel	0.001797	0.002174	0.002587	0.012682	0.015212	1.988958	0.001073
175	Diesel	0.000409	0.000494	0.000588	0.003354	0.004421	0.542374	0.000208
300	Diesel	0.000853	0.001032	0.001228	0.004387	0.009094	1.450612	0.00042
50	Diesel	0.000112	0.000135	0.000161	0.000599	0.000512	0.062169	3.88E-05
75	Diesel	0.000163	0.000197	0.000235	0.001516	0.001619	0.239531	8.68E-05
100	Diesel	0.000194	0.000235	0.00028	0.00125	0.0015	0.181314	0.000132
175	Diesel	0.001088	0.001317	0.001567	0.00835	0.009769	1.303691	0.000558
300	Diesel	0.0012	0.001452	0.001728	0.00447	0.012046	1.534739	0.000634
25	Diesel	1.37E-06	1.66E-06	1.98E-06	3.35E-06	2.27E-06	0.000186	2.47E-07
50	Diesel	1.16E-05	1.4E-05	1.67E-05	4.24E-05	4.12E-05	0.004604	3.63E-06
75	Diesel	3.45E-05	4.17E-05	4.97E-05	0.000142	0.00028	0.019049	2.42E-05
100	Diesel	8.36E-05	0.000101	0.00012	0.000404	0.000689	0.056073	5.92E-05
175	Diesel	0.000588	0.000712	0.000847	0.003559	0.005974	0.521377	0.000368
300	Diesel	0.001231	0.00149	0.001773	0.006047	0.013089	1.898308	0.00076
50	Diesel	0.000107	0.00013	0.000154	0.000357	0.000299	0.030808	3.52E-05
75	Diesel	0.000388	0.00047	0.000559	0.001692	0.003033	0.224186	0.000264
100	Diesel	0.001155	0.001397	0.001663	0.006201	0.008708	0.894343	0.000749
175	Diesel	0.002477	0.002997	0.003567	0.021698	0.023734	3.387616	0.001371
300	Diesel	0.002712	0.003282	0.003906	0.012509	0.026992	4.129726	0.001549
25	Diesel	7.01E-07	8.49E-07	1.01E-06	1.75E-06	1.34E-06	0.000109	1.45E-07
50	Diesel	0.003505	0.004242	0.005048	0.029601	0.026112	3.924038	0.001279
75	Diesel	0.00143	0.00173	0.002059	0.01864	0.017611	3.11554	0.000529
100	Diesel	0.001536	0.001858	0.002211	0.015057	0.013995	2.37663	0.00111
175	Diesel	0.007095	0.008585	0.010217	0.083219	0.063177	13.46986	0.003183
300	Diesel	0.007121	0.008616	0.010254	0.033411	0.067868	14.27474	0.003225
50	Diesel	4.28E-05	5.18E-05	6.16E-05	0.00013	0.000106	0.010378	1.36E-05
75	Diesel	8.31E-05	0.000101	0.00012	0.000272	0.000602	0.031691	5.89E-05
100	Diesel	0.000205	0.000248	0.000295	0.000712	0.001496	0.0839	0.000145
175	Diesel	0.002199	0.002661	0.003166	0.010302	0.021451	1.373436	0.001393
300	Diesel	0.002489	0.003011	0.003584	0.012295	0.027377	5.092827	0.001322
25	Diesel	2.21E-05	2.66E-05	3.17E-05	9.06E-05	0.000168	0.000243	5.64E-06
25	Diesel	6.56E-06	7.89E-06	9.43E-06	2.65E-05	4.92E-05	7.14E-05	1.79E-06
25	Diesel	4.36E-06	5.25E-06	6.27E-06	1.79E-05	3.31E-05	4.79E-05	1.11E-06
50	Diesel	1.43E-05	1.71E-05	2.07E-05	0.000128	0.000117	0.016496	5.28E-06
25	Diesel	3.14E-06	3.78E-06	4.51E-06	1.29E-05	2.39E-05	3.45E-05	8.09E-07
25	Diesel	2.25E-05	2.71E-05	3.24E-05	9.24E-05	0.000171	0.000247	5.76E-06
25	Diesel	1.17E-05	1.41E-05	1.68E-05	4.8E-05	8.88E-05	0.000128	2.99E-06
25	Diesel	5.92E-06	7.12E-06	8.51E-06	2.43E-05	4.5E-05	6.5E-05	1.54E-06
25	Diesel	1.01E-05	1.21E-05	1.44E-05	4.13E-05	7.64E-05	0.00011	2.57E-06

25	Diesel	7.06E-05	8.49E-05	0.000101	0.00029	0.000537	0.000776	1.8E-05
25	Diesel	3.77E-06	4.54E-06	5.42E-06	1.55E-05	2.87E-05	4.14E-05	9.64E-07
50	Diesel	6.28E-06	7.47E-06	9.04E-06	5.55E-05	5.07E-05	0.007406	2.27E-06
25	Diesel	0.001183	0.001423	0.001701	0.004831	0.008971	0.01296	0.000312
25	Diesel	0.000107	0.000129	0.000154	0.000441	0.000816	0.00118	2.75E-05
25	Diesel	0.000104	0.000126	0.00015	0.000428	0.000793	0.001147	2.67E-05
50	Diesel	0.001673	0.002024	0.002409	0.007103	0.005766	0.619924	0.000511
75	Diesel	0.000678	0.00082	0.000976	0.003781	0.00496	0.540629	0.000387
100	Diesel	0.000576	0.000697	0.00083	0.003747	0.004344	0.538	0.000366
175	Diesel	0.001592	0.001926	0.002292	0.019249	0.012946	2.958015	0.000712
300	Diesel	0.000908	0.001099	0.001308	0.00377	0.008537	1.292288	0.000467
50	Diesel	5.09E-05	6.15E-05	7.32E-05	0.00029	0.000246	0.027673	1.83E-05
75	Diesel	3.86E-05	4.67E-05	5.56E-05	0.0002	0.000317	0.027651	2.59E-05
100	Diesel	1.81E-05	2.19E-05	2.61E-05	0.000101	0.000118	0.014229	8.38E-06
175	Diesel	0.000633	0.000766	0.000912	0.004962	0.005382	0.73497	0.000348
300	Diesel	0.001548	0.001874	0.00223	0.00599	0.014899	1.668236	0.000894
50	Diesel	0.000174	0.000211	0.000251	0.000632	0.000521	0.057663	5.03E-05
75	Diesel	0.00031	0.000376	0.000447	0.001971	0.002518	0.299058	0.000166
100	Diesel	0.000307	0.000371	0.000442	0.002191	0.002467	0.32636	0.000192
175	Diesel	0.000738	0.000893	0.001063	0.006852	0.006491	1.103332	0.000342
300	Diesel	0.000559	0.000676	0.000804	0.00289	0.00532	1.34928	0.000235
50	Diesel	0.000175	0.000211	0.000252	0.001178	0.001052	0.154038	5.75E-05
75	Diesel	9.89E-05	0.00012	0.000142	0.000725	0.000857	0.111995	4.94E-05
100	Diesel	0.00017	0.000206	0.000245	0.001169	0.001394	0.174025	0.000112
175	Diesel	0.000608	0.000736	0.000876	0.007611	0.005372	1.233526	0.000279
300	Diesel	0.000277	0.000335	0.000398	0.001288	0.002761	0.549785	0.000132
50	Diesel	0.002551	0.003086	0.003673	0.01262	0.011119	1.444812	0.000801
75	Diesel	0.000475	0.000575	0.000684	0.003716	0.004543	0.591279	0.000264
100	Diesel	0.00099	0.001198	0.001426	0.005987	0.007764	0.877945	0.000651
175	Diesel	0.003042	0.00368	0.00438	0.032644	0.027374	5.285929	0.001415
300	Diesel	0.00038	0.000459	0.000547	0.001523	0.00407	0.432588	0.000231
50	Diesel	4.61E-05	5.57E-05	6.63E-05	0.00033	0.000311	0.048245	1.66E-05
75	Diesel	0.000655	0.000793	0.000944	0.010958	0.010367	1.924171	0.000219
100	Diesel	0.000921	0.001114	0.001326	0.007934	0.008443	1.27303	0.000623
175	Diesel	0.003725	0.004508	0.005364	0.050753	0.036455	8.54713	0.00167
300	Diesel	4.21E-05	5.09E-05	6.06E-05	0.000207	0.000431	0.067024	2.45E-05
50	Diesel	3.48E-05	4.21E-05	5.01E-05	0.000103	8.28E-05	0.007939	9.61E-06
75	Diesel	4.33E-05	5.24E-05	6.24E-05	0.000192	0.000326	0.025905	2.79E-05
100	Diesel	8.18E-05	9.9E-05	0.000118	0.000421	0.000601	0.06028	5.94E-05
175	Diesel	0.000187	0.000226	0.000269	0.001312	0.001765	0.196255	0.000106
300	Diesel	0.000199	0.00024	0.000286	0.000924	0.001822	0.240409	0.000121
50	Diesel	0.000222	0.000268	0.000319	0.000906	0.000732	0.084848	6.99E-05
75	Diesel	0.000631	0.000763	0.000908	0.004486	0.00545	0.68589	0.000343
100	Diesel	0.001143	0.001383	0.001645	0.007535	0.008825	1.102513	0.000732
175	Diesel	0.006894	0.008342	0.009927	0.056687	0.06197	8.591049	0.003663
300	Diesel	0.008498	0.010283	0.012237	0.040203	0.078419	16.3387	0.003954
50	Diesel	9.77E-06	1.18E-05	1.41E-05	2.51E-05	2.05E-05	0.001803	2.63E-06

75	Diesel	3.38E-05	4.1E-05	4.87E-05	0.00017	0.000266	0.025356	2.09E-05
100	Diesel	3.22E-05	3.89E-05	4.63E-05	0.000202	0.000269	0.029945	2.05E-05
175	Diesel	0.00044	0.000532	0.000633	0.002079	0.004262	0.238703	0.000301
300	Diesel	0.004113	0.004976	0.005922	0.016386	0.043677	3.679817	0.002676
50	Diesel	0.002484	0.003006	0.003577	0.012384	0.010703	1.423552	0.000748
75	Diesel	0.005384	0.006515	0.007753	0.063152	0.062028	10.52799	0.002083
100	Diesel	0.003151	0.003812	0.004537	0.033447	0.030447	5.303959	0.002143
175	Diesel	0.000432	0.000522	0.000622	0.009201	0.003962	1.58539	0.000138
300	Diesel	6.7E-05	8.1E-05	9.65E-05	0.000329	0.000597	0.127465	3.25E-05
50	Diesel	4.42E-05	5.35E-05	6.37E-05	0.000162	0.000132	0.013921	1.3E-05
75	Diesel	2.29E-05	2.77E-05	3.29E-05	0.000165	0.000206	0.024988	1.3E-05
100	Diesel	3.61E-05	4.37E-05	5.2E-05	0.000213	0.000276	0.030451	2.8E-05
175	Diesel	0.000108	0.00013	0.000155	0.000904	0.00096	0.139009	5.78E-05
300	Diesel	0.00013	0.000158	0.000188	0.000496	0.00127	0.159185	7.19E-05
25	Diesel	2.91E-07	3.52E-07	4.18E-07	2.95E-06	2.51E-06	0.000358	1.76E-07
50	Diesel	0.003785	0.00458	0.00545	0.014816	0.012297	1.399568	0.001139
75	Diesel	0.006027	0.007293	0.00868	0.043114	0.052794	6.683775	0.003177
100	Diesel	0.014363	0.017379	0.020683	0.103913	0.113948	15.66578	0.008886
175	Diesel	0.008944	0.010822	0.012879	0.104943	0.080469	16.97238	0.00412
300	Diesel	0.003497	0.004232	0.005036	0.017224	0.032926	7.164706	0.001643
50	Diesel	0.000806	0.000976	0.001161	0.003852	0.003506	0.447738	0.000255
75	Diesel	0.000196	0.000238	0.000283	0.000977	0.001561	0.139566	0.000127
100	Diesel	0.000275	0.000332	0.000395	0.001171	0.001881	0.160883	0.000167
175	Diesel	0.000273	0.000331	0.000393	0.001824	0.002542	0.269018	0.000153
300	Diesel	0.000161	0.000195	0.000232	0.000611	0.001766	0.162596	9.96E-05
Aggregate	Gasoline	0.079443	0.080238	0.087342	3.995532	0.039761	8.439336	0.000466

25	Diesel	0.001662	0.002011	0.002393	0.009594	0.008547	1.22251	0.000423

PM2.5_tpd	SOx_tpd	NH3_tpd	Fuel Consumption	Total_Activity_hp	Total_Populati	Horsepowe
0.00073	1.36E-05	1.23E-05	48887.81345	32698.66079	127.5920636	1747420
0.025654	0.000329	0.000297	1180576.648	139224.7142	1539.670713	42197900
0.029051	0.000369	0.000332	1319478.226	149488.1973	1161.338007	47162723
0.049842	0.000906	0.000812	3229647.647	151129.2007	1676.624548	1.15E+08
0.024912	0.000771	0.000691	2747571.127	195786.2124	997.7197069	1.09E+08
0.012031	0.000613	0.00055	2184597.818	126141.9017	318.8449156	86808493
0.000389	1.11E-05	1E-05	39764.30185	41926.92077	113.3408055	1705577
0.000756	2.42E-05	2.18E-05	86513.31388	38057.0516	160.109964	3710743
2.18E-05	1.38E-06	1.23E-06	4903.194996	4116.967064	2.361045051	233803.6
0.000668	1.67E-05	1.5E-05	59699.98944	28609.17169	17.21697774	2277384
7.2E-05	2.48E-06	2.23E-06	8846.20936	10288.62689	2.221675572	337457.6
2.99E-05	6.32E-07	5.67E-07	2254.621323	1997.213963	1.291756103	77364.46
0.000284	8.36E-06	7.49E-06	29789.78279	2892.173673	11.08622201	1280502
0.000526	1.8E-05	1.61E-05	64134.15549	14887.83662	11.89692496	2756781
3.8E-05	7.18E-07	6.47E-07	2572.120262	4683.221105	2.578910357	110323.8
0.000206	4.35E-06	3.9E-06	15505.77217	15092.0939	12.91386893	665076
0.001127	1.77E-05	1.59E-05	63192.02502	28670.73011	41.1921021	2710442
0.00231	6.78E-05	6.08E-05	241600.537	36728.8851	155.6537611	11520461
0.000428	1.22E-05	1.09E-05	43471.86723	20370.39058	10.88278705	2072909
0.000536	9.75E-06	8.79E-06	34922.32158	41126.53719	47.24117134	1497894
0.002799	5.88E-05	5.27E-05	209601.6346	76890.56288	165.6121388	8990266
0.001103	2.01E-05	1.8E-05	71671.47238	51324.38712	44.81932803	3074144
0.000176	5.18E-06	4.65E-06	18472.83317	11799.99112	8.944482207	880857.1
1.15E-05	2.43E-07	2.18E-07	865.3994917	7984.734072	0.590261257	35351.29
0.000167	4.8E-06	4.3E-06	17103.26186	12302.89239	7.173749637	776714.9
0.000282	9.73E-06	8.72E-06	34650.16123	9724.640857	8.972694354	1573577
0.000116	2.78E-06	2.51E-06	9965.608933	1993.092222	24.56508792	385321
0.000665	1.09E-05	9.8E-06	38948.65694	27905.16158	44.7241682	1505953
0.000469	9.85E-06	8.84E-06	35133.74321	17311.03103	22.01608125	1358449
0.004871	7.71E-05	6.92E-05	275209.844	82344.86506	141.9945072	10641009
0.001789	4.82E-05	4.32E-05	171688.4318	67614.04497	70.67624618	7379959
0.001185	3.2E-05	2.87E-05	114154.231	18845.91503	22.87833235	4906874
0.000394	8.33E-06	7.47E-06	29699.85402	20410.28648	19.16474863	1148347
0.002153	3.72E-05	3.34E-05	132631.7247	55400.07422	65.3556772	5128215
0.001772	4.86E-05	4.36E-05	173398.4912	60585.61918	69.58165166	7453465
0.00062	2.13E-05	1.91E-05	75888.82369	13492.5161	13.84447766	3262051

4E-06	9.55E-08	8.6E-08	341.9956797	5509.994251	1.027883567	13970.41
0.000247	4.64E-06	4.18E-06	16596.11205	28443.40945	21.86567601	677945.8
0.008767	0.000137	0.000123	487718.9682	36284.64837	438.640391	19923161
0.000457	7.99E-06	7.17E-06	28483.34513	10124.23819	15.90252357	1163535
0.001204	3.35E-05	3E-05	119252.4209	59084.07554	45.76916959	5415641
0.00107	3E-05	2.69E-05	106998.4631	42193.40729	23.68819587	4859149
0.000176	3.34E-06	3E-06	11941.59575	2892.173673	11.0862221	426834
0.00022	4.65E-06	4.17E-06	16591.12828	6303.609133	11.5178153	593024.4
0.000987	1.81E-05	1.63E-05	64694.37345	18272.50698	28.70864985	2312401
0.000192	4.95E-06	4.44E-06	17641.67161	13853.23296	5.789646311	701020.1
0.000386	1.32E-05	1.19E-05	47183.7166	14711.95893	9.408263959	1874921
3.57E-05	5.89E-07	0	2020.185566	1814.242165	3.800875972	36022.98
7.98E-05	2.27E-06	0	7783.606757	4360.842484	8.853259886	138793.5
0.000121	1.72E-06	0	5891.843155	2392.742567	4.681566746	105060.5
0.000513	1.23E-05	0	42363.67394	12001.35903	18.5408584	839800.5
0.000583	1.45E-05	0	49871.60336	8746.831041	14.5082217	988634.6
2.27E-07	1.76E-09	0	6.033495818	17.05690176	0.092704292	107.5864
3.34E-06	4.36E-08	0	149.6196339	229.5418413	1.205155796	2667.946
2.23E-05	1.8E-07	0	619.0018198	620.8526977	3.569115242	11037.74
5.45E-05	5.31E-07	0	1822.105762	1308.458517	6.999174046	32490.92
0.000338	4.94E-06	0	16942.23317	7966.427204	31.47310713	335856
0.000699	1.8E-05	0	61685.85937	17651.11692	70.82607909	1222836
3.24E-05	2.92E-07	0	1001.109756	1061.728895	3.986284556	17851.31
0.000243	2.12E-06	0	7284.957588	4536.697502	15.80608179	129901.9
0.000689	8.47E-06	0	29061.84072	13712.3596	39.77014127	518216.8
0.001261	3.21E-05	0	110081.1862	37494.69607	81.67248125	2182205
0.001425	3.91E-05	0	134196.1608	28163.61996	66.14451234	2660251
1.34E-07	1.03E-09	0	3.549080303	20.81759875	0.046352146	63.2855
0.001176	3.72E-05	0	127512.2947	168559.4588	346.3895871	2273738
0.000487	2.95E-05	0	101240.0263	76999.20489	143.2744833	1805264
0.001021	2.25E-05	0	77229.00371	40446.66081	75.41494154	1377111
0.002928	0.000128	0	437705.4722	155775.4436	214.285971	8676897
0.002967	0.000135	0	463860.1234	102948.4287	159.6367908	9195377
1.25E-05	9.83E-08	0	337.2439262	407.080696	1.715029402	6013.572
5.42E-05	3E-07	0	1029.793469	733.0946149	3.291002366	18362.78
0.000133	7.95E-07	0	2726.338544	1394.380284	5.701313958	48614.76
0.001282	1.3E-05	0	44630.05088	14928.33066	48.53069686	884728.2
0.001216	4.82E-05	0	165492.3064	35284.14731	90.85020616	3280653
4.26E-06	2.3E-09	1.98E-09	7.889347233	0	1.241256355	0
1.35E-06	6.77E-10	5.83E-10	2.321064716	0	0.880347044	0
8.42E-07	4.55E-10	3.92E-10	1.558518921	0	0.325946599	0
4.86E-06	2.11E-07	1.35E-07	536.55	394.2	0.68	13008.6
6.11E-07	3.27E-10	2.82E-10	1.121819733	0	0.45342602	0
4.35E-06	2.35E-09	2.02E-09	8.04778779	0	0.715385033	0
2.26E-06	1.22E-09	1.05E-09	4.177700931	0	0.934542569	0
1.16E-06	6.17E-10	5.31E-10	2.114369937	0	0.281535078	0
1.94E-06	1.05E-09	9.03E-10	3.592134684	0	0.700035494	0

1.36E-05	7.36E-09	6.34E-09	25.23221756	0	5.551117734	0
7.28E-07	3.93E-10	3.39E-10	1.348135707	0	0.169761559	0
2.09E-06	9.31E-08	6.06E-08	240.9	146	0.27	5402
0.000236	1.23E-07	1.06E-07	421.5592803	0	74.32166222	0
2.08E-05	1.12E-08	9.65E-09	38.38313598	0	5.240231512	0
2.02E-05	1.09E-08	9.37E-09	37.29226875	0	3.739835232	0
0.00047	5.87E-06	0	20144.52301	22418.91935	37.26712538	359207.5
0.000356	5.12E-06	0	17567.83802	12269.47357	20.11683136	313261.3
0.000337	5.1E-06	0	17482.40713	8455.381541	13.3030659	311737.9
0.000655	2.8E-05	0	96121.21414	30230.61393	29.43361271	1905468
0.00043	1.22E-05	0	41993.12413	8916.543413	11.49533221	832454.8
1.68E-05	2.62E-07	0	899.2394184	1500.98726	2.410311592	16034.81
2.38E-05	2.62E-07	0	898.5327539	622.409946	1.205155796	16022.21
7.71E-06	1.35E-07	0	462.3790813	253.8822973	0.417169314	8244.922
0.000321	6.96E-06	0	23882.97178	7893.075212	8.992316324	473446.4
0.000822	1.58E-05	0	54209.63038	12297.72582	17.84557621	1074630
4.63E-05	5.46E-07	0	1873.78468	2148.199781	6.164835418	33412.43
0.000153	2.83E-06	0	9717.955857	6235.044167	15.99149037	173285.9
0.000177	3.09E-06	0	10605.12078	5375.862497	12.28331869	189105.4
0.000315	1.05E-05	0	35852.95994	12092.26067	21.73915647	710734.7
0.000216	1.28E-05	0	43845.09747	9085.392383	16.08419466	869167.6
5.29E-05	1.46E-06	0	5005.489013	6726.926521	17.05758973	89255.48
4.54E-05	1.06E-06	0	3639.296318	2751.849673	6.72106117	64894.19
0.000103	1.65E-06	0	5654.963904	3245.018815	7.64810409	100836.6
0.000256	1.17E-05	0	40083.64042	16344.77811	24.70569382	794602
0.000121	5.21E-06	0	17865.37459	4211.310973	7.833512674	354156
0.000737	1.37E-05	0	46949.4053	63031.0082	173.357026	837179.3
0.000243	5.6E-06	0	19213.71519	13345.58328	35.22763096	342609.8
0.000599	8.32E-06	0	28528.96243	15607.86349	41.80963569	508714.8
0.001302	5.01E-05	0	171767.1771	67498.41016	113.2846448	3405044
0.000213	4.1E-06	0	14057.00852	3281.416459	7.509047652	278660.5
1.52E-05	4.57E-07	0	1567.733791	1581.484066	5.747666104	27955.08
0.000202	1.82E-05	0	62526.26031	39611.82654	117.4099858	1114938
0.000574	1.21E-05	0	41367.31783	21415.42158	67.2106117	737642.2
0.001536	8.1E-05	0	277740.4733	113743.4969	235.8397188	5505816
2.26E-05	6.35E-07	0	2177.958602	515.9520276	1.436916526	43174.98
8.84E-06	7.52E-08	0	257.9650458	295.9517107	0.834338628	4599.909
2.56E-05	2.45E-07	0	841.8034123	608.6814878	1.39056438	15010.64
5.47E-05	5.71E-07	0	1958.800035	1007.280288	2.3176073	34928.38
9.78E-05	1.86E-06	0	6377.348158	2214.210545	3.847228118	126422
0.000111	2.28E-06	0	7812.129982	1698.33239	3.105593782	154864.5
6.43E-05	8.04E-07	0	2757.137066	3464.939423	7.138230484	49163.95
0.000316	6.5E-06	0	22288.12662	16618.079	31.8439243	397431.2
0.000674	1.04E-05	0	35826.34282	20554.61539	38.65768976	638838.2
0.00337	8.14E-05	0	279167.6366	104283.3722	144.3869348	5534107
0.003637	0.000155	0	530928.9701	129698.1717	182.7665117	10524923
2.42E-06	1.71E-08	0	58.58445737	52.53311473	0.23176073	1044.65

1.92E-05	2.4E-07	0	823.9408913	471.952203	1.807733694	14692.12
1.89E-05	2.84E-07	0	973.0629861	438.3842751	1.436916526	17351.19
0.000277	2.26E-06	0	7756.693081	2142.346313	8.714203448	153765.6
0.002462	3.49E-05	0	119576.2911	20650.95982	68.69388037	2370432
0.000688	1.35E-05	0	46258.559	53109.04437	136.3680135	824860.5
0.001916	9.97E-05	0	342108.9492	245968.9222	531.2882975	6100323
0.001971	5.02E-05	0	172353.0856	99142.17381	207.3331491	3073318
0.000127	1.5E-05	0	51517.50852	24644.99296	35.92291315	1021262
2.99E-05	1.21E-06	0	4141.982182	1066.266689	1.946790132	82108.99
1.19E-05	1.32E-07	0	452.35223	731.1402711	1.575972964	8066.128
1.19E-05	2.37E-07	0	811.9829351	754.8580848	1.529620818	14478.89
2.57E-05	2.88E-07	0	989.5032696	680.795341	1.436916526	17644.35
5.32E-05	1.32E-06	0	4517.131338	2245.950578	3.47641095	89545.8
6.62E-05	1.51E-06	0	5172.730804	1433.859577	2.642072322	102542.1
1.62E-07	3.39E-09	0	11.6450521	24.40058659	0.092704292	207.649
0.001048	1.33E-05	0	45479.21403	58643.08178	149.7174316	810963.6
0.002922	6.33E-05	0	217190.44	158184.1412	353.6205218	3872836
0.008175	0.000148	0	509062.176	280376.6255	587.0962812	9077353
0.003791	0.000161	0	551520.5465	233622.5509	348.290025	10933122
0.001512	6.79E-05	0	232818.3585	56920.33367	95.85623793	4615298
0.000234	4.24E-06	0	14549.33777	12438.87353	40.23366273	259436.8
0.000117	1.32E-06	0	4535.218822	2614.044457	8.80690774	80869.85
0.000154	1.52E-06	0	5227.930431	2131.386328	7.230934776	93221.95
0.00014	2.55E-06	0	8741.779537	2784.940523	7.230934776	173293.5
9.16E-05	1.54E-06	0	5283.5996	935.1177924	2.78112876	104740
0.000352	0.000143	0.000197	559286.0401	0	6288.038301	0

0.000389	1.11E-05	1E-05	39764.30185	41926.92077	113.3408055	1705577

Table 23-1: Conversions

Days/YR	lbs / ton	grams / lbs
365	2000	453.59237

r_Hours_hhpy	HC_g_hp-hr	TOG_g_hp-hr	NH3_g_hp-hr	ROG_g_hp-hr	CO_g_hp-hr
	0.893367164	1.286448716	0.002330495	1.08097427	3.209161503
	0.827377979	1.191424289	0.002330495	1.001127356	3.108978608
	0.41371033	0.595742876	0.002330495	0.5005895	2.048801695
	0.248593037	0.357973974	0.002330495	0.300797576	1.797272087
	0.165737741	0.238662347	0.002096303	0.200542667	1.542845331
	0.10912337	0.157137653	0.002096303	0.132039277	0.626831648
	0.322674118	0.464650731	0.001942079	0.390435683	1.862571004
	0.238390802	0.343282756	0.001942079	0.288452871	1.67800968
	0.075477948	0.108688245	0.00174692	0.091328317	1.17276972
	0.204804405	0.294918342	0.002183649	0.24781333	1.659441035
	0.155148367	0.223413649	0.002183649	0.187729524	0.812964748
	0.283385923	0.408075729	0.002427599	0.342896969	1.881678038
	0.164232718	0.236495114	0.001937903	0.19872159	1.430007245
	0.139900839	0.201457208	0.001937903	0.169280015	0.712336423
	0.490033875	0.705648784	0.001942079	0.592940991	2.128550003
	0.226708747	0.326460596	0.001942079	0.274317584	1.505342433
	0.239931984	0.345502056	0.001942079	0.2903177	1.550320742
	0.146347003	0.210739683	0.00174692	0.177079873	1.245435498
	0.145202819	0.209092058	0.00174692	0.175695411	0.691563509
	0.489270318	0.704549256	0.001942079	0.592017083	2.142625009
	0.226663867	0.326395968	0.001942079	0.274263279	1.504989893
	0.216296385	0.311466795	0.001942079	0.261718626	1.512366334
	0.148203899	0.213413615	0.00174692	0.179326717	1.291826454
	0.238044187	0.342783628	0.002039183	0.288033468	1.580609563
	0.157179536	0.226338533	0.001834266	0.190187239	1.383901152
	0.130324629	0.187667465	0.001834266	0.157692801	0.682890389
	0.543607075	0.782794191	0.002154398	0.65776456	2.361255001
	0.605484496	0.871897672	0.002154398	0.732636239	2.545515589
	0.250663289	0.360955137	0.002154398	0.303302581	1.675594881
	0.26404644	0.380226873	0.002154398	0.319496192	1.725353512
	0.173682098	0.250102221	0.001937903	0.210155339	1.452744744
	0.169563646	0.24417165	0.001937903	0.205172011	0.810710335
	0.251493837	0.362151124	0.002154398	0.304307541	1.669914991
	0.249612234	0.359441617	0.002154398	0.302030803	1.693809217
	0.171597094	0.247099816	0.001937903	0.207632484	1.447484327
	0.138770712	0.199829826	0.001937903	0.167912561	0.717003314

0.514535547	0.74093119	0.002039183	0.622588011	2.234977491
0.514438196	0.740791002	0.002039183	0.622470218	2.239508391
0.280217933	0.403513823	0.002039183	0.339063699	1.675299159
0.234533769	0.337728626	0.002039183	0.283785861	1.599581919
0.161215827	0.232150791	0.001834266	0.195071151	1.36757642
0.155346505	0.223698968	0.001834266	0.187969271	0.75293951
0.588040546	0.846778388	0.002330495	0.711529056	2.554259826
0.27197366	0.391642068	0.002330495	0.32908813	1.808391343
0.2572802	0.370483487	0.002330495	0.311309042	1.816000081
0.193033058	0.277967604	0.002096303	0.23357	1.584345586
0.150649779	0.216935683	0.002096303	0.182286233	0.774766191
1.028741903	1.48138834	0	1.244777702	5.509562938
0.389028392	0.560200884	0	0.470724354	3.616308504
0.611844286	0.881055771	0	0.740331586	3.939577466
0.429098687	0.617902109	0	0.519209411	3.29226833
0.40182192	0.578623564	0	0.486204523	1.497298819
4.226702418	6.086451482	0	5.114309926	10.31192712
1.440304686	2.074038747	0	1.74276867	5.261940858
1.034464586	1.489629004	0	1.251702149	4.262257173
0.851843099	1.226654063	0	1.03073015	4.121880223
0.579930733	0.835100255	0	0.701716187	3.508519164
0.333382288	0.480070495	0	0.403392569	1.637474789
1.987557139	2.86208228	0	2.404944138	6.618199985
0.989230459	1.42449186	0	1.196968855	4.313123925
0.737733213	1.062335827	0	0.892657188	3.962482911
0.375817805	0.54117764	0	0.454739545	3.292367872
0.337592073	0.486132585	0	0.408486408	1.557051803
3.669962342	5.284745772	0	4.440654434	9.139906214
0.510489643	0.735105085	0	0.617692468	4.310702723
0.262245203	0.377633093	0	0.317316696	3.418952974
0.369234394	0.531697527	0	0.446773616	3.620379721
0.270762495	0.389897993	0	0.327622619	3.175738221
0.256418421	0.369242527	0	0.31026629	1.203117102
2.35723705	3.394421353	0	2.852256831	7.132114609
1.49838676	2.157676935	0	1.81304798	4.900338028
1.397359422	2.012197568	0	1.690804901	4.848291304
0.822976735	1.185086498	0	0.995801849	3.855539392
0.251182079	0.361702194	0	0.303930316	1.240931803
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
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#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
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0.716602647	1.031907812	0	0.867089203	3.996829223
0.611928213	0.881176627	0	0.740433138	3.980345789
0.276642785	0.39836561	0	0.33473777	3.344953594
0.361336286	0.520324252	0	0.437216906	1.499653587
1.050180802	1.512260355	0	1.27071877	5.987899965
0.798334588	1.149601807	0	0.965984851	4.129079742
0.727600727	1.047745047	0	0.88039688	4.048066823
0.443027163	0.637959115	0	0.536062867	3.470644371
0.477123218	0.687057434	0	0.577319094	1.845702773
1.728557654	2.489123022	0	2.091554762	6.264284212
0.593067134	0.854016673	0	0.717611232	3.766848372
0.536946658	0.773203187	0	0.649705456	3.837047301
0.343778199	0.495040606	0	0.415971621	3.1920855
0.212819074	0.306459467	0	0.25751108	1.101085817
0.648199096	0.933406698	0	0.784320906	4.371470154
0.504644594	0.726688215	0	0.610619958	3.698957688
0.559525775	0.805717116	0	0.677026187	3.839937952
0.253452308	0.364971323	0	0.306677292	3.171711907
0.258609329	0.372397434	0	0.312917288	1.204384308
1.008858602	1.452756387	0	1.220718909	4.991317744
0.459342547	0.661453267	0	0.555804481	3.591834888
0.64442328	0.927969523	0	0.779752169	3.896936257
0.295778736	0.42592138	0	0.357892271	3.174461932
0.451074304	0.649546997	0	0.545799907	1.809531055
0.545496954	0.785515614	0	0.660051315	3.904915176
0.194591488	0.280211743	0	0.2354557	3.254254352
0.41337258	0.595256515	0	0.500180822	3.561458145
0.224043092	0.322622053	0	0.271092142	3.05232952
0.322701348	0.464689941	0	0.390468631	1.587175993
2.506590227	3.609489927	0	3.032974175	7.414381942
0.955294276	1.375623758	0	1.155906074	4.235470967
0.775420431	1.11660542	0	0.938258721	3.993689685
0.489093433	0.704294543	0	0.591803054	3.435137679
0.424607678	0.611435056	0	0.51377529	1.975225007
1.492676512	2.149454178	0	1.80613858	6.099743198
0.525338819	0.7564879	0	0.635659971	3.737413339
0.592221962	0.852799625	0	0.716588574	3.905756703
0.412490254	0.593985965	0	0.499113207	3.391748788
0.267354749	0.384990838	0	0.323499246	1.264815975
3.097457856	4.460339313	0	3.747924006	7.959544447

0.762804009	1.098437772	0	0.92299285	3.837846719
0.61376662	0.883823933	0	0.74265761	3.852507878
0.94662858	1.363145156	0	1.145420582	4.47773627
0.574504937	0.827287109	0	0.695150974	2.288873902
0.997207367	1.435978609	0	1.206620914	4.971399544
0.292256931	0.42084998	0	0.353630886	3.427862393
0.339443468	0.488798593	0	0.410726596	3.603611711
0.139944789	0.201520496	0	0.169333194	2.983146148
0.270123289	0.388977537	0	0.32684918	1.326417953
1.814856134	2.613392833	0	2.195975923	6.669063733
0.522822714	0.752864708	0	0.632615484	3.762441085
0.678282544	0.976726864	0	0.820721879	3.988563513
0.397841522	0.572891791	0	0.481388241	3.341414504
0.420962578	0.606186113	0	0.50936472	1.601658368
0.463370245	0.667253153	0	0.560677997	4.703182161
1.545381889	2.22534992	0	1.869912085	6.049494783
0.515343186	0.742094188	0	0.623565255	3.686197255
0.523933251	0.754463881	0	0.633959233	3.790519536
0.270870817	0.390053976	0	0.327753689	3.178316062
0.250905245	0.361303553	0	0.303595347	1.235754524
1.029061964	1.481849228	0	1.245164976	4.916675084
0.803884329	1.157593434	0	0.972700038	4.000683819
0.975095074	1.404136906	0	1.179865039	4.159549051
0.521932594	0.751582935	0	0.631538438	3.484572152
0.510364028	0.734924201	0	0.617540474	1.93100628
47.03376129	51.71067894	0.116901848	47.50443696	2365.534205

13.84018916	19.9298724	0.083299976	16.74662886	79.88968916

NOx_g_hp-hr	PM10_g_hp-hr	PM2.5_g_hp-hr	CO2_g_hp-hr	gal/hp-hr
2.348093446	0.150280409	0.138257977	284.8072283	0.027977
2.482436335	0.21881277	0.201307749	284.8072269	0.027977
3.393950487	0.221697286	0.203961503	284.8072272	0.027977
2.225138102	0.155399096	0.142967169	284.8072271	0.027977
1.791174286	0.082123707	0.07555381	256.1869073	0.025166
1.120506957	0.049879731	0.045889353	256.1869072	0.025166
1.659303661	0.082085585	0.075518738	237.3393561	0.023314
1.53096195	0.07336418	0.067495045	237.3393562	0.023314
0.882945758	0.033576601	0.030890473	213.4890895	0.020971
2.217639047	0.105535942	0.097093067	266.8613627	0.026214
1.68703764	0.076824677	0.070678703	266.8613626	0.026214
2.539605314	0.139089455	0.127962299	296.6741959	0.029143
1.768348393	0.079700357	0.073324328	236.8289212	0.023264
1.474679098	0.068607475	0.063118876	236.8289216	0.023264
1.725201816	0.123999845	0.114079857	237.3393581	0.023314
2.031684299	0.111271569	0.102369842	237.3393563	0.023314
2.076158392	0.149686882	0.137711931	237.3393575	0.023314
1.708417381	0.072155678	0.066383224	213.4890863	0.020971
1.628201123	0.074395279	0.068443657	213.4890885	0.020971
1.795875948	0.128810084	0.118505278	237.3393555	0.023314
2.030666634	0.112060844	0.103095977	237.3393568	0.023314
1.839602652	0.129127089	0.118796922	237.3393554	0.023314
1.590922317	0.072014848	0.06625366	213.4890916	0.020971
2.133268548	0.11683515	0.107488338	249.206321	0.02448
1.638942721	0.077306257	0.071121756	224.1635426	0.02202
1.417111642	0.064532729	0.059370111	224.1635453	0.02202
1.992091625	0.108767402	0.10006601	263.2866325	0.025863
2.045312301	0.159050422	0.146326388	263.2866317	0.025863
2.245411343	0.124349372	0.114401423	263.2866341	0.025863
2.242875398	0.164758071	0.151577425	263.2866332	0.025863
1.876989712	0.087239312	0.080260167	236.8289205	0.023264
1.803359777	0.086915277	0.079962055	236.8289193	0.023264
2.253799536	0.12343641	0.113561498	263.2866347	0.025863
2.113229505	0.151128756	0.139038455	263.2866334	0.025863
1.853841916	0.085586096	0.078739209	236.8289213	0.023264
1.486170615	0.068388576	0.06291749	236.8289221	0.023264

1.885556587	0.102950629	0.094714579	249.2063237	0.02448
1.822812241	0.131007816	0.12052719	249.2063243	0.02448
2.395136904	0.158376887	0.145706736	249.2063216	0.02448
1.984867473	0.141441881	0.130126531	249.2063231	0.02448
1.739497818	0.080031253	0.073628753	224.1635437	0.02202
1.657458858	0.079240537	0.072901294	224.1635443	0.02202
2.070242114	0.148799792	0.136895809	284.8072269	0.027977
2.43677431	0.133783982	0.123081263	284.8072291	0.027977
2.178324865	0.153645258	0.141353637	284.8072265	0.027977
2.08814007	0.098463393	0.090586321	256.1869058	0.025166
1.606106465	0.074160346	0.068227519	256.1869092	0.025166
4.708717442	0.356993929	0.328434415	571.4540783	0.05608
3.8631891	0.207050709	0.190486652	571.4540783	0.05608
4.729167765	0.415760304	0.38249948	571.4540783	0.05608
3.851714144	0.220071453	0.202465737	514.0285459	0.050445
4.034553364	0.212288106	0.195305058	514.0285459	0.050445
6.999928172	0.759992202	0.699192825	571.4540783	0.05608
5.119084034	0.451035612	0.414952763	571.4540783	0.05608
8.40462866	0.726425455	0.668311419	571.4540783	0.05608
7.025757159	0.603210059	0.554953254	571.4540783	0.05608
5.889886387	0.36264332	0.333631854	514.0285459	0.050445
3.544295858	0.205673739	0.18921984	514.0285459	0.050445
5.539383392	0.653792836	0.601489409	571.4540783	0.05608
7.73112422	0.673881699	0.619971163	571.4540783	0.05608
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3.230218774	0.097085278	0.089318456	571.4540783	0.05608
3.365174116	0.266780043	0.24543764	571.4540783	0.05608
2.410911941	0.121465671	0.111748418	514.0285459	0.050445
2.443917879	0.116133236	0.106842577	514.0285459	0.050445
5.829211269	0.75068903	0.690633907	571.4540783	0.05608
10.84770395	1.061385256	0.976474435	571.4540783	0.05608
10.18817475	0.984326395	0.905580283	571.4540783	0.05608
8.028404988	0.521503089	0.479782842	514.0285459	0.050445
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4.61423818	0.388973585	0.357855698	571.4540783	0.05608
2.249763165	0.123795638	0.113891987	514.0285459	0.050445
3.395841698	0.185767667	0.170906254	514.0285459	0.050445
5.076911739	0.377219807	0.347042222	571.4540783	0.05608
6.55855304	0.534483503	0.491724823	571.4540783	0.05608
4.745358849	0.336492795	0.309573372	571.4540783	0.05608
3.764429292	0.243659746	0.224166966	514.0285459	0.050445
4.590891857	0.275444637	0.253409066	514.0285459	0.050445
5.160294157	0.498627546	0.458737343	571.4540783	0.05608
4.811202156	0.318136454	0.292685538	571.4540783	0.05608
4.320364386	0.336577471	0.309651273	571.4540783	0.05608
3.024100532	0.159479201	0.146720865	514.0285459	0.050445
2.026635682	0.089343886	0.082196375	514.0285459	0.050445
3.903204551	0.213235546	0.196176702	571.4540783	0.05608
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4.576872853	0.367675561	0.338261516	571.4540783	0.05608
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4.397949383	0.316775212	0.291433195	571.4540783	0.05608
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4.836070877	0.274707049	0.252730485	514.0285459	0.050445
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3.078864707	0.065049007	0.059845086	571.4540783	0.05608
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4.70435365	0.296873056	0.273123211	571.4540783	0.05608
5.183951813	0.524804606	0.482820238	571.4540783	0.05608
3.548282998	0.213728015	0.196629774	514.0285459	0.050445
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4.513799074	0.271593379	0.249865908	571.4540783	0.05608
4.156583998	0.324146362	0.298214653	571.4540783	0.05608
2.437101824	0.124783631	0.11480094	514.0285459	0.050445
2.362240073	0.11790601	0.108473529	514.0285459	0.050445
4.475377064	0.32502383	0.299021923	571.4540783	0.05608
6.390528915	0.519439064	0.477883938	571.4540783	0.05608
6.682986971	0.593558898	0.546074186	571.4540783	0.05608
4.856798605	0.291426274	0.268112172	514.0285459	0.050445
5.581585041	0.314869837	0.28968025	514.0285459	0.050445
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71.17111423	3.520827837	3.23916161	10179.99708	

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Sheet 9: On-Road Vehicle Operational Fuel Efficiency
EMFAC2021 San Joaquin Valley Fuel Efficiency Estimates for 2021

Table 9-1: 2021 San Joaquin Valley Average Vehicle Fuel Efficiency (Gasoline)

Vehicle Class	Population	Vehicle Miles Travelled Per Day	Gallons Per Day	Miles Per Gallon
HHDT	3.63	65.46	22.58	2.90
LDA	249,898.69	9,778,546.00	352,851.20	27.71
LDT1	23,308.28	739,633.69	31,986.75	23.12
LDT2	94,763.35	3,632,206.82	164,952.66	22.02
LHDT1	10,285.19	342,935.13	38,358.53	8.94
LHDT2	1,215.05	41,289.19	5,096.94	8.10
MCY	12,209.48	65,618.60	1,657.62	39.59
MDV	96,879.25	3,295,870.53	183,463.62	17.96
MH	1,698.57	14,496.65	3,288.20	4.41
MHDT	606.60	26,887.13	5,951.69	4.52
OBUS	198.27	8,881.63	1,929.55	4.60
SBUS	123.83	6,576.42	652.69	10.08
UBUS	48.14	3,627.08	772.00	4.70
TOTAL	491,238.35	17,956,634.31	790,984.04	22.70

Table 9-2: 2021 San Joaquin Valley Average Vehicle Fuel Efficiency (Diesel)

Vehicle Class	Population	Vehicle Miles Travelled Per Day	Gallons Per Day	Miles Per Gallon
HHDT	8,006.8	1,153,664.27	199,122.12	5.79
LDA	782.81	25,941.32	618.15	41.97
LDT1	7.89	93.79	3.83	24.47
LDT2	226.36	9,565.78	309.72	30.89
LHDT1	9,240.06	323,200.86	20,506.52	15.76
LHDT2	3,131.25	115,626.09	8,957.09	12.91
MCY	0.00	0.00	0.00	0.00
MDV	1,358.73	54,194.48	2,304.27	23.52
MH	651.32	5,727.79	608.66	9.41
MHDT	5,563.72	262,958.26	30,850.40	8.52
OBUS	81.53	5,807.60	835.41	6.95
SBUS	484.04	11,109.63	1,367.95	8.12
UBUS	80.77	5,598.19	638.24	8.77
TOTAL	29,615.28	1,973,488.07	266122.37	7.42

Table 9-3: 2021 San Joaquin Valley Average Vehicle Fuel Efficiency (Electricity)

Vehicle Class	Population	Vehicle Miles Travelled Per Day	Energy Consumption (kWh/day)	Miles Per kWh
HHDT	0.00	0.00	0.00	0.00
LDA	8,906.58	288,476.46	103,071.65	2.80
LDT1	15.47	410.02	150.60	2.72
LDT2	334.09	9,252.95	3,004.14	3.08
LHDT1	0.00	0.00	0.00	0.00
LHDT2	0.00	0.00	0.00	0.00
MCY	0.00	0.00	0.00	0.00
MDV	383.22	9,614.14	3,148.04	3.05
MH	0.00	0.00	0.00	0.00
MHDT	0.00	0.00	0.00	0.00
OBUS	0.00	0.00	0.00	0.00
SBUS	0.00	0.00	0.00	0.00
UBUS	17.16	766.36	1,335.95	0.57
TOTAL	9,656.52	308,519.93	110,710.38	2.79

Sheet 10: EMFAC Output

Source: EMFAC2021 (v1.0.2) Emissions Inventory
Region Type: County
Region: San Joaquin
Calendar Year: 2021
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for CVMT and EVMT, trips/day for Trips, kWh/day for Energy Consumption, tons/day for Emissi

Region	Calendar Ye	Vehicle Cat	Model Year	Speed	Fuel	Population	Total VMT	CVMT	EVMT
San Joaquin	2021	HHDT	Aggregate	Aggregate	Gasoline	3.629012	65.46353	65.46353	0
San Joaquin	2021	HHDT	Aggregate	Aggregate	Diesel	8006.805	1153664	1153664	0
San Joaquin	2021	HHDT	Aggregate	Aggregate	Natural Ga	189.6409	12867.14	12867.14	0
San Joaquin	2021	LDA	Aggregate	Aggregate	Gasoline	245564	9665835	9665835	0
San Joaquin	2021	LDA	Aggregate	Aggregate	Diesel	782.8122	25941.32	25941.32	0
San Joaquin	2021	LDA	Aggregate	Aggregate	Electricity	4571.887	189680.5	0	189680.5
San Joaquin	2021	LDA	Aggregate	Aggregate	Plug-in Hyb	4334.692	211506.8	112710.8	98796
San Joaquin	2021	LDT1	Aggregate	Aggregate	Gasoline	23304.88	739538.6	739538.6	0
San Joaquin	2021	LDT1	Aggregate	Aggregate	Diesel	7.892279	93.79146	93.79146	0
San Joaquin	2021	LDT1	Aggregate	Aggregate	Electricity	12.05973	318.3305	0	318.3305
San Joaquin	2021	LDT1	Aggregate	Aggregate	Plug-in Hyb	3.405929	186.7791	95.08519	91.69394
San Joaquin	2021	LDT2	Aggregate	Aggregate	Gasoline	94499.39	3624965	3624965	0
San Joaquin	2021	LDT2	Aggregate	Aggregate	Diesel	226.3608	9565.781	9565.781	0
San Joaquin	2021	LDT2	Aggregate	Aggregate	Electricity	70.12716	2492.193	0	2492.193
San Joaquin	2021	LDT2	Aggregate	Aggregate	Plug-in Hyb	263.9668	14003.05	7242.29	6760.761
San Joaquin	2021	LHDT1	Aggregate	Aggregate	Gasoline	10285.19	342935.1	342935.1	0
San Joaquin	2021	LHDT1	Aggregate	Aggregate	Diesel	9240.057	323200.9	323200.9	0
San Joaquin	2021	LHDT2	Aggregate	Aggregate	Gasoline	1215.051	41289.19	41289.19	0
San Joaquin	2021	LHDT2	Aggregate	Aggregate	Diesel	3131.247	115626.1	115626.1	0
San Joaquin	2021	MCY	Aggregate	Aggregate	Gasoline	12209.48	65618.6	65618.6	0
San Joaquin	2021	MDV	Aggregate	Aggregate	Gasoline	96578.51	3288181	3288181	0
San Joaquin	2021	MDV	Aggregate	Aggregate	Diesel	1358.732	54194.48	54194.48	0
San Joaquin	2021	MDV	Aggregate	Aggregate	Electricity	82.48314	2906.343	0	2906.343
San Joaquin	2021	MDV	Aggregate	Aggregate	Plug-in Hyb	300.7369	14397.09	7689.295	6707.792
San Joaquin	2021	MH	Aggregate	Aggregate	Gasoline	1698.568	14496.65	14496.65	0
San Joaquin	2021	MH	Aggregate	Aggregate	Diesel	651.3176	5727.792	5727.792	0
San Joaquin	2021	MHDT	Aggregate	Aggregate	Gasoline	606.5982	26887.13	26887.13	0
San Joaquin	2021	MHDT	Aggregate	Aggregate	Diesel	5563.717	262958.3	262958.3	0
San Joaquin	2021	MHDT	Aggregate	Aggregate	Natural Ga	43.75257	2558.492	2558.492	0
San Joaquin	2021	OBUS	Aggregate	Aggregate	Gasoline	198.2741	8881.631	8881.631	0
San Joaquin	2021	OBUS	Aggregate	Aggregate	Diesel	81.52575	5807.602	5807.602	0
San Joaquin	2021	OBUS	Aggregate	Aggregate	Natural Ga	1.54806	93.15252	93.15252	0
San Joaquin	2021	SBUS	Aggregate	Aggregate	Gasoline	123.829	6576.42	6576.42	0
San Joaquin	2021	SBUS	Aggregate	Aggregate	Diesel	484.0434	11109.63	11109.63	0
San Joaquin	2021	SBUS	Aggregate	Aggregate	Natural Ga	83.44888	2126.842	2126.842	0
San Joaquin	2021	UBUS	Aggregate	Aggregate	Gasoline	48.14238	3627.078	3627.078	0

San Joaqui	2021	UBUS	Aggregate	Aggregate	Diesel	80.77485	5598.186	5598.186	0
San Joaqui	2021	UBUS	Aggregate	Aggregate	Electricity	17.15976	766.3601	0	766.3601
San Joaqui	2021	UBUS	Aggregate	Aggregate	Natural Ga	56.05856	3591.376	3591.376	0

ions, 1000 gallons/day for Fuel Consumption

Trips	Energy Cor	NOx_RUNE	NOx_IDLEX	NOx_STRE	NOx_TOTE	PM2.5_RU	PM2.5_IDL	PM2.5_STF	PM2.5_TO
72.60926	0	0.001684	0	0.000172	0.001856	8.12E-07	0	2.14E-07	1.03E-06
131025.8	0	3.233385	0.726473	0.342925	4.302783	0.049316	0.000627	0	0.049942
1542.566	0	0.024769	0.002525	0	0.027295	5.11E-05	4.41E-06	0	5.55E-05
1136573	0	0.658826	0	0.390154	1.04898	0.015542	0	0.002732	0.018274
3397.115	0	0.008984	0	0	0.008984	0.000547	0	0	0.000547
23125.13	73232.31	0	0	0	0	0	0	0	0
17923.95	29839.34	0.000881	0	0.002255	0.003136	0.000204	0	4.77E-05	0.000251
100706.7	0	0.182524	0	0.063352	0.245875	0.002078	0	0.000422	0.002499
24.03617	0	0.000156	0	0	0.000156	2.47E-05	0	0	2.47E-05
52.44858	122.9018	0	0	0	0	0	0	0	0
14.08351	27.6943	7.43E-07	0	1.77E-06	2.51E-06	1.14E-07	0	2.55E-08	1.39E-07
437156.8	0	0.466336	0	0.23116	0.697496	0.006126	0	0.001056	0.007182
1070.117	0	0.000861	0	0	0.000861	0.000119	0	0	0.000119
362.9604	962.192	0	0	0	0	0	0	0	0
1091.503	2041.951	5.66E-05	0	0.000137	0.000194	1.15E-05	0	2.61E-06	1.41E-05
153234.1	0	0.111534	0.000457	0.121298	0.233288	0.000697	0	6.97E-05	0.000767
116228.3	0	0.935227	0.024077	0	0.959304	0.018667	0.000274	0	0.018941
18102.45	0	0.011781	5.34E-05	0.013934	0.025769	7.57E-05	0	6.81E-06	8.25E-05
39387.15	0	0.245612	0.007937	0	0.253549	0.005338	9.14E-05	0	0.00543
24418.96	0	0.050518	0	0.004826	0.055344	0.000133	0	8.89E-05	0.000222
437715.8	0	0.660639	0	0.322459	0.983097	0.005732	0	0.001163	0.006895
6450.732	0	0.00704	0	0	0.00704	0.000486	0	0	0.000486
425.6838	1122.088	0	0	0	0	0	0	0	0
1243.547	2025.953	6.01E-05	0	0.000156	0.000217	1.58E-05	0	3.84E-06	1.96E-05
169.9248	0	0.008156	0	7.54E-05	0.008232	2.79E-05	0	7.95E-08	2.79E-05
65.13176	0	0.033318	0	0	0.033318	0.000862	0	0	0.000862
12136.82	0	0.032282	5.82E-05	0.006392	0.038733	5.11E-05	0	1.02E-05	6.13E-05
67380.74	0	0.584401	0.102208	0.098799	0.785408	0.007931	0.000354	0	0.008285
383.8559	0	0.000259	0.000316	0	0.000575	3.96E-06	1.01E-06	0	4.97E-06
3967.068	0	0.008832	1.41E-05	0.00197	0.010816	8.54E-06	0	1.19E-06	9.73E-06
968.5953	0	0.019261	0.001542	0.001424	0.022227	0.000407	3.55E-06	0	0.000411
13.77773	0	6.01E-06	2.5E-06	0	8.51E-06	1.74E-07	9.49E-09	0	1.83E-07
495.316	0	0.001636	0.000126	0.000352	0.002115	6.79E-06	0	3.38E-07	7.13E-06
7008.948	0	0.06306	0.013217	0.003308	0.079585	0.000339	1.43E-05	0	0.000353
1208.34	0	0.001119	0.000481	0	0.0016	7.92E-06	1.14E-06	0	9.06E-06
192.5695	0	0.000815	0	0.000199	0.001013	4.71E-06	0	2.1E-07	4.92E-06

323.0994	0	0.003764	0	0	0.003764	3.92E-05	0	0	3.92E-05
68.63904	1335.953	0	0	0	0	0	0	0	0
224.2342	0	0.000314	0	0	0.000314	9.71E-07	0	0	9.71E-07

PM2.5_PM	PM2.5_PM	PM2.5_TO	PM10_RUN	PM10_IDL	PM10_STR	PM10_TO	PM10_PM	PM10_PM	PM10_TO
3.61E-07	2.86E-06	4.25E-06	8.83E-07	0	2.33E-07	1.12E-06	1.44E-06	8.18E-06	1.07E-05
0.011255	0.034762	0.095959	0.051546	0.000655	0	0.052201	0.045018	0.099319	0.196538
0.000128	0.000656	0.000839	5.55E-05	4.8E-06	0	6.03E-05	0.000511	0.001873	0.002444
0.02131	0.032188	0.071771	0.016903	0	0.002971	0.019874	0.085238	0.091964	0.197076
5.72E-05	8.72E-05	0.000692	0.000572	0	0	0.000572	0.000229	0.000249	0.00105
0.000418	0.000319	0.000737	0	0	0	0	0.001673	0.000912	0.002585
0.000466	0.000333	0.001051	0.000221	0	5.19E-05	0.000273	0.001865	0.000952	0.00309
0.00163	0.002987	0.007117	0.002259	0	0.000458	0.002718	0.006522	0.008534	0.017774
2.07E-07	4.3E-07	2.53E-05	2.58E-05	0	0	2.58E-05	8.27E-07	1.23E-06	2.78E-05
7.02E-07	5.42E-07	1.24E-06	0	0	0	0	2.81E-06	1.55E-06	4.36E-06
4.12E-07	2.94E-07	8.45E-07	1.24E-07	0	2.77E-08	1.52E-07	1.65E-06	8.4E-07	2.64E-06
0.007992	0.014012	0.029185	0.006662	0	0.001148	0.00781	0.031967	0.040035	0.079812
2.11E-05	3.57E-05	0.000175	0.000124	0	0	0.000124	8.44E-05	0.000102	0.00031
5.49E-06	4.18E-06	9.68E-06	0	0	0	0	2.2E-05	1.19E-05	3.39E-05
3.09E-05	2.2E-05	6.7E-05	1.25E-05	0	2.84E-06	1.53E-05	0.000123	6.29E-05	0.000202
0.000756	0.01032	0.011843	0.000758	0	7.58E-05	0.000834	0.003024	0.029486	0.033344
0.001069	0.009726	0.029736	0.019511	0.000286	0	0.019798	0.004275	0.027789	0.051862
9.1E-05	0.00145	0.001623	8.23E-05	0	7.4E-06	8.97E-05	0.000364	0.004142	0.004596
0.000382	0.004059	0.009871	0.00558	9.55E-05	0	0.005675	0.001529	0.011598	0.018803
7.23E-05	0.000304	0.000598	0.000142	0	9.42E-05	0.000236	0.000289	0.000868	0.001393
0.007249	0.013184	0.027329	0.006232	0	0.001265	0.007496	0.028997	0.037669	0.074163
0.000119	0.000209	0.000814	0.000508	0	0	0.000508	0.000478	0.000596	0.001582
6.41E-06	4.88E-06	1.13E-05	0	0	0	0	2.56E-05	1.39E-05	3.96E-05
3.17E-05	2.27E-05	7.4E-05	1.72E-05	0	4.18E-06	2.13E-05	0.000127	6.48E-05	0.000213
4.79E-05	0.000252	0.000328	3.03E-05	0	8.64E-08	3.04E-05	0.000192	0.00072	0.000942
2.53E-05	9.91E-05	0.000986	0.000901	0	0	0.000901	0.000101	0.000283	0.001285
8.89E-05	0.000467	0.000617	5.55E-05	0	1.11E-05	6.66E-05	0.000356	0.001335	0.001757
0.00087	0.004573	0.013728	0.008289	0.00037	0	0.00866	0.003478	0.013066	0.025204
8.46E-06	4.51E-05	5.85E-05	4.31E-06	1.1E-06	0	5.41E-06	3.38E-05	0.000129	0.000168
2.94E-05	0.000154	0.000193	9.29E-06	0	1.29E-06	1.06E-05	0.000117	0.000439	0.000568
1.92E-05	0.000132	0.000562	0.000426	3.71E-06	0	0.000429	7.68E-05	0.000376	0.000882
3.08E-07	1.66E-06	2.15E-06	1.89E-07	1.03E-08	0	1.99E-07	1.23E-06	4.74E-06	6.17E-06
1.45E-05	0.000114	0.000136	7.39E-06	0	3.68E-07	7.75E-06	5.8E-05	0.000326	0.000391
3.67E-05	0.000193	0.000582	0.000354	1.49E-05	0	0.000369	0.000147	0.00055	0.001066
7.03E-06	3.69E-05	5.29E-05	8.61E-06	1.23E-06	0	9.85E-06	2.81E-05	0.000105	0.000143
1.2E-05	0.000154	0.000171	5.12E-06	0	2.29E-07	5.35E-06	4.8E-05	0.00044	0.000493

4.66E-05	0.000238	0.000323	4.1E-05	0	0	4.1E-05	0.000187	0.000679	0.000906
7.51E-06	1.63E-05	2.38E-05	0	0	0	0	3E-05	4.65E-05	7.65E-05
1.96E-05	0.000152	0.000173	1.01E-06	0	0	1.01E-06	7.82E-05	0.000435	0.000514

CO2_RUNE	CO2_IDLEX	CO2_STREX	CO2_TOTE	CH4_RUNE	CH4_IDLEX	CH4_STREX	CH4_TOTE	N2O_RUNE	N2O_IDLEX
0.209872	0	0.004275	0.214148	5.38E-05	0	3.65E-09	5.38E-05	3.35E-05	0
2089.956	139.1162	0	2229.072	0.002525	0.002622	0	0.005147	0.329273	0.021918
21.44536	2.013457	0	23.45882	0.036959	0.006707	0	0.043666	0.004372	0.00041
3213.335	0	94.1584	3307.493	0.038784	0	0.10979	0.148574	0.063894	0
6.919844	0	0	6.919844	4.72E-05	0	0	4.72E-05	0.00109	0
0	0	0	0	0	0	0	0	0	0
37.35222	0	1.341475	38.6937	0.000134	0	0.000841	0.000975	0.000164	0
292.5244	0	10.78219	303.3066	0.009694	0	0.017501	0.027194	0.012283	0
0.042914	0	0	0.042914	1.48E-06	0	0	1.48E-06	6.76E-06	0
0	0	0	0	0	0	0	0	0	0
0.031562	0	0.001151	0.032713	1.14E-07	0	6.67E-07	7.81E-07	1.41E-07	0
1515.283	0	46.51002	1561.793	0.01872	0	0.051583	0.070303	0.034326	0
3.467175	0	0	3.467175	1.31E-05	0	0	1.31E-05	0.000546	0
0	0	0	0	0	0	0	0	0	0
2.403021	0	0.096689	2.499709	8.68E-06	0	5.16E-05	6.02E-05	1.07E-05	0
358.0566	1.395131	4.312958	363.7647	0.005254	0.001373	0.006491	0.013118	0.00614	3.42E-05
228.1562	1.404054	0	229.5602	0.003971	5.19E-05	0	0.004023	0.035946	0.000221
47.62391	0.189592	0.522199	48.3357	0.000477	0.000163	0.000737	0.001376	0.000667	4.09E-06
99.51296	0.757119	0	100.2701	0.001178	1.76E-05	0	0.001196	0.015678	0.000119
14.19465	0	1.52499	15.71964	0.015796	0	0.005766	0.021562	0.003266	0
1679.948	0	57.20033	1737.148	0.025623	0	0.06987	0.095493	0.043329	0
25.79514	0	0	25.79514	5.48E-05	0	0	5.48E-05	0.004064	0
0	0	0	0	0	0	0	0	0	0
2.549175	0	0.139452	2.688627	9.14E-06	0	5.83E-05	6.74E-05	1.12E-05	0
31.17694	0	0.005981	31.18292	0.000306	0	7.17E-06	0.000314	0.000473	0
6.813636	0	0	6.813636	4.22E-05	0	0	4.22E-05	0.001073	0
55.39151	0.369124	0.680871	56.44151	0.001128	0.000156	0.000744	0.002028	0.001361	4E-06
331.1512	14.20352	0	345.3547	0.000897	9.36E-05	0	0.000991	0.052173	0.002238
2.856091	0.276967	0	3.133057	0.002185	0.000795	0	0.00298	0.000582	5.65E-05
18.0669	0.085018	0.146517	18.29844	0.000244	4.12E-05	0.000177	0.000462	0.00039	1.05E-06
9.097033	0.255005	0	9.352038	4.8E-05	4.22E-06	0	5.22E-05	0.001433	4.02E-05
0.11162	0.002388	0	0.114008	8.85E-05	5.76E-06	0	9.43E-05	2.28E-05	4.87E-07
5.809165	0.350212	0.030282	6.189659	3.82E-05	0.000343	3.47E-05	0.000415	0.000118	1.27E-05
14.0729	1.240618	0	15.31352	4.53E-05	4.6E-06	0	4.99E-05	0.002217	0.000195
2.956135	0.389061	0	3.345196	0.007465	0.001356	0	0.008821	0.000603	7.93E-05
7.294964	0	0.026147	7.321111	1.57E-05	0	2.82E-05	4.39E-05	7.53E-05	0

7.144735	0	0	7.144735	2.11E-05	0	0	2.11E-05	0.001126	0
0	0	0	0	0	0	0	0	0	0
4.139572	0	0	4.139572	0.009804	0	0	0.009804	0.000844	0

N2O_STRE	N2O_TOTE	ROG_RUNI	ROG_IDLE	ROG_STRE	ROG_TOTE	ROG_DIUR	ROG_HOTS	ROG_RUNI	ROG_TOTA
3.12E-06	3.67E-05	0.000362	0	1.98E-08	0.000362	5.05E-05	1.38E-05	0.000124	0.00055
0	0.351191	0.05436	0.05645	0	0.11081	0	0	0	0.11081
0	0.004782	0.001394	0.000119	0	0.001513	0	0	0	0.001513
0.045674	0.109567	0.156301	0	0.526375	0.682676	0.475371	0.135572	0.343536	1.637155
0	0.00109	0.001016	0	0	0.001016	0	0	0	0.001016
0	0	0	0	0	0	0	0	0	0
0.00042	0.000584	0.000418	0	0.003366	0.003784	0.002487	0.00082	0.00071	0.007802
0.005256	0.017539	0.044676	0	0.097087	0.141762	0.111191	0.028735	0.087723	0.369411
0	6.76E-06	3.19E-05	0	0	3.19E-05	0	0	0	3.19E-05
0	0	0	0	0	0	0	0	0	0
3.35E-07	4.76E-07	3.53E-07	0	2.65E-06	3E-06	1.36E-06	4.22E-07	4.07E-07	5.18E-06
0.021549	0.055876	0.077889	0	0.253766	0.331654	0.191611	0.052695	0.140693	0.716654
0	0.000546	0.000282	0	0	0.000282	0	0	0	0.000282
0	0	0	0	0	0	0	0	0	0
2.59E-05	3.66E-05	2.69E-05	0	0.000205	0.000232	0.000113	3.42E-05	3.32E-05	0.000412
0.00895	0.015124	0.026884	0.005228	0.033158	0.06527	0.039043	0.010496	0.053896	0.168705
0	0.036167	0.085495	0.001118	0	0.086613	0	0	0	0.086613
0.001048	0.001719	0.002312	0.000611	0.003728	0.00665	0.004175	0.001083	0.005618	0.017527
0	0.015798	0.025368	0.000379	0	0.025747	0	0	0	0.025747
0.000277	0.003543	0.110257	0	0.044088	0.154345	0.067728	0.096926	0.102513	0.421512
0.025137	0.068466	0.116591	0	0.376012	0.492603	0.233978	0.064092	0.174612	0.965286
0	0.004064	0.00118	0	0	0.00118	0	0	0	0.00118
0	0	0	0	0	0	0	0	0	0
2.9E-05	4.02E-05	2.85E-05	0	0.000234	0.000262	0.000151	4.34E-05	4.42E-05	0.0005
7.69E-06	0.000481	0.001388	0	3.1E-05	0.001419	0.009592	0.002609	5.77E-05	0.013677
0	0.001073	0.000909	0	0	0.000909	0	0	0	0.000909
0.000397	0.001762	0.005934	0.000662	0.004492	0.011088	0.00336	0.00083	0.006974	0.022252
0	0.054411	0.019313	0.002015	0	0.021328	0	0	0	0.021328
0	0.000639	3.12E-05	1.14E-05	0	4.26E-05	0	0	0	4.26E-05
0.000135	0.000525	0.001205	0.000162	0.000974	0.002341	0.000729	0.000178	0.000763	0.004011
0	0.001473	0.001034	9.07E-05	0	0.001125	0	0	0	0.001125
0	2.32E-05	1.26E-06	8.23E-08	0	1.35E-06	0	0	0	1.35E-06
3.5E-05	0.000166	0.000178	0.001451	0.000191	0.00182	0.000142	3.88E-05	8.39E-05	0.002085
0	0.002413	0.000976	9.9E-05	0	0.001075	0	0	0	0.001075
0	0.000682	0.000107	1.94E-05	0	0.000126	0	0	0	0.000126
1.85E-05	9.37E-05	5.16E-05	0	0.000119	0.000171	2.86E-05	7.52E-06	2.02E-05	0.000227

0	0.001126	0.000454	0	0	0.000454	0	0	0	0.000454
0	0	0	0	0	0	0	0	0	0
0	0.000844	0.000143	0	0	0.000143	0	0	0	0.000143

TOG_RUNE	TOG_IDLEX	TOG_STRE	TOG_TOTE	TOG_DIUR	TOG_HOTS	TOG_RUNI	TOG_TOTA	CO_RUNEX	CO_IDLEX
0.000528	0	2.17E-08	0.000528	5.05E-05	1.38E-05	0.000124	0.000716	0.020901	0
0.061884	0.064264	0	0.126148	0	0	0	0.126148	0.224741	0.764497
0.038705	0.006872	0	0.045577	0	0	0	0.045577	0.186314	0.013699
0.227994	0	0.576311	0.804305	0.475371	0.135572	0.343536	1.758784	10.86451	0
0.001157	0	0	0.001157	0	0	0	0.001157	0.012144	0
0	0	0	0	0	0	0	0	0	0
0.00061	0	0.003686	0.004296	0.002487	0.00082	0.00071	0.008313	0.062723	0
0.065147	0	0.106297	0.171443	0.111191	0.028735	0.087723	0.399093	1.988271	0
3.63E-05	0	0	3.63E-05	0	0	0	3.63E-05	0.000181	0
0	0	0	0	0	0	0	0	0	0
5.15E-07	0	2.9E-06	3.41E-06	1.36E-06	4.22E-07	4.07E-07	5.6E-06	5.32E-05	0
0.113618	0	0.277841	0.391459	0.191611	0.052695	0.140693	0.776459	5.009673	0
0.000321	0	0	0.000321	0	0	0	0.000321	0.002092	0
0	0	0	0	0	0	0	0	0	0
3.92E-05	0	0.000224	0.000264	0.000113	3.42E-05	3.32E-05	0.000444	0.004046	0
0.039229	0.007629	0.036303	0.083161	0.039043	0.010496	0.053896	0.186596	0.586659	0.042447
0.097331	0.001273	0	0.098603	0	0	0	0.098603	0.252171	0.009266
0.003373	0.000892	0.004081	0.008346	0.004175	0.001083	0.005618	0.019222	0.056535	0.005021
0.02888	0.000431	0	0.029311	0	0	0	0.029311	0.069657	0.00314
0.129726	0	0.047905	0.177631	0.067728	0.096926	0.102513	0.444797	1.192782	0
0.167655	0	0.411663	0.579318	0.233978	0.064092	0.174612	1.052001	5.76615	0
0.001344	0	0	0.001344	0	0	0	0.001344	0.018598	0
0	0	0	0	0	0	0	0	0	0
4.16E-05	0	0.000256	0.000297	0.000151	4.34E-05	4.42E-05	0.000536	0.004284	0
0.002025	0	3.4E-05	0.002059	0.009592	0.002609	5.77E-05	0.014317	0.035046	0
0.001035	0	0	0.001035	0	0	0	0.001035	0.003143	0
0.008659	0.000966	0.004918	0.014543	0.00336	0.00083	0.006974	0.025707	0.130246	0.009934
0.021986	0.002294	0	0.02428	0	0	0	0.02428	0.059872	0.042984
0.00223	0.000811	0	0.003041	0	0	0	0.003041	0.008327	0.001972
0.001759	0.000236	0.001066	0.003061	0.000729	0.000178	0.000763	0.004731	0.027425	0.001255
0.001177	0.000103	0	0.00128	0	0	0	0.00128	0.002944	0.001195
9.04E-05	5.88E-06	0	9.62E-05	0	0	0	9.62E-05	0.000354	1.89E-05
0.000259	0.002118	0.000209	0.002586	0.000142	3.88E-05	8.39E-05	0.002851	0.004164	0.011217
0.001111	0.000113	0	0.001224	0	0	0	0.001224	0.002849	0.002071
0.007618	0.001384	0	0.009002	0	0	0	0.009002	0.024522	0.002113
7.53E-05	0	0.00013	0.000206	2.86E-05	7.52E-06	2.02E-05	0.000262	0.001072	0

0.000517	0	0	0.000517	0	0	0	0.000517	0.00052	0
0	0	0	0	0	0	0	0	0	0
0.010009	0	0	0.010009	0	0	0	0.010009	0.100357	0

CO_STREX	CO_TOTEX	SOx_RUNE	SOx_IDLEX	SOx_STREX	SOx_TOTE	NH3_RUNE	Fuel Consumption
0.000225	0.021125	2.07E-06	0	4.23E-08	2.12E-06	1.77E-06	0.022582
0	0.989238	0.019791	0.001317	0	0.021108	0.257044	199.1221
0	0.200013	0	0	0	0	0.012447	2.711482
4.958579	15.82309	0.031767	0	0.000931	0.032698	0.338118	348.771
0	0.012144	6.56E-05	0	0	6.56E-05	8.86E-05	0.618147
0	0	0	0	0	0	0	0
0.025881	0.088604	0.000369	0	1.33E-05	0.000383	0.004563	4.080202
0.913042	2.901313	0.002892	0	0.000107	0.002998	0.030247	31.9833
0	0.000181	4.07E-07	0	0	4.07E-07	3.21E-07	0.003834
0	0	0	0	0	0	0	0
2.03E-05	7.35E-05	3.12E-07	0	1.14E-08	3.23E-07	4.4E-06	0.00345
2.322703	7.332376	0.01498	0	0.00046	0.01544	0.134816	164.6891
0	0.002092	3.29E-05	0	0	3.29E-05	3.27E-05	0.309721
0	0	0	0	0	0	0	0
0.001576	0.005622	2.38E-05	0	9.56E-07	2.47E-05	0.000334	0.263591
0.488683	1.117789	0.00354	1.38E-05	4.26E-05	0.003596	0.01693	38.35853
0	0.261438	0.002162	1.33E-05	0	0.002175	0.0486	20.50652
0.060521	0.122077	0.000471	1.87E-06	5.16E-06	0.000478	0.002046	5.096939
0	0.072797	0.000943	7.17E-06	0	0.00095	0.020381	8.957087
0.228488	1.42127	0.00014	0	1.51E-05	0.000155	0.000611	1.657617
2.662213	8.428363	0.016608	0	0.000565	0.017173	0.118563	183.1801
0	0.018598	0.000244	0	0	0.000244	0.000185	2.30427
0	0	0	0	0	0	0	0
0.001796	0.00608	2.52E-05	0	1.38E-06	2.66E-05	0.000356	0.283512
0.000685	0.035731	0.000308	0	5.91E-08	0.000308	0.000713	3.2882
0	0.003143	6.46E-05	0	0	6.46E-05	0.000727	0.608659
0.102529	0.242709	0.000548	3.65E-06	6.73E-06	0.000558	0.001326	5.951686
0	0.102856	0.003136	0.000134	0	0.00327	0.054012	30.8504
0	0.010298	0	0	0	0	0.002989	0.362134
0.020632	0.049312	0.000179	8.4E-07	1.45E-06	0.000181	0.00044	1.929547
0	0.004139	8.61E-05	2.41E-06	0	8.86E-05	0.001179	0.835414
0	0.000373	0	0	0	0	0.000109	0.013178
0.004963	0.020344	5.74E-05	3.46E-06	2.99E-07	6.12E-05	0.000326	0.652692
0	0.00492	0.000133	1.17E-05	0	0.000145	0.001447	1.367951
0	0.026635	0	0	0	0	0.002485	0.386654
0.002206	0.003278	7.21E-05	0	2.58E-07	7.24E-05	0.00018	0.772002

0	0.00052	6.77E-05	0	0	6.77E-05	0.001151	0.638236
0	0	0	0	0	0	0	0
0	0.100357	0	0	0	0	0.00384	0.478471

Carnegie SVRA RMA EIR

Operational Air Quality Emission Estimates and Transportation Energy Calculations
Prepared by: MIG, Inc.
November 2024

Contents:

Sheet 1: Emissions Summary

Table 1-1: 2022 Conditions: Annual Exhaust Emission Totals

Construction Phase / Source	AQ Emissions (short tons)					GHG Emissions (Metric tons)			
	ROG	CO	NOx	PM10 (Exh)	PM2.5 (Exh)	CO2	CH4	N2O	CO2e
Heavy-Duty Off-Road Equipment	0.1	0.1	0.0	0.0	0.0	20.7	0.0	0.0	20.7
Parks-Owned On- and Off-Road Vehicles	0.0	0.2	0.1	0.0	0.0	83.9	0.0	0.0	85.8
Small, Utility Off-Road Equipment	0.1	0.2	0.0	0.0	0.0	2.4	0.0	0.0	2.4
Worker and Vendor Trips	0.3	0.3	0.3	0.3	0.3	8.5	0.2	0.2	79.9
Total	0.4	0.8	0.4	0.3	0.3	115.5	0.2	0.3	188.9

Table 1-2: 2022 Conditions: Average Daily Exhaust Emission Totals

Construction Phase / Source	Emissions (pounds)				
	ROG	CO	NOx	PM10 (Exh)	PM2.5 (Exh)
Heavy-Duty Off-Road Equipment	0.7	1.1	0.0	0.0	0.0
Parks-Owned On- and Off-Road Vehicles	0.2	1.2	0.8	0.0	0.0
Small, Utility Off-Road Equipment	0.5	1.8	0.1	0.0	0.0
Worker and Vendor Trips	2.1	2.1	2.2	2.1	2.1
Total	3.4	6.3	3.2	2.1	2.1

Sheet 2: Off-Road Heavy-Duty Equipment Emissions

Table 2-1: Existing Heavy-Duty Equipment Emissions

Equipment	Annual Runtime	Horsepower	Load Factor	Emission Factor (g/hp-hr)								Annual Emissions (short tons)							
				NOx	CO	ROG	PM10	PM2.5	CO2	CH4	N2O	NOx	CO	ROG	PM10	PM2.5	CO2	CH4	N2O
7130 TRACTOR	3	130	0.70	2.32	3.7	0.09	0.112	0.112	256.187	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00
672G GRADER	68	255	0.41	1.29	2.6	0.06	0.009	0.009	514.029	0.021	0.004	0.01	0.02	0.00	0.00	0.00	4.03	0.00	0.00
430E BACKHOE	149	95	0.37	2.74	3.7	0.09	0.112	0.112	571.454	0.021	0.004	0.02	0.02	0.00	0.00	0.00	3.30	0.00	0.00
480 TRAIL DOZER	7	91	0.43	2.74	3.7	0.09	0.112	0.112	571.454	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00
750J DOZER	8	157	0.43	2.32	3.7	0.09	0.112	0.112	514.029	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.31	0.00	0.00
544K LOADER	167	163	0.36	2.15	3.7	0.08	0.009	0.009	571.454	0.021	0.004	0.02	0.04	0.00	0.00	0.00	6.17	0.00	0.00
E18B MINI EX	7	15	0.38	4.55	4.1	0.09	0.128	0.128	571.454	0.024	0.005	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00
T190 SKID STEER	50	61	0.37	2.74	3.7	0.09	0.192	0.192	571.454	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.71	0.00	0.00
500 TRAIL DOZER	0	80	0.43	2.74	3.7	0.09	0.192	0.192	571.454	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SK140SR-7 EX	200	106	0.37	2.15	3.7	0.08	0.009	0.009	514.029	0.021	0.004	0.02	0.03	0.00	0.00	0.00	4.44	0.00	0.00
415F2 BACKHOE / LOADER	225	68	0.37	2.74	3.7	0.09	0.112	0.112	571.454	0.021	0.004	0.02	0.02	0.00	0.00	0.00	3.57	0.00	0.00
											Total	0.09	0.15	0.00	0.00	0.00	22.80	0.00	0.00

Sheet 3: Off-Road Heavy-Duty Equipment Emission Factors

Table 3-1: Equipment Category and Emissions Assignment (Default; No Runtime Hour Adjustment)

Equipment	Horsepower	Engine Tier	OFFROAD Category	HP_Bin	Load Factor	ROG g_hp-hr	CO g_hp-hr	NOx g_hp-hr	PM10 g_hp-hr	PM2_5 g_hp-hr	CO2_g_hp-hr	CH4_g_hp-hr	N2O_g_hp-hr
									Default Emission Factors				
7130 TRACTOR	130	3	Agricultural - Agricultural Tractors	175	0.70	0.090	3.700	2.320	0.112	0.112	256.1869073	0.021	0.004
672G GRADER	255	4	Construction and Mining - Graders	300	0.41	0.060	2.600	1.290	0.009	0.009	514.03	0.021	0.004
430E BACKHOE	95	3	Construction and Mining - Tractors/Loaders/Bac	100	0.37	0.090	3.700	2.740	0.112	0.112	571.4540783	0.021	0.004
480 TRAIL DOZER	91	3	Construction and Mining - Crawler Tractors	100	0.43	0.090	3.700	2.740	0.112	0.112	571.4540783	0.021	0.004
750J DOZER	157	3	Construction and Mining - Crawler Tractors	175	0.43	0.090	3.700	2.320	0.112	0.112	514.0285459	0.021	0.004
544K LOADER	163	4	Construction and Mining - Rubber Tired Loaders	175	0.36	0.080	3.700	2.150	0.009	0.009	571.4540783	0.021	0.004
E18B MINI EX	15	4	Construction and Mining - Excavators	50	0.38	0.090	4.100	4.550	0.128	0.128	571.4540783	0.024	0.005
T190 SKID STEER	61	3	Construction and Mining - Skid Steer Loaders	75	0.37	0.090	3.700	2.740	0.192	0.192	571.4540783	0.021	0.004
500 TRAIL DOZER	80	3	Construction and Mining - Crawler Tractors	75	0.43	0.090	3.700	2.740	0.192	0.192	571.4540783	0.021	0.004
SK140SR-7 EX	106	4	Construction and Mining - Tractors/Loaders/Bac	175	0.37	0.080	3.700	2.150	0.009	0.009	514.03	0.021	0.004
415F2 BACKHOE / LOADER	68	4	Construction and Mining - Tractors/Loaders/Bac	75	0.37	0.090	3.700	2.740	0.112	0.112	571.4540783	0.021	0.004

Note: CH4 and N2O emission rates for standard OFFROAD2021 equipment profiles taken from CalEEMod. Load factors from CalEEMod / Carl Moyer.

Table 3-2: Equipment Category and Emissions Assignment (Runtime Hour Adjustment)

Equipment	Existing Runtime Hours on Equipment	ROG g_hp-hr	CO g_hp-hr	Nox g_hp-hr	PM10 g_hp-hr	PM2_5 g_hp-hr	Co2_g_hp-hr	CH4_g_hp-hr	N2O_g_hp-hr
				Adjusted Emission Factors					
7130 TRACTOR	459.3	0.099	3.700	2.332	0.112	0.112	256.19	0.021	0.004
672G GRADER	1941.5	0.093	2.600	1.323	0.010	0.010	514.03	0.021	0.004
430E BACKHOE	2658.9	0.151	3.700	2.836	0.133	0.133	571.45	0.021	0.004
480 TRAIL DOZER	346.7	0.098	3.700	2.752	0.115	0.115	571.45	0.021	0.004
750J DOZER	4230.4	0.175	3.700	2.434	0.114	0.114	514.03	0.021	0.004
544K LOADER	1672.1	0.113	3.700	2.195	0.010	0.010	571.45	0.021	0.004
E18B MINI EX	2200	0.169	4.100	4.759	0.149	0.149	571.45	0.024	0.005
T190 SKID STEER	2140.9	0.139	3.700	2.817	0.222	0.222	571.45	0.021	0.004
500 TRAIL DOZER	1.4	0.090	3.700	2.740	0.192	0.192	571.45	0.021	0.004
SK140SR-7 EX	4230.4	0.175	3.700	2.264	0.011	0.011	514.03	0.021	0.004
415F2 BACKHOE / LOADER	4230.4	0.177	3.700	2.892	0.146	0.146	571.45	0.021	0.004

Sheet 4: U.S. EPA Tier III and Tier IV Emission Factors

Table 4-1: U.S. EPA Tier III Emission Standards

Maximum Horsepower	Assigned HP Bin	Emission Factors (g/hp-hr)				
		ROG	CO	NOx	PM10	PM2.5
25≤hp<50	50	--	--	--	--	--
50≤hp<75	75	0.09	3.7	2.74	0.192	0.192
75≤hp<100	100	0.09	3.7	2.74	0.112	0.112
100≤hp<175	175	0.09	3.7	2.32	0.112	0.112
175≤hp<300	300	0.09	2.6	2.32	0.088	0.088
300≤hp<600	600	0.09	2.6	2.32	0.088	0.088

CARB 2017 Table D-9 (pg. 235); and CalEEMod v2022.4.0 for CO.

Table 4-2: U.S EPA Tier III Controlled Off-Road Diesel Engine Deterioration Rates

Maximum Horsepower	Assigned HP Bin	Emission Factors (g/hp-hr)		
		ROG	NOx	PM
25≤hp<50	50	--	--	--
50≤hp<75	75	0.000023	0.000036	0.0000141
75≤hp<100	100	0.000023	0.000036	0.0000080
100≤hp<175	175	0.000020	0.000027	0.0000004
175≤hp<300	300	0.000023	0.000030	0.0000046
300≤hp<600	600	0.000023	0.000030	0.0000044

Table 4-3: U.S. EPA Tier IV (Interim) Emission Standards

Maximum Horsepower	Assigned HP Bin	Emission Factors (g/hp-hr)				
		ROG	CO	NOx	PM10	PM2.5
25≤hp<50	50	0.09	4.1	4.55	0.128	0.128
50≤hp<75	75	0.09	3.7	2.74	0.112	0.112
75≤hp<100	100	0.08	3.7	2.15	0.009	0.009
100≤hp<175	175	0.08	3.7	2.15	0.009	0.009
175≤hp<300	300	0.06	2.6	1.29	0.009	0.009
300≤hp<600	600	0.06	2.6	1.29	0.009	0.009

CARB 2017 Table D-9 (pg. 235); EFs for Tier IV (Phase-In or Alt. NOx) Used Where Option Exists and CalEEMod v2022.4.0 for CO.

Table 4-4: U.S. EPA Tier IV (Interim) Controlled Off-Road Diesel Engine Deterioration Rates

Maximum Horsepower	Assigned HP Bin	Emission Factors (g/hp-hr)		
		ROG	NOx	PM
25≤hp<50	50	0.000036	0.000095	0.0000096
50≤hp<75	75	0.000023	0.000036	0.0000080
75≤hp<100	100	0.000021	0.000027	0.0000009
100≤hp<175	175	0.000020	0.000027	0.0000004
175≤hp<300	300	0.000017	0.000017	0.0000003
300≤hp<600	600	0.000017	0.000017	0.0000003

Sheet 5: On-Site, On-Road Vehicles Emission Factors and Emissions

Table 5-1: On-road Existing Ops Vehicle Emission Factor Assignment

Make	Model	Gross Vehicle Weight Rating (lbs)	Vehicle Class	Fuel	Emission Factors (tons / mi)							
					ROG	CO	NOx	PM10 (Exh)	PM2.5 (Exh)	CO2	CH4	N2O
RAM	4500 (OPERATOR)	16,500	MHDT	Diesel	6.46465E-08	3.44627E-07	2.67641E-06	2.39099E-08	2.28755E-08	0.001308896	3.00266E-09	2.06217E-07
INTERNATIONAL	TRANSPORT 9300	50,000	HHDT	Diesel	7.87795E-08	8.13187E-07	3.35767E-06	3.34223E-08	3.19765E-08	0.001914801	3.6591E-09	3.01678E-07
FORD	F350 (RESOURCES)	10,100 to 14,000	LHDT2	Diesel	2.17205E-07	6.13485E-07	2.06693E-06	4.79805E-08	4.59049E-08	0.000863134	1.00888E-08	1.35987E-07
CHEVROLET	1500 (ELIZ)	6,700 to 7,300	MDV	Gasoline	2.7744E-07	2.33631E-06	2.64955E-07	2.19366E-09	2.01717E-09	0.000518934	2.64533E-08	1.91202E-08
FORD	F350 r FLATBED	10,100 to 14,000	LHDT2	Gasoline	4.01812E-07	2.82053E-06	5.8761E-07	2.05811E-09	1.89235E-09	0.001154801	3.11234E-08	3.97274E-08
RAM	2500 (DAVID)	10000	LHDT1	Gasoline	4.59773E-07	3.06919E-06	6.31151E-07	2.28501E-09	2.10099E-09	0.001042112	3.5141E-08	4.15939E-08
INTERNATIONAL	WATER-TRUCK	52000	HHDT	Diesel	7.87795E-08	8.13187E-07	3.35767E-06	3.34223E-08	3.19765E-08	0.001914801	3.6591E-09	3.01678E-07
FORD	F350 (JOHN M)	10,100 to 14,000	LHDT2	Gasoline	4.01812E-07	2.82053E-06	5.8761E-07	2.05811E-09	1.89235E-09	0.001154801	3.11234E-08	3.97274E-08
FORD	F250 (ROBERT)	10,000 to 11,400	LHDT2	Gasoline	4.01812E-07	2.82053E-06	5.8761E-07	2.05811E-09	1.89235E-09	0.001154801	3.11234E-08	3.97274E-08
FORD	F250 (JESSE/MIKE)	10,000 to 11,400	LHDT2	Gasoline	4.01812E-07	2.82053E-06	5.8761E-07	2.05811E-09	1.89235E-09	0.001154801	3.11234E-08	3.97274E-08
INTERNATIONAL	DUMPTRUCK		HHDT	Diesel	7.87795E-08	8.13187E-07	3.35767E-06	3.34223E-08	3.19765E-08	0.001914801	3.6591E-09	3.01678E-07
FORD	F250 (KEITH)	10,000 to 11,400	LHDT2	Gasoline	4.01812E-07	2.82053E-06	5.8761E-07	2.05811E-09	1.89235E-09	0.001154801	3.11234E-08	3.97274E-08
FORD	F250 (GARY)	10,000 to 11,400	LHDT2	Gasoline	4.01812E-07	2.82053E-06	5.8761E-07	2.05811E-09	1.89235E-09	0.001154801	3.11234E-08	3.97274E-08
FORD	F350 FLATBED	10,100 to 14,000	LHDT2	Diesel	2.17205E-07	6.13485E-07	2.06693E-06	4.79805E-08	4.59049E-08	0.000863134	1.00888E-08	1.35987E-07

Table 5-2: On-road Existing Ops Vehicle Emission Calculations

Make	Model	Annual VMT	Vehicle Class	Fuel	Emissions (tons)							
					ROG	CO	NOx	PM10 (Exh)	PM2.5 (Exh)	CO2	CH4	N2O
RAM	4500 (OPERATOR)	8898	MHDT	Diesel	0.000575224	0.003066493	0.023814677	0.00021275	0.000203546	11.64655964	2.67177E-05	0.00183492
INTERNATIONAL	TRANSPORT 9300	764	HHDT	Diesel	6.01876E-05	0.000621275	0.002565258	2.55347E-05	2.443E-05	1.462908049	2.79556E-06	0.000230482
FORD	F350 (RESOURCES)	5472	LHDT2	Diesel	0.001188548	0.003356992	0.011310221	0.00026255	0.000251192	4.723069247	5.52058E-05	0.000744121
CHEVROLET	1500 (ELIZ)	4957	MDV	Gasoline	0.00137527	0.011581096	0.001313382	1.0874e-05	9.9991E-06	2.572357768	0.000131129	9.47787E-05
FORD	F350 r FLATBED	3061	LHDT2	Gasoline	0.001229946	0.008633641	0.001798674	6.29986E-06	5.79249E-06	3.53484674	9.52688E-05	0.000121606
RAM	2500 (DAVID)	7041	LHDT1	Gasoline	0.003237258	0.021610189	0.004443932	1.60888E-05	1.4793E-05	7.33751234	0.000247428	0.000292863
INTERNATIONAL	WATER TRUCK	3183	HHDT	Diesel	0.000250755	0.002588373	0.010687456	0.000106383	0.000101781	6.094811935	1.16469E-05	0.00096024
FORD	F350 (JOHN M)	10072	LHDT2	Gasoline	0.004047047	0.028408375	0.005918407	2.07292E-05	1.90598E-05	11.63115857	0.000313475	0.000400135
FORD	F250 (ROBERT)	4091	LHDT2	Gasoline	0.001643812	0.011538787	0.002403912	8.41971E-06	7.74161E-06	4.724292066	0.000127326	0.000162525
FORD	F250 (JESSE/MIKE)	9028	LHDT2	Gasoline	0.003627556	0.025463742	0.005304942	1.85806E-05	1.70842E-05	10.42554602	0.000280982	0.000358659
INTERNATIONAL	DUMPTRUCK	833	HHDT	Diesel	6.56233E-05	0.000677384	0.002796937	2.78408E-05	2.66364E-05	1.595029325	3.04803E-06	0.000251298
FORD	F250 (KEITH)	6891	LHDT2	Gasoline	0.002768884	0.01943627	0.00404922	1.41824E-05	1.30402E-05	7.957735671	0.000214472	0.000273762
FORD	F250 (GARY)	6037	LHDT2	Gasoline	0.002425737	0.017027538	0.003547401	1.24248E-05	1.14241E-05	6.971535371	0.000187892	0.000239835
FORD	F350 FLATBED	13643	LHDT2	Diesel	0.002963333	0.008369781	0.028199076	0.000654599	0.000626281	11.77573716	0.000137641	0.001855272
				Total	0.025459181	0.162379936	0.108153499	0.001397256	0.001332801	92.45309991	0.001835028	0.007820495

Sheet 6: On-Site Small Equipment Emission Factors and Emissions

Table 6-1: On-site Small Equipment Category and Emission Factor Assignment

Make	Model	Horsepower	Fuel	OFFROAD Category	HP_Bin	Load Factor	Emission Factors							
							ROG g_hp-hr	CO g_hp-hr	Nox g_hp-hr	PM10 g_hp-hr	PM2_5 g_hp-hr	Co2_g_hp-hr	CH4_g_hp-hr	N2O_g_hp-hr
GATOR 1	XUV 855D	24.6	Diesel	Agricultural - ATVs	25	0.40	1.055	3.183	2.325	0.147	0.135	284.807	0.021	0.004
GATOR 2	XUV 855D	24.6	Diesel	Agricultural - ATVs	25	0.40	1.055	3.183	2.325	0.147	0.135	284.807	0.021	0.004
Gator 855	XUV 855D	24.6	Diesel	Agricultural - ATVs	25	0.40	1.055	3.183	2.325	0.147	0.135	284.807	0.021	0.004
Canycom 1	SC75	22.1	Gasoline	Construction and Mining - Paving Equipme	50	0.36	0.742	4.365	3.837	0.199	0.183	571.454	0.018	0.004
Canycom 2	SC75	22.1	Gasoline	Construction and Mining - Paving Equipme	50	0.36	0.742	4.365	3.837	0.199	0.183	571.454	0.018	0.004
Jumping Jack	MTX-70	2.8	Gasoline	N/A; CalEEMod - Plate Compactor	25	0.55	994.174	229.329	4.855	2.346	1.773	429.441	0.018	0.004
Jumping Jack	MTR-40	2.8	Gasoline	N/A; CalEEMod - Plate Compactor	25	0.55	994.174	229.329	4.855	2.346	1.773	429.441	0.018	0.004
Vibroplate	WP 1550	4.15	Gasoline	N/A; CalEEMod - Plate Compactor	25	0.55	994.174	229.329	4.855	2.346	1.773	429.441	0.018	0.004
John Deere Mower	727A	23	Gasoline	Lawn and Garden - Misc - Rear Engine Rid	Aggregate	1.00	45.406	2369.218	22.840	0.238	0.179	4997.779	0.238	0.179

Note: CH4 and N2O emission rates for standard OFFROAD2021 equipment profiles taken from CalEEMod. Load factors from CalEEMod / Carl Moyer.

* - Emission factors for John Deere Mower (727A) are based on emissions per gallon of gasoline consumed.

Table 6-2: Small Equipment Annual Emissions Estimates

Make	Model	Annual Runtime	Horsepower	Load Factor	Annual Emissions (tons)							
					ROG	CO	NOx	PM10 (Exh)	PM2.5 (Exh)	CO2	CH4	N2O
GATOR 1	XUV 855D	286	24.6	0.40	0.003272027	0.009873127	0.007211052	0.000454839	0.000418452	0.883520751	6.51456E-05	1.24087E-05
GATOR 2	XUV 855D	227	24.6	0.40	0.002597029	0.007836363	0.005723457	0.000361009	0.000332128	0.70125598	5.17065E-05	9.84885E-06
Gator 855	XUV 855D	0	24.6	0.40	0	0	0	0	0	0	0	0
Canycom 1	SC75	77	22.1	0.36	0.000501297	0.002947655	0.002591389	0.000134606	0.000123838	0.385897046	1.21552E-05	2.70116E-06
Canycom 2	SC75	47.1	22.1	0.36	0.000306638	0.001803046	0.001585122	8.23371E-05	7.57502E-05	0.236048713	7.4352E-06	1.65227E-06
Jumping Jack	MTX-70	9	2.8	0.55	0.015189037	0.003503699	7.41749E-05	3.58423E-05	2.7088E-05	0.00656102	2.75005E-07	6.11122E-08
Jumping Jack	MTR-40	9	2.8	0.55	0.015189037	0.003503699	7.41749E-05	3.58423E-05	2.7088E-05	0.00656102	2.75005E-07	6.11122E-08
Vibroplate	WP 1550	9	4.15	0.55	0.022512323	0.005192983	0.000109938	5.31234E-05	4.01483E-05	0.009724369	4.07596E-07	9.0577E-08
John Deere Mower*	727A	78.0	23	1.00	0.003904024	0.20370617	0.001963805	2.04554E-05	1.5428E-05	0.429710801	2.04554E-05	1.5428E-05
				Total	0.063471412	0.238366743	0.019333114	0.001178055	0.001059921	2.659279699	0.000157855	4.22518E-05

Note: * - Assumes mower consumes one gallon of gas per hour runtime.

Sheet 7: Off-site Worker and Vendor Emission Factors

Table 7-1: Worker and Vendor Trips: Emissions Assignment

Trip Source	Reason	Number of Trips	Trip Distance	Total VMT	Vehicle Class	Fuel Type	Percent of Workers by Vehcile Class	Emission Factors (tons / mi)							
								ROG	CO	NOx	PM10 (Exh)	PM2.5 (Exh)	CO2	CH4	N2O
							Worker Trips								
General Workers	N/A	50	19.4	336590	LDA	Agg	0.5	1.511E-07	1.511E-07	1.511E-07	1.511E-07	1.511E-07	1.511E-07	1.511E-07	1.511E-07
					LDT1	Agg	0.25	4.622E-07	4.622E-07	4.622E-07	4.622E-07	4.622E-07	4.622E-07	4.622E-07	4.622E-07
					LDT2	Agg	0.25	1.81E-07	1.81E-07	1.81E-07	1.81E-07	1.81E-07	1.81E-07	1.81E-07	1.81E-07
							Vendor Trips								
Harkrader and Sons Trucking	3/4 in Road Base	38	20	760	HHDT	Diesel	1.0	7.878E-08	8.132E-07	3.358E-06	3.342E-08	3.198E-08	0.0019148	3.659E-09	3.017E-07
Harkrader and Sons Trucking	Sand	12	20	240	HHDT	Diesel	1.0	7.878E-08	8.132E-07	3.358E-06	3.342E-08	3.198E-08	0.0019148	3.659E-09	3.017E-07
Denair Lumber Co., Inc.	2x4x8 Cedar Split Rail	2	49	98	HHDT	Diesel	1.0	7.878E-08	8.132E-07	3.358E-06	3.342E-08	3.198E-08	0.0019148	3.659E-09	3.017E-07
Pacific Source Seed	Hydroseed / Seed Mix	20	15	300	HHDT	Diesel	1.0	7.878E-08	8.132E-07	3.358E-06	3.342E-08	3.198E-08	0.0019148	3.659E-09	3.017E-07

Table 7-2: Worker and Vendor Trips: Emissions Calculations

Trip Source	Reason	Number of Trips	Trip Distance	Total VMT	Vehicle Class	Fuel Type	Percent of Workers by Vehcile Class	Emissions (tons)							
								ROG	CO	NOx	PM10 (Exh)	PM2.5 (Exh)	CO2	CH4	N2O
							Worker Trips								
General Workers	N/A	50	19.4	336590	LDA	Agg	0.5	0.0508424	0.0508424	0.0508424	0.0508424	0.0508424	0.0508424	0.0508424	0.0508424
					LDT1	Agg	0.25	0.1555584	0.1555584	0.1555584	0.1555584	0.1555584	0.1555584	0.1555584	0.1555584
					LDT2	Agg	0.25	0.0609067	0.0609067	0.0609067	0.0609067	0.0609067	0.0609067	0.0609067	0.0609067
							Worker Sub-Total	**0.2673075**	**0.2673075**	**0.2673075**	**0.2673075**	**0.2673075**	**0.2673075**	**0.2673075**	**0.2673075**
							Vendor Trips								
Harkrader and Sons Trucking	3/4 in Road Base	38	95	3610	HHDT	Diesel	1.0	0.0002844	0.0029356	0.0121212	0.0001207	0.0001154	6.912432	1.321E-05	0.0010891
Harkrader and Sons Trucking	Sand	12	95	1140	HHDT	Diesel	1.0	8.981E-05	0.000927	0.0038277	3.81E-05	3.645E-05	2.1828733	4.171E-06	0.0003439
Denair Lumber Co., Inc.	2x4x8 Cedar Split Rail	2	49	98	HHDT	Diesel	1.0	7.72E-06	7.969E-05	0.0003291	3.275E-06	3.134E-06	0.1876505	3.586E-07	2.956E-05
Pacific Source Seed	Hydroseed / Seed Mix	20	15	300	HHDT	Diesel	1.0	2.363E-05	0.000244	0.0010073	1.003E-05	9.593E-06	0.5744403	1.098E-06	9.05E-05
							Vendor Sub-Total	**0.0003742**	**0.0038626**	**0.0159489**	**0.0001588**	**0.0001519**	**9.0953053**	**1.738E-05**	**0.001433**

| | | | | | | | **Total** | **0.2676817** | **0.2711702** | **0.2832564** | **0.2674663** | **0.2674594** | **9.3626128** | **0.2673249** | **0.2687405** |

Sheet 8: OFFROAD Output

Model Output: OFFROAD2021 (v1.0.7) Emissions Inventory
Region Type: County
Region: San Joaquin
Calendar Year: 2022
Scenario: All Adopted Rules - Exhaust
Vehicle Classification: OFFROAD2021 Equipment Types
Units: tons/day for Emissions, gallons/year for Fuel, hours/year for Activity, Horsepower-hours/year for Horse

Region	Calendar Year	Vehicle Category	Model Year
San Joaquin	2022	Agricultural - Agricultural Tractors	Aggregate
San Joaquin	2022	Agricultural - Agricultural Tractors	Aggregate
San Joaquin	2022	Agricultural - Agricultural Tractors	Aggregate
San Joaquin	2022	Agricultural - Agricultural Tractors	Aggregate
San Joaquin	2022	Agricultural - Agricultural Tractors	Aggregate
San Joaquin	2022	Agricultural - Agricultural Tractors	Aggregate
San Joaquin	2022	Agricultural - ATVs	Aggregate
San Joaquin	2022	Agricultural - ATVs	Aggregate
San Joaquin	2022	Agricultural - ATVs	Aggregate
San Joaquin	2022	Agricultural - Bale Wagons (Self Propelled)	Aggregate
San Joaquin	2022	Agricultural - Bale Wagons (Self Propelled)	Aggregate
San Joaquin	2022	Agricultural - Balers (Self Propelled)	Aggregate
San Joaquin	2022	Agricultural - Combine Harvesters	Aggregate
San Joaquin	2022	Agricultural - Combine Harvesters	Aggregate
San Joaquin	2022	Agricultural - Construction Equipment	Aggregate
San Joaquin	2022	Agricultural - Construction Equipment	Aggregate
San Joaquin	2022	Agricultural - Construction Equipment	Aggregate
San Joaquin	2022	Agricultural - Construction Equipment	Aggregate
San Joaquin	2022	Agricultural - Construction Equipment	Aggregate
San Joaquin	2022	Agricultural - Forklifts	Aggregate
San Joaquin	2022	Agricultural - Forklifts	Aggregate
San Joaquin	2022	Agricultural - Forklifts	Aggregate
San Joaquin	2022	Agricultural - Forklifts	Aggregate
San Joaquin	2022	Agricultural - Hay Squeeze/Stack Retriever	Aggregate
San Joaquin	2022	Agricultural - Hay Squeeze/Stack Retriever	Aggregate
San Joaquin	2022	Agricultural - Hay Squeeze/Stack Retriever	Aggregate
San Joaquin	2022	Agricultural - Nut Harvester	Aggregate
San Joaquin	2022	Agricultural - Nut Harvester	Aggregate
San Joaquin	2022	Agricultural - Nut Harvester	Aggregate
San Joaquin	2022	Agricultural - Nut Harvester	Aggregate
San Joaquin	2022	Agricultural - Nut Harvester	Aggregate
San Joaquin	2022	Agricultural - Nut Harvester	Aggregate
San Joaquin	2022	Agricultural - Other Harvesters	Aggregate
San Joaquin	2022	Agricultural - Other Harvesters	Aggregate
San Joaquin	2022	Agricultural - Other Harvesters	Aggregate
San Joaquin	2022	Agricultural - Other Harvesters	Aggregate

San Joaquin	2022	Agricultural - Sprayers/Spray Rigs	Aggregate
San Joaquin	2022	Agricultural - Sprayers/Spray Rigs	Aggregate
San Joaquin	2022	Agricultural - Sprayers/Spray Rigs	Aggregate
San Joaquin	2022	Agricultural - Sprayers/Spray Rigs	Aggregate
San Joaquin	2022	Agricultural - Sprayers/Spray Rigs	Aggregate
San Joaquin	2022	Agricultural - Sprayers/Spray Rigs	Aggregate
San Joaquin	2022	Agricultural - Swathers/Windrowers/Hay Conditioners	Aggregate
San Joaquin	2022	Agricultural - Swathers/Windrowers/Hay Conditioners	Aggregate
San Joaquin	2022	Agricultural - Swathers/Windrowers/Hay Conditioners	Aggregate
San Joaquin	2022	Agricultural - Swathers/Windrowers/Hay Conditioners	Aggregate
San Joaquin	2022	Agricultural - Swathers/Windrowers/Hay Conditioners	Aggregate
San Joaquin	2022	Construction and Mining - Bore/Drill Rigs	Aggregate
San Joaquin	2022	Construction and Mining - Bore/Drill Rigs	Aggregate
San Joaquin	2022	Construction and Mining - Bore/Drill Rigs	Aggregate
San Joaquin	2022	Construction and Mining - Bore/Drill Rigs	Aggregate
San Joaquin	2022	Construction and Mining - Bore/Drill Rigs	Aggregate
San Joaquin	2022	Construction and Mining - Cranes	Aggregate
San Joaquin	2022	Construction and Mining - Cranes	Aggregate
San Joaquin	2022	Construction and Mining - Cranes	Aggregate
San Joaquin	2022	Construction and Mining - Cranes	Aggregate
San Joaquin	2022	Construction and Mining - Cranes	Aggregate
San Joaquin	2022	Construction and Mining - Cranes	Aggregate
San Joaquin	2022	Construction and Mining - Crawler Tractors	Aggregate
San Joaquin	2022	Construction and Mining - Crawler Tractors	Aggregate
San Joaquin	2022	Construction and Mining - Crawler Tractors	Aggregate
San Joaquin	2022	Construction and Mining - Crawler Tractors	Aggregate
San Joaquin	2022	Construction and Mining - Crawler Tractors	Aggregate
San Joaquin	2022	Construction and Mining - Excavators	Aggregate
San Joaquin	2022	Construction and Mining - Excavators	Aggregate
San Joaquin	2022	Construction and Mining - Excavators	Aggregate
San Joaquin	2022	Construction and Mining - Excavators	Aggregate
San Joaquin	2022	Construction and Mining - Excavators	Aggregate
San Joaquin	2022	Construction and Mining - Excavators	Aggregate
San Joaquin	2022	Construction and Mining - Graders	Aggregate
San Joaquin	2022	Construction and Mining - Graders	Aggregate
San Joaquin	2022	Construction and Mining - Graders	Aggregate
San Joaquin	2022	Construction and Mining - Graders	Aggregate
San Joaquin	2022	Construction and Mining - Graders	Aggregate
San Joaquin	2022	Construction and Mining - Misc - Bore/Drill Rigs	Aggregate
San Joaquin	2022	Construction and Mining - Misc - Cement And Mortar Mixers	Aggregate
San Joaquin	2022	Construction and Mining - Misc - Concrete/Industrial Saws	Aggregate
San Joaquin	2022	Construction and Mining - Misc - Concrete/Industrial Saws	Aggregate
San Joaquin	2022	Construction and Mining - Misc - Dumpers/Tenders	Aggregate
San Joaquin	2022	Construction and Mining - Misc - Excavators	Aggregate
San Joaquin	2022	Construction and Mining - Misc - Other	Aggregate
San Joaquin	2022	Construction and Mining - Misc - Pavers	Aggregate
San Joaquin	2022	Construction and Mining - Misc - Paving Equipment	Aggregate

San Joaquin	2022	Construction and Mining - Misc - Rollers	Aggregate
San Joaquin	2022	Construction and Mining - Misc - Rubber Tired Loaders	Aggregate
San Joaquin	2022	Construction and Mining - Misc - Signal Boards	Aggregate
San Joaquin	2022	Construction and Mining - Misc - Skid Steer Loaders	Aggregate
San Joaquin	2022	Construction and Mining - Misc - Tractors/Loaders/Backhoes	Aggregate
San Joaquin	2022	Construction and Mining - Misc - Trenchers	Aggregate
San Joaquin	2022	Construction and Mining - Off-Highway Tractors	Aggregate
San Joaquin	2022	Construction and Mining - Off-Highway Tractors	Aggregate
San Joaquin	2022	Construction and Mining - Off-Highway Tractors	Aggregate
San Joaquin	2022	Construction and Mining - Off-Highway Tractors	Aggregate
San Joaquin	2022	Construction and Mining - Off-Highway Tractors	Aggregate
San Joaquin	2022	Construction and Mining - Off-Highway Trucks	Aggregate
San Joaquin	2022	Construction and Mining - Off-Highway Trucks	Aggregate
San Joaquin	2022	Construction and Mining - Off-Highway Trucks	Aggregate
San Joaquin	2022	Construction and Mining - Off-Highway Trucks	Aggregate
San Joaquin	2022	Construction and Mining - Off-Highway Trucks	Aggregate
San Joaquin	2022	Construction and Mining - Pavers	Aggregate
San Joaquin	2022	Construction and Mining - Pavers	Aggregate
San Joaquin	2022	Construction and Mining - Pavers	Aggregate
San Joaquin	2022	Construction and Mining - Pavers	Aggregate
San Joaquin	2022	Construction and Mining - Pavers	Aggregate
San Joaquin	2022	Construction and Mining - Paving Equipment	Aggregate
San Joaquin	2022	Construction and Mining - Paving Equipment	Aggregate
San Joaquin	2022	Construction and Mining - Paving Equipment	Aggregate
San Joaquin	2022	Construction and Mining - Paving Equipment	Aggregate
San Joaquin	2022	Construction and Mining - Paving Equipment	Aggregate
San Joaquin	2022	Construction and Mining - Rollers	Aggregate
San Joaquin	2022	Construction and Mining - Rollers	Aggregate
San Joaquin	2022	Construction and Mining - Rollers	Aggregate
San Joaquin	2022	Construction and Mining - Rollers	Aggregate
San Joaquin	2022	Construction and Mining - Rollers	Aggregate
San Joaquin	2022	Construction and Mining - Rough Terrain Forklifts	Aggregate
San Joaquin	2022	Construction and Mining - Rough Terrain Forklifts	Aggregate
San Joaquin	2022	Construction and Mining - Rough Terrain Forklifts	Aggregate
San Joaquin	2022	Construction and Mining - Rough Terrain Forklifts	Aggregate
San Joaquin	2022	Construction and Mining - Rough Terrain Forklifts	Aggregate
San Joaquin	2022	Construction and Mining - Rubber Tired Dozers	Aggregate
San Joaquin	2022	Construction and Mining - Rubber Tired Dozers	Aggregate
San Joaquin	2022	Construction and Mining - Rubber Tired Dozers	Aggregate
San Joaquin	2022	Construction and Mining - Rubber Tired Dozers	Aggregate
San Joaquin	2022	Construction and Mining - Rubber Tired Dozers	Aggregate
San Joaquin	2022	Construction and Mining - Rubber Tired Loaders	Aggregate
San Joaquin	2022	Construction and Mining - Rubber Tired Loaders	Aggregate
San Joaquin	2022	Construction and Mining - Rubber Tired Loaders	Aggregate
San Joaquin	2022	Construction and Mining - Rubber Tired Loaders	Aggregate
San Joaquin	2022	Construction and Mining - Rubber Tired Loaders	Aggregate
San Joaquin	2022	Construction and Mining - Scrapers	Aggregate

San Joaquin	2022	Construction and Mining - Scrapers	Aggregate
San Joaquin	2022	Construction and Mining - Scrapers	Aggregate
San Joaquin	2022	Construction and Mining - Scrapers	Aggregate
San Joaquin	2022	Construction and Mining - Scrapers	Aggregate
San Joaquin	2022	Construction and Mining - Skid Steer Loaders	Aggregate
San Joaquin	2022	Construction and Mining - Skid Steer Loaders	Aggregate
San Joaquin	2022	Construction and Mining - Skid Steer Loaders	Aggregate
San Joaquin	2022	Construction and Mining - Skid Steer Loaders	Aggregate
San Joaquin	2022	Construction and Mining - Skid Steer Loaders	Aggregate
San Joaquin	2022	Construction and Mining - Surfacing Equipment	Aggregate
San Joaquin	2022	Construction and Mining - Surfacing Equipment	Aggregate
San Joaquin	2022	Construction and Mining - Surfacing Equipment	Aggregate
San Joaquin	2022	Construction and Mining - Surfacing Equipment	Aggregate
San Joaquin	2022	Construction and Mining - Surfacing Equipment	Aggregate
San Joaquin	2022	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate
San Joaquin	2022	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate
San Joaquin	2022	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate
San Joaquin	2022	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate
San Joaquin	2022	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate
San Joaquin	2022	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate
San Joaquin	2022	Construction and Mining - Trenchers	Aggregate
San Joaquin	2022	Construction and Mining - Trenchers	Aggregate
San Joaquin	2022	Construction and Mining - Trenchers	Aggregate
San Joaquin	2022	Construction and Mining - Trenchers	Aggregate
San Joaquin	2022	Construction and Mining - Trenchers	Aggregate
San Joaquin	2022	Lawn and Garden - Misc - Rear Engine Riding Mowers	Aggregate

power-hours

Horsepower	Fuel	HC_tpd	ROG_tpd	TOG_tpd	CO_tpd	NOx_tpd	CO2_tpd	PM10_tpd
25	Diesel	0.00456	0.005517	0.006566	0.016649	0.01216	1.489844	0.000767
50	Diesel	0.101433	0.122734	0.146063	0.388823	0.307828	35.94026	0.026718
75	Diesel	0.056905	0.068856	0.081944	0.28786	0.468629	40.24798	0.030347
100	Diesel	0.081499	0.098613	0.117358	0.61844	0.730052	98.55385	0.051358
175	Diesel	0.051573	0.062404	0.074266	0.502427	0.546098	83.714	0.025169
300	Diesel	0.02671	0.03232	0.038463	0.158449	0.26264	66.37828	0.011748
25	Diesel	0.00157	0.0019	0.002262	0.009449	0.008407	1.215165	0.000405
50	Diesel	0.002502	0.003027	0.003603	0.018554	0.016664	2.648234	0.000759
175	Diesel	4.96E-05	6E-05	7.14E-05	0.00082	0.00056	0.14923	2.15E-05
175	Diesel	0.001336	0.001617	0.001924	0.011161	0.014224	1.802746	0.00068
300	Diesel	0.000149	0.000181	0.000215	0.000792	0.001606	0.268287	7.29E-05
75	Diesel	6.29E-05	7.61E-05	9.06E-05	0.000429	0.000566	0.067989	3.04E-05
175	Diesel	0.000602	0.000728	0.000866	0.00539	0.006331	0.898319	0.000287
300	Diesel	0.001101	0.001333	0.001586	0.0057	0.011354	1.941458	0.00053
50	Diesel	0.000159	0.000192	0.000229	0.000704	0.000566	0.079125	3.94E-05
75	Diesel	0.000434	0.000525	0.000624	0.002955	0.003903	0.468747	0.00021
100	Diesel	0.001846	0.002233	0.002658	0.012476	0.016046	1.920213	0.001164
175	Diesel	0.004693	0.005678	0.006758	0.042462	0.054547	7.31272	0.002307
300	Diesel	0.00087	0.001052	0.001252	0.004202	0.009581	1.331852	0.00044
50	Diesel	0.002102	0.002543	0.003027	0.009456	0.007856	1.058905	0.000547
75	Diesel	0.005881	0.007116	0.008469	0.040148	0.052968	6.370295	0.002865
100	Diesel	0.001895	0.002293	0.002729	0.013748	0.015955	2.170508	0.00113
175	Diesel	0.000378	0.000457	0.000544	0.003388	0.003962	0.56346	0.00018
75	Diesel	2.44E-05	2.95E-05	3.51E-05	0.000166	0.000219	0.026336	1.18E-05
175	Diesel	0.000351	0.000424	0.000505	0.003194	0.003573	0.519917	0.00017
300	Diesel	0.000584	0.000707	0.000841	0.003095	0.006273	1.048077	0.000285
25	Diesel	0.000616	0.000745	0.000887	0.00273	0.002302	0.306861	0.000124
50	Diesel	0.002664	0.003224	0.003836	0.011467	0.009129	1.196814	0.000692
75	Diesel	0.000987	0.001195	0.001422	0.006786	0.008895	1.07289	0.000482
100	Diesel	0.008136	0.009844	0.011715	0.055058	0.068773	8.443117	0.005089
175	Diesel	0.003732	0.004516	0.005374	0.032156	0.039556	5.269695	0.001849
300	Diesel	0.002397	0.002901	0.003452	0.011588	0.025083	3.469622	0.001214
75	Diesel	0.000838	0.001014	0.001207	0.005711	0.007543	0.9059	0.000405
100	Diesel	0.003694	0.004469	0.005319	0.025919	0.030954	4.051254	0.002233
175	Diesel	0.003677	0.00445	0.005295	0.031947	0.038942	5.255206	0.001808
300	Diesel	0.001295	0.001567	0.001865	0.006784	0.013635	2.303808	0.000628

25 Diesel	2.09E-05	2.53E-05	3.01E-05	9.27E-05	7.81E-05	0.010415	4.2E-06
50 Diesel	0.001017	0.00123	0.001464	0.004519	0.003647	0.507221	0.000254
75 Diesel	0.016104	0.019486	0.023189	0.099148	0.138444	14.80929	0.009001
100 Diesel	0.000789	0.000955	0.001136	0.005563	0.006604	0.871491	0.000475
175 Diesel	0.002532	0.003064	0.003646	0.022117	0.026764	3.645799	0.001238
300 Diesel	0.002175	0.002632	0.003132	0.01066	0.022846	3.256821	0.001095
50 Diesel	0.000723	0.000875	0.001041	0.003204	0.002574	0.360102	0.000179
75 Diesel	0.000462	0.000559	0.000666	0.003155	0.00416	0.499895	0.000224
100 Diesel	0.001703	0.002061	0.002452	0.012443	0.014234	1.963015	0.001013
175 Diesel	0.000387	0.000469	0.000558	0.003277	0.004116	0.532428	0.000195
300 Diesel	0.000809	0.000979	0.001165	0.004223	0.008469	1.434075	0.000392
50 Diesel	0.000104	0.000126	0.00015	0.00059	0.000498	0.062028	3.62E-05
75 Diesel	0.000156	0.000189	0.000225	0.00151	0.001572	0.238736	7.96E-05
100 Diesel	0.000179	0.000217	0.000258	0.001237	0.001395	0.181122	0.000123
175 Diesel	0.000986	0.001193	0.001419	0.008313	0.008648	1.30802	0.000496
300 Diesel	0.001111	0.001344	0.0016	0.004351	0.010754	1.54239	0.000571
25 Diesel	1.36E-06	1.64E-06	1.96E-06	3.31E-06	2.22E-06	0.000182	2.41E-07
50 Diesel	1.07E-05	1.3E-05	1.55E-05	4.12E-05	3.98E-05	0.004615	3.35E-06
75 Diesel	3.26E-05	3.95E-05	4.7E-05	0.000141	0.000269	0.019211	2.28E-05
100 Diesel	7.78E-05	9.42E-05	0.000112	0.000401	0.000643	0.05657	5.55E-05
175 Diesel	0.000541	0.000654	0.000778	0.003537	0.005434	0.527825	0.000337
300 Diesel	0.001139	0.001378	0.00164	0.005832	0.011728	1.911508	0.000686
50 Diesel	0.0001	0.000121	0.000144	0.000347	0.00029	0.031104	3.27E-05
75 Diesel	0.000364	0.00044	0.000524	0.001673	0.002897	0.225775	0.000245
100 Diesel	0.001057	0.001278	0.001521	0.006137	0.008039	0.898815	0.000696
175 Diesel	0.00231	0.002795	0.003326	0.021598	0.021587	3.390189	0.001257
300 Diesel	0.002529	0.00306	0.003642	0.012156	0.024183	4.155027	0.001402
25 Diesel	6.89E-07	8.33E-07	9.92E-07	1.72E-06	1.31E-06	0.000107	1.43E-07
50 Diesel	0.003404	0.004118	0.004901	0.029703	0.02568	3.889991	0.001219
75 Diesel	0.001425	0.001724	0.002052	0.018596	0.017339	3.087883	0.000498
100 Diesel	0.001414	0.001712	0.002037	0.014965	0.012978	2.367003	0.001032
175 Diesel	0.006705	0.008112	0.009654	0.083144	0.057014	13.41135	0.00289
300 Diesel	0.006734	0.008148	0.009696	0.03301	0.060579	14.25715	0.002907
50 Diesel	3.96E-05	4.79E-05	5.71E-05	0.000125	0.000102	0.010572	1.25E-05
75 Diesel	7.59E-05	9.19E-05	0.000109	0.000267	0.000563	0.032559	5.35E-05
100 Diesel	0.000187	0.000226	0.000269	0.000702	0.001372	0.086086	0.000133
175 Diesel	0.001998	0.002418	0.002877	0.010203	0.019386	1.401325	0.001268
300 Diesel	0.002358	0.002853	0.003395	0.012154	0.024595	5.091674	0.001209
25 Diesel	2.23E-05	2.68E-05	3.2E-05	9.14E-05	0.000169	0.000245	5.69E-06
25 Diesel	6.58E-06	7.92E-06	9.46E-06	2.67E-05	4.96E-05	7.18E-05	1.77E-06
25 Diesel	4.43E-06	5.33E-06	6.37E-06	1.82E-05	3.37E-05	4.87E-05	1.13E-06
50 Diesel	1.33E-05	1.58E-05	1.92E-05	0.000129	0.000114	0.016832	4.61E-06
25 Diesel	3.19E-06	3.83E-06	4.58E-06	1.31E-05	2.42E-05	3.5E-05	8.17E-07
25 Diesel	2.28E-05	2.74E-05	3.28E-05	9.36E-05	0.000173	0.000251	5.83E-06
25 Diesel	1.19E-05	1.43E-05	1.7E-05	4.87E-05	9.01E-05	0.00013	3.03E-06
25 Diesel	6.01E-06	7.22E-06	8.63E-06	2.47E-05	4.57E-05	6.6E-05	1.55E-06
25 Diesel	1.02E-05	1.23E-05	1.47E-05	4.19E-05	7.75E-05	0.000112	2.61E-06

25	Diesel	7.15E-05	8.6E-05	0.000103	0.000294	0.000543	0.000786	1.83E-05
25	Diesel	3.91E-06	4.7E-06	5.62E-06	1.6E-05	2.97E-05	4.29E-05	9.99E-07
50	Diesel	5.84E-06	6.95E-06	8.41E-06	5.56E-05	4.99E-05	0.007406	1.99E-06
25	Diesel	0.001192	0.001433	0.001713	0.004874	0.009049	0.013065	0.000312
25	Diesel	0.000109	0.000131	0.000157	0.000447	0.000828	0.001197	2.78E-05
25	Diesel	0.000106	0.000127	0.000152	0.000434	0.000803	0.001161	2.7E-05
50	Diesel	0.001515	0.001833	0.002181	0.006834	0.005545	0.621158	0.000465
75	Diesel	0.000625	0.000756	0.000899	0.003737	0.004711	0.541597	0.000348
100	Diesel	0.000532	0.000644	0.000767	0.003707	0.004044	0.536909	0.000341
175	Diesel	0.00151	0.001827	0.002174	0.019165	0.011699	2.945224	0.000645
300	Diesel	0.000835	0.001011	0.001203	0.00365	0.007514	1.30155	0.000413
50	Diesel	4.74E-05	5.74E-05	6.83E-05	0.000283	0.000239	0.027526	1.71E-05
75	Diesel	3.61E-05	4.37E-05	5.2E-05	0.000198	0.000301	0.027694	2.34E-05
100	Diesel	1.62E-05	1.97E-05	2.34E-05	9.92E-05	0.000108	0.014286	7.8E-06
175	Diesel	0.00057	0.00069	0.000821	0.004901	0.004739	0.740402	0.000307
300	Diesel	0.001391	0.001683	0.002003	0.005699	0.012943	1.703875	0.00078
50	Diesel	0.000159	0.000193	0.000229	0.000609	0.000501	0.057961	4.58E-05
75	Diesel	0.000291	0.000352	0.000418	0.001956	0.00242	0.298954	0.000153
100	Diesel	0.000285	0.000345	0.000411	0.002172	0.002306	0.32563	0.000182
175	Diesel	0.000676	0.000817	0.000973	0.006828	0.005786	1.103517	0.000306
300	Diesel	0.000535	0.000648	0.000771	0.002869	0.004773	1.345214	0.000213
50	Diesel	0.000164	0.000199	0.000237	0.00117	0.001028	0.15312	5.34E-05
75	Diesel	9.35E-05	0.000113	0.000135	0.000719	0.000832	0.11161	4.59E-05
100	Diesel	0.000157	0.00019	0.000226	0.001158	0.001289	0.174161	0.000104
175	Diesel	0.000573	0.000693	0.000825	0.007582	0.004819	1.228912	0.000252
300	Diesel	0.000262	0.000317	0.000377	0.001274	0.00246	0.549504	0.000119
50	Diesel	0.002354	0.002848	0.00339	0.01236	0.010778	1.442396	0.000735
75	Diesel	0.000448	0.000542	0.000645	0.003693	0.004386	0.590036	0.000241
100	Diesel	0.000908	0.001098	0.001307	0.005932	0.007169	0.881689	0.000605
175	Diesel	0.00281	0.0034	0.004046	0.032523	0.024317	5.281176	0.001266
300	Diesel	0.000352	0.000427	0.000508	0.001485	0.003651	0.435147	0.000211
50	Diesel	4.35E-05	5.27E-05	6.27E-05	0.000326	0.000303	0.047948	1.53E-05
75	Diesel	0.000654	0.000791	0.000941	0.010908	0.010233	1.907209	0.000205
100	Diesel	0.00085	0.001029	0.001224	0.007883	0.007811	1.272111	0.000585
175	Diesel	0.003524	0.004264	0.005075	0.050614	0.032793	8.514083	0.001519
300	Diesel	3.69E-05	4.46E-05	5.31E-05	0.000195	0.000364	0.069062	2.04E-05
50	Diesel	3.03E-05	3.67E-05	4.37E-05	9.58E-05	7.72E-05	0.008085	8.33E-06
75	Diesel	3.83E-05	4.63E-05	5.51E-05	0.000189	0.000301	0.026356	2.41E-05
100	Diesel	7.48E-05	9.05E-05	0.000108	0.000416	0.000554	0.060539	5.49E-05
175	Diesel	0.000171	0.000207	0.000247	0.001307	0.001587	0.197297	9.62E-05
300	Diesel	0.000183	0.000222	0.000264	0.000883	0.001631	0.243378	0.000108
50	Diesel	0.0002	0.000242	0.000288	0.000874	0.000704	0.085175	6.27E-05
75	Diesel	0.000595	0.00072	0.000857	0.004453	0.005258	0.683625	0.000315
100	Diesel	0.001038	0.001256	0.001494	0.007453	0.008098	1.105054	0.000676
175	Diesel	0.006369	0.007707	0.009172	0.056362	0.05574	8.600896	0.003309
300	Diesel	0.008008	0.009689	0.011531	0.039599	0.069739	16.32233	0.003554
50	Diesel	9.03E-06	1.09E-05	1.3E-05	2.4E-05	1.95E-05	0.00182	2.42E-06

75	Diesel	3.19E-05	3.86E-05	4.59E-05	0.000169	0.000256	0.025338	1.97E-05
100	Diesel	2.92E-05	3.53E-05	4.2E-05	0.0002	0.000246	0.030181	1.89E-05
175	Diesel	0.0004	0.000484	0.000576	0.002058	0.003849	0.248673	0.000272
300	Diesel	0.003792	0.004588	0.005461	0.015709	0.039306	3.73405	0.002437
50	Diesel	0.002273	0.00275	0.003273	0.012096	0.01037	1.420287	0.000681
75	Diesel	0.005262	0.006367	0.007577	0.062907	0.060808	10.44495	0.001937
100	Diesel	0.002991	0.003619	0.004307	0.033265	0.028774	5.269708	0.002061
175	Diesel	0.000433	0.000524	0.000624	0.009222	0.003662	1.570094	0.000129
300	Diesel	6.43E-05	7.78E-05	9.26E-05	0.000323	0.000545	0.126823	2.99E-05
50	Diesel	3.88E-05	4.7E-05	5.59E-05	0.000154	0.000126	0.014019	1.14E-05
75	Diesel	2.13E-05	2.57E-05	3.06E-05	0.000164	0.000196	0.025053	1.16E-05
100	Diesel	3.22E-05	3.9E-05	4.64E-05	0.00021	0.000249	0.030658	2.52E-05
175	Diesel	9.98E-05	0.000121	0.000144	0.000896	0.000868	0.138913	5.26E-05
300	Diesel	0.000122	0.000148	0.000176	0.000483	0.001147	0.159926	6.57E-05
25	Diesel	3.01E-07	3.64E-07	4.33E-07	3E-06	2.48E-06	0.000354	1.74E-07
50	Diesel	0.003459	0.004185	0.004981	0.014339	0.011863	1.403505	0.00104
75	Diesel	0.005662	0.006851	0.008154	0.042792	0.050859	6.669007	0.002895
100	Diesel	0.013118	0.015872	0.01889	0.102961	0.105022	15.66724	0.008243
175	Diesel	0.008459	0.010236	0.012181	0.104763	0.07284	16.90314	0.00375
300	Diesel	0.003322	0.004019	0.004783	0.016986	0.029521	7.148165	0.00149
50	Diesel	0.000739	0.000895	0.001065	0.003755	0.003386	0.447976	0.000232
75	Diesel	0.000185	0.000224	0.000266	0.000967	0.001501	0.1397	0.000118
100	Diesel	0.000247	0.000299	0.000356	0.001161	0.001703	0.164221	0.000152
175	Diesel	0.000247	0.000298	0.000355	0.001822	0.002255	0.274563	0.000136
300	Diesel	0.000145	0.000176	0.000209	0.00058	0.001548	0.166448	8.76E-05
Aggregate	Gasoline	0.075959	0.076651	0.083525	3.999541	0.038557	8.436886	0.000402

PM2.5_tpd	SOx_tpd	NH3_tpd	Fuel Consumption	Total_Activity_hp	Total_Populati	Horsepowe
0.000706	1.35E-05	1.22E-05	48459.79786	33041.75604	126.5571857	1732121
0.02458	0.000326	0.000294	1169020.656	140601.1405	1525.18801	41784848
0.027919	0.000366	0.000329	1309136.912	151004.5777	1152.352551	46793089
0.04725	0.000899	0.000806	3205638.472	152010.3696	1663.755249	1.15E+08
0.023156	0.000764	0.000685	2722946.189	196639.1218	989.1777405	1.08E+08
0.010809	0.000606	0.000543	2159071.079	126616.0094	315.137017	85794147
0.000373	1.11E-05	9.94E-06	39525.40315	41867.84923	112.660388	1695330
0.000698	2.41E-05	2.17E-05	86138.49413	38323.83515	159.4262904	3694666
1.98E-05	1.36E-06	1.22E-06	4853.970188	4183.731569	2.33713027	231456.3
0.000626	1.64E-05	1.48E-05	58637.50609	28567.57986	16.91064559	2236853
6.71E-05	2.45E-06	2.2E-06	8726.525633	10330.67469	2.191798215	332892
2.8E-05	6.2E-07	5.56E-07	2211.454325	2005.376206	1.267024172	75883.24
0.000264	8.2E-06	7.35E-06	29219.42807	2903.993488	10.87396554	1255986
0.000488	1.77E-05	1.59E-05	63149.37116	14966.11267	11.71454487	2714451
3.63E-05	7.19E-07	6.47E-07	2573.674504	4702.360498	2.580468712	110390.5
0.000193	4.27E-06	3.84E-06	15246.8213	15153.77286	12.69726291	653969.1
0.00107	1.75E-05	1.57E-05	62458.31621	28396.06919	40.71976791	2678972
0.002122	6.67E-05	5.98E-05	237859.1564	36719.14555	153.2955767	11342058
0.000405	1.22E-05	1.09E-05	43320.83897	20434.87885	10.84183494	2065708
0.000503	9.62E-06	8.66E-06	34442.77194	41227.13383	46.60851981	1477325
0.002635	5.81E-05	5.21E-05	207205.119	76862.20214	163.7129916	8887475
0.001039	1.98E-05	1.78E-05	70599.62502	51693.53057	44.16316901	3028170
0.000166	5.14E-06	4.61E-06	18327.53721	11887.51121	8.876410721	873928.9
1.08E-05	2.4E-07	2.16E-07	856.6339735	8017.366478	0.584282563	34993.22
0.000156	4.75E-06	4.25E-06	16911.2253	12376.37425	7.093982595	767993.9
0.000262	9.57E-06	8.58E-06	34090.54905	9764.383909	8.829977107	1548163
0.000114	2.79E-06	2.51E-06	9981.210737	2001.237737	24.60354513	385924.2
0.000637	1.09E-05	9.79E-06	38928.5038	27778.13518	44.70333849	1505173
0.000444	9.78E-06	8.78E-06	34897.65232	17437.43699	21.8855542	1349320
0.004682	7.7E-05	6.91E-05	274627.3281	82265.8755	141.7195259	10618486
0.001701	4.81E-05	4.31E-05	171406.1767	67576.66489	70.56258934	7367826
0.001116	3.17E-05	2.84E-05	112855.6014	18910.90345	22.61807838	4851053
0.000373	8.26E-06	7.41E-06	29466.0077	20493.70006	19.01387932	1139305
0.002054	3.69E-05	3.32E-05	131774.1982	55304.49646	64.93588733	5095059
0.001664	4.8E-05	4.3E-05	170934.8956	60489.29852	68.59624509	7347569
0.000577	2.1E-05	1.89E-05	74935.43347	13565.09	13.67476202	3221070

3.86E-06	9.46E-08	8.52E-08	338.7773749	5532.512947	1.018073476	13838.95
0.000234	4.61E-06	4.15E-06	16498.2546	28498.80524	21.73448816	673948.3
0.008281	0.000135	0.000121	481698.2499	36271.02569	433.2430979	19677216
0.000437	7.95E-06	7.13E-06	28346.79175	10129.82921	15.81582279	1157957
0.001139	3.33E-05	2.98E-05	118586.0762	59019.11177	45.52131808	5385380
0.001008	2.97E-05	2.66E-05	105933.862	42058.84081	23.45492117	4810802
0.000165	3.27E-06	2.95E-06	11712.9617	2903.993315	10.87396564	418661.8
0.000206	4.56E-06	4.09E-06	16259.96003	6368.666354	11.28857676	581187.3
0.000932	1.79E-05	1.61E-05	63850.54852	18364.61605	28.3356226	2282240
0.000179	4.86E-06	4.36E-06	17318.16956	13918.4479	5.684558751	688165.2
0.00036	1.31E-05	1.17E-05	46645.84022	14722.74759	9.30125019	1853547
3.33E-05	5.88E-07	0	2015.61578	1810.044938	3.800875972	35941.5
7.32E-05	2.26E-06	0	7757.780736	4346.7708	8.853259886	138333
0.000113	1.72E-06	0	5885.599075	2390.239308	4.681566746	104949.2
0.000456	1.24E-05	0	42504.32315	12041.32452	18.5408584	842588.6
0.000525	1.46E-05	0	50120.23064	8790.405326	14.5082217	993563.3
2.22E-07	1.72E-09	0	5.899536453	16.67819399	0.092704292	105.1977
3.08E-06	4.37E-08	0	149.9609354	230.0967086	1.205155796	2674.032
2.1E-05	1.82E-07	0	624.2683032	626.0362956	3.569115242	11131.65
5.1E-05	5.36E-07	0	1838.248759	1320.238697	6.999174046	32778.77
0.00031	5E-06	0	17151.78126	8065.24489	31.47310713	340010
0.000631	1.81E-05	0	62114.77935	17777.40697	70.82607909	1231338
3.01E-05	2.95E-07	0	1010.721819	1071.253115	3.986284556	18022.71
0.000225	2.14E-06	0	7336.612173	4568.932299	15.80608179	130823
0.00064	8.51E-06	0	29207.16216	13780.98914	39.77014127	520808.1
0.001156	3.21E-05	0	110164.7707	37522.89987	81.67248125	2183862
0.00129	3.94E-05	0	135018.3386	28338.14798	66.14451234	2676549
1.31E-07	1.02E-09	0	3.484579553	20.4392611	0.046352146	62.13535
0.001121	3.68E-05	0	126405.937	167097.9587	346.3895871	2254010
0.000458	2.93E-05	0	100341.3127	76315.40016	143.2744833	1789238
0.000949	2.24E-05	0	76916.17354	40282.49145	75.41494154	1371532
0.002659	0.000127	0	435803.9977	155106.9957	214.285971	8639203
0.002675	0.000135	0	463288.6475	102824.4571	159.6367908	9184048
1.15E-05	1E-07	0	343.5411031	414.4382176	1.715029402	6125.86
4.92E-05	3.08E-07	0	1057.998091	753.3581406	3.291002366	18865.72
0.000122	8.15E-07	0	2797.386645	1430.756473	5.701313958	49881.66
0.001166	1.33E-05	0	45536.29131	15231.18613	48.53069686	902693.1
0.001112	4.82E-05	0	165454.8416	35274.9421	90.85020616	3279910
4.3E-06	2.32E-09	2E-09	7.955031109	0	1.251590603	0
1.34E-06	6.81E-10	5.87E-10	2.334756989	0	0.891259558	0
8.56E-07	4.62E-10	3.98E-10	1.584615828	0	0.331404476	0
4.24E-06	2.14E-07	1.38E-07	547.5	397.85	0.69	13129.05
6.18E-07	3.32E-10	2.86E-10	1.139271899	0	0.460486885	0
4.4E-06	2.38E-09	2.05E-09	8.148787867	0	0.724363152	0
2.29E-06	1.24E-09	1.06E-09	4.236691554	0	0.947738649	0
1.17E-06	6.26E-10	5.39E-10	2.14633986	0	0.285813436	0
1.97E-06	1.06E-09	9.16E-10	3.644490781	0	0.710238652	0

1.38E-05	7.46E-09	6.42E-09	25.55189191	0	5.621446458	0
7.55E-07	4.07E-10	3.51E-10	1.396470494	0	0.175848029	0
1.83E-06	9.44E-08	6.06E-08	240.9	138.7	0.27	5131.9
0.000236	1.24E-07	1.07E-07	424.9549524	0	75.0960674	0
2.1E-05	1.14E-08	9.79E-09	38.9341337	0	5.315456149	0
2.04E-05	1.1E-08	9.49E-09	37.74825342	0	3.785563487	0
0.000427	5.88E-06	0	20184.64122	22458.40243	37.26712538	359922.9
0.00032	5.13E-06	0	17599.28624	12286.97384	20.11683136	313822
0.000314	5.09E-06	0	17446.94188	8436.476968	13.3030659	311105.5
0.000594	2.79E-05	0	95705.56929	30094.07873	29.43361271	1897229
0.00038	1.23E-05	0	42294.08517	8975.195378	11.49533221	838421
1.57E-05	2.61E-07	0	894.4579595	1492.974092	2.410311592	15949.55
2.15E-05	2.62E-07	0	899.9242112	623.289339	1.205155796	16047.02
7.18E-06	1.35E-07	0	464.2419902	254.9595915	0.417169314	8278.141
0.000282	7.01E-06	0	24059.50794	7952.061949	8.992316324	476946
0.000717	1.61E-05	0	55367.71065	12563.78284	17.84557621	1097587
4.21E-05	5.49E-07	0	1883.438989	2159.739083	6.164835418	33584.58
0.00014	2.83E-06	0	9714.56993	6232.887415	15.99149037	173225.6
0.000167	3.08E-06	0	10581.39496	5363.716475	12.28331869	188682.4
0.000281	1.05E-05	0	35858.96348	12094.9646	21.73915647	710853.7
0.000196	1.27E-05	0	43712.95655	9057.575284	16.08419466	866548.1
4.91E-05	1.45E-06	0	4975.658581	6687.007941	17.05758973	88723.56
4.22E-05	1.06E-06	0	3626.786914	2742.550589	6.72106117	64671.13
9.6E-05	1.65E-06	0	5659.402981	3247.543183	7.64810409	100915.8
0.000232	1.16E-05	0	39933.70885	16283.75151	24.70569382	791629.8
0.00011	5.21E-06	0	17856.23626	4209.116476	7.833512674	353974.9
0.000676	1.37E-05	0	46870.90484	62926.16402	173.357026	835779.5
0.000221	5.59E-06	0	19173.3179	13320.10497	35.22763096	341889.4
0.000556	8.35E-06	0	28650.65358	15674.49199	41.80963569	510884.7
0.001165	5E-05	0	171612.7397	67439.53351	113.2846448	3401982
0.000194	4.12E-06	0	14140.18523	3300.741232	7.509047652	280309.4
1.4E-05	4.54E-07	0	1558.088181	1572.051147	5.747666104	27783.08
0.000189	1.81E-05	0	61975.10444	39262.76173	117.4099858	1105110
0.000538	1.21E-05	0	41337.46459	21399.49487	67.2106117	737109.9
0.001398	8.07E-05	0	276666.597	113307.4263	235.8397188	5484527
1.88E-05	6.54E-07	0	2244.179256	531.9724512	1.436916526	44487.71
7.67E-06	7.66E-08	0	262.7340287	301.2125827	0.834338628	4684.947
2.21E-05	2.5E-07	0	856.4284495	619.0080637	1.39056438	15271.42
5.05E-05	5.73E-07	0	1967.241154	1011.638541	2.3176073	35078.9
8.85E-05	1.87E-06	0	6411.212804	2226.072669	3.847228118	127093.3
9.96E-05	2.31E-06	0	7908.614333	1720.174755	3.105593782	156777.2
5.77E-05	8.07E-07	0	2767.787796	3478.386215	7.138230484	49353.87
0.000289	6.48E-06	0	22214.52547	16563.37668	31.8439243	396118.8
0.000622	1.05E-05	0	35908.91753	20601.7735	38.65768976	640310.6
0.003044	8.15E-05	0	279487.6109	104405.0433	144.3869348	5540450
0.00327	0.000155	0	530397.0898	129568.7457	182.7665117	10514379
2.22E-06	1.72E-08	0	59.13745911	53.02071767	0.23176073	1054.511

1.81E-05	2.4E-07	0	823.3502916	471.645714	1.807733694	14681.59
1.74E-05	2.86E-07	0	980.7433847	441.8341522	1.436916526	17488.15
0.00025	2.36E-06	0	8080.674468	2232.35414	8.714203448	160188
0.002242	3.54E-05	0	121338.6092	20958.82524	68.69388037	2405368
0.000627	1.35E-05	0	46152.47807	52985.34786	136.3680135	822968.9
0.001782	9.89E-05	0	339410.3804	244029.3649	531.2882975	6052203
0.001896	4.99E-05	0	171240.0677	98501.99736	207.3331491	3053471
0.000119	1.49E-05	0	51020.48056	24407.25535	35.92291315	1011410
2.75E-05	1.2E-06	0	4121.12005	1061.021021	1.946790132	81695.43
1.05E-05	1.33E-07	0	455.5633898	736.2309805	1.575972964	8123.388
1.07E-05	2.37E-07	0	814.093133	756.865985	1.529620818	14516.52
2.32E-05	2.9E-07	0	996.2372444	685.4482242	1.436916526	17764.43
4.84E-05	1.32E-06	0	4514.010433	2244.178367	3.47641095	89483.93
6.04E-05	1.51E-06	0	5196.813686	1440.496962	2.642072322	103019.5
1.6E-07	3.36E-09	0	11.509718	24.11701281	0.092704292	205.2358
0.000957	1.33E-05	0	45607.13073	58806.50751	149.7174316	813244.5
0.002663	6.32E-05	0	216710.5545	157848.5639	353.6205218	3864279
0.007583	0.000148	0	509109.7992	280403.0469	587.0962812	9078202
0.00345	0.00016	0	549270.4641	232670.9249	348.290025	10888517
0.001371	6.77E-05	0	232280.8681	56789.42343	95.85623793	4604643
0.000213	4.24E-06	0	14557.04609	12448.36464	40.23366273	259574.3
0.000109	1.32E-06	0	4539.58306	2616.625855	8.80690774	80947.67
0.00014	1.56E-06	0	5336.39956	2175.246548	7.230934776	95156.12
0.000125	2.6E-06	0	8921.972933	2840.183666	7.230934776	176865.6
8.06E-05	1.58E-06	0	5408.74179	958.4134575	2.78112876	107220.7
0.000303	0.000144	0.000198	558976.7607	0	6278.306011	0

Table 23-1: Conversions

Days/YR	lbs / ton	grams / lbs
365	2000	453.59237

r_Hours_hhpy	HC_g_hp-hr	TOG_g_hp-hr	NH3_g_hp-hr	ROG_g_hp-hr	CO_g_hp-hr
	0.871697455	1.255244338	0.002330495	1.054753921	3.182650681
	0.803799982	1.157471974	0.002330495	0.972597978	3.08121629
	0.402680233	0.579859536	0.002330495	0.487243081	2.036989124
	0.235520074	0.339148907	0.002330495	0.28497929	1.787206818
	0.157827873	0.227272138	0.002096303	0.190971727	1.537558405
	0.103088574	0.148447547	0.002096303	0.124737175	0.611535367
	0.306740568	0.441706417	0.001942079	0.371156088	1.845486982
	0.224221035	0.322878289	0.001942079	0.271307451	1.662799885
	0.070942121	0.102156654	0.00174692	0.085839967	1.17350736
	0.197764173	0.284780408	0.002183649	0.23929465	1.652099831
	0.148691505	0.214115767	0.002183649	0.179916721	0.788086357
	0.274465347	0.3952301	0.002427599	0.332103068	1.870278539
	0.158603219	0.228388635	0.001937903	0.191909896	1.420974235
	0.134339669	0.193449123	0.001937903	0.162550999	0.695343871
	0.476525091	0.686196134	0.001942079	0.57659536	2.111422002
	0.219572274	0.316184071	0.001942079	0.265682452	1.496222838
	0.228127602	0.328503747	0.001942079	0.276034398	1.542012659
	0.137006758	0.197289733	0.00174692	0.165778178	1.23964869
	0.13938832	0.20071918	0.00174692	0.168659867	0.67362607
	0.471096379	0.678378783	0.001942079	0.570026619	2.119522822
	0.219112459	0.315521941	0.001942079	0.265126075	1.495789815
	0.207246791	0.298435378	0.001942079	0.250768617	1.503271253
	0.143061965	0.206009231	0.00174692	0.173104977	1.283745039
	0.230550879	0.331993264	0.002039183	0.278966564	1.571033975
	0.15114214	0.217644681	0.001834266	0.18288199	1.37709347
	0.124900857	0.179857233	0.001834266	0.151130036	0.661992511
	0.528621461	0.761214895	0.002154399	0.639631965	2.342254528
	0.586072731	0.843944732	0.002154398	0.709148004	2.522692236
	0.2423126	0.348930144	0.002154398	0.293198245	1.665306882
	0.25369655	0.365323031	0.002154398	0.306972825	1.716893495
	0.167714915	0.241509478	0.001937903	0.202935047	1.445157566
	0.163632919	0.235631404	0.001937903	0.197995832	0.790962075
	0.243577175	0.350751134	0.002154398	0.294728383	1.659798384
	0.24004587	0.345666052	0.002154398	0.290455502	1.684460378
	0.165723252	0.238641483	0.001937903	0.200525134	1.439713433
	0.133119905	0.191692663	0.001937903	0.161075086	0.697418756

0.500351342	0.72050593	0.002039183	0.605425122	2.216993086
0.499480654	0.719252142	0.002039183	0.604371589	2.22042477
0.270990336	0.390226086	0.002039183	0.327898305	1.668426193
0.22558154	0.324837417	0.002039183	0.272953663	1.590671228
0.155698408	0.224205708	0.001834266	0.188395073	1.35989386
0.149706644	0.215577566	0.001834266	0.181145038	0.73370127
0.571830024	0.823435231	0.002330495	0.691914325	2.533706211
0.263357028	0.37923412	0.002330495	0.318662005	1.797454067
0.247077276	0.355791277	0.002330495	0.298963505	1.805254006
0.186408914	0.268428837	0.002096303	0.225554787	1.576805517
0.144567014	0.208176501	0.002096303	0.174926087	0.754357021
0.956947396	1.378004251	0	1.15790635	5.43228002
0.37369928	0.538126963	0	0.452176128	3.614271685
0.564837473	0.813365961	0	0.683453342	3.903910042
0.387348738	0.557782182	0	0.468691973	3.266893685
0.370255243	0.53316755	0	0.448008844	1.449980446
4.275451821	6.156650623	0	5.173296704	10.41966447
1.330954474	1.916574443	0	1.610454914	5.100657057
0.970901637	1.398098357	0	1.174790981	4.186787326
0.786273128	1.132233304	0	0.951390484	4.047902538
0.526422256	0.758048048	0	0.636970929	3.44453629
0.306223916	0.44096244	0	0.370530939	1.568203262
1.838634691	2.647633955	0	2.224747976	6.372771462
0.920830681	1.325996181	0	1.114205125	4.233638216
0.671757553	0.967330877	0	0.812826639	3.901836653
0.350176476	0.504254126	0	0.423713536	3.274778988
0.312854	0.45050976	0	0.37855334	1.503787688
3.669962342	5.284745772	0	4.440654434	9.139906214
0.499991126	0.719987221	0	0.604989262	4.363497085
0.263693125	0.3797181	0	0.319068681	3.441371767
0.341487122	0.491741456	0	0.413199418	3.61303947
0.256969447	0.370036003	0	0.310933031	3.186746767
0.242775621	0.349596894	0	0.293758502	1.190140986
2.14165502	3.083983229	0	2.591402574	6.75028389
1.332917493	1.91940119	0	1.612830167	4.691260252
1.241456596	1.787697499	0	1.502162481	4.657525113
0.732929396	1.055418331	0	0.88684457	3.742602205
0.238045335	0.342785283	0	0.288034856	1.226987212
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0.335488856	0.483103953	0.003473728	0.399259465	3.242264792
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0.376611433	0.542320463	0.003910242	0.44819873	3.586345151
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
1.393514775	2.006661276	0	1.686152878	6.286758712
0.659086358	0.949084355	0	0.797494493	3.943173211
0.566681488	0.816021343	0	0.685684601	3.945874151
0.263488534	0.379423488	0	0.318821126	3.344906505
0.32989486	0.475048599	0	0.399172781	1.441379177
0.984713677	1.417987695	0	1.191503549	5.874664419
0.745207881	1.073099349	0	0.901701536	4.084521013
0.649757786	0.935651211	0	0.786206921	3.968955693
0.395960101	0.570182546	0	0.479111722	3.402569177
0.419726986	0.604406859	0	0.507869653	1.719195282
1.568609963	2.258798346	0	1.898018055	6.007460074
0.555421871	0.799807494	0	0.672060464	3.73866847
0.500644806	0.72092852	0	0.605780215	3.811451259
0.314707866	0.453179327	0	0.380796518	3.180758704
0.204618773	0.294651033	0	0.247588716	1.096455899
0.613507486	0.88345078	0	0.742344058	4.365023229
0.478962118	0.68970545	0	0.579544162	3.682033216
0.514291174	0.74057929	0	0.62229232	3.800777738
0.239604877	0.345031023	0	0.289921901	3.171492575
0.244727214	0.352407189	0	0.296119929	1.191999309
0.932588566	1.342927535	0	1.128432165	4.897008909
0.434068661	0.625058872	0	0.52522308	3.576496576
0.588380111	0.84726736	0	0.711939935	3.844911512
0.273481373	0.393813177	0	0.330912461	3.165516816
0.416391612	0.599603921	0	0.503833851	1.753722711
0.518594849	0.746776582	0	0.627499767	3.889967361
0.195853455	0.282028976	0	0.236982681	3.268261567
0.381906813	0.54994581	0	0.462107243	3.541178613
0.212771678	0.306391216	0	0.25745373	3.055757583
0.274424115	0.395170726	0	0.33205318	1.447886089
2.1440723	3.087464111	0	2.594327483	6.77114096
0.830120176	1.195373053	0	1.004445413	4.089221149
0.706013555	1.016659519	0	0.854276401	3.929496992
0.446070837	0.642342006	0	0.539745713	3.404304398
0.387350549	0.557784791	0	0.468694165	1.864871881
1.340170707	1.929845819	0	1.621606556	5.863081103
0.497682563	0.716662891	0	0.602195901	3.722387324
0.53658377	0.772680629	0	0.649266362	3.85414306
0.380650192	0.548136277	0	0.460586733	3.368424273
0.252178734	0.363137378	0	0.305136269	1.247066083
2.836425369	4.084452531	0	3.432074696	7.542191058

0.71888759	1.03519813	0	0.869853984	3.804618083
0.552676555	0.795854239	0	0.668738631	3.790830795
0.827271323	1.191270706	0	1.000998301	4.253621648
0.522024382	0.75171511	0	0.631649502	2.162546216
0.914593823	1.317015105	0	1.106658526	4.86680799
0.287889307	0.414560602	0	0.348346062	3.441731318
0.324336544	0.467044624	0	0.392447219	3.607301841
0.141869924	0.20429269	0	0.171662608	3.019026577
0.260648312	0.375333569	0	0.315384457	1.311017839
1.581925264	2.277972381	0	1.91412957	6.260514769
0.484834361	0.69816148	0	0.586649577	3.7302313
0.600191549	0.86427583	0	0.726231774	3.90857102
0.369262122	0.531737455	0	0.446807167	3.316286631
0.391966053	0.564431116	0	0.474278924	1.553653739
0.485253688	0.698765311	0	0.587156962	4.833953172
1.408258388	2.027892078	0	1.703992649	5.838401978
0.485189903	0.698673461	0	0.587079783	3.666782104
0.47846238	0.688985828	0	0.57893948	3.755461795
0.257247044	0.370435743	0	0.311268923	3.185862754
0.238873026	0.343977157	0	0.289036361	1.221444641
0.943056231	1.358000973	0	1.14109804	4.789992006
0.755948747	1.088566196	0	0.914697984	3.957076668
0.859513121	1.237698894	0	1.040010876	4.04108244
0.461692665	0.664837437	0	0.558648124	3.411822036
0.448307281	0.645562484	0	0.54245181	1.79003672
44.99607775	49.47814537	0.117209087	45.40599948	2369.217669

NOx_g_hp-hr	PM10_g_hp-hr	PM2.5_g_hp-hr	CO2_g_hp-hr	gal/hp-hr
2.32451784	0.146619708	0.134890131	284.8072263	0.027977
2.43937289	0.211723853	0.194785944	284.8072279	0.027977
3.316162877	0.214745934	0.197566259	284.8072272	0.027977
2.109752191	0.14841809	0.136544643	284.8072278	0.027977
1.671205188	0.077024731	0.070862752	256.1869073	0.025166
1.013660533	0.045342991	0.041715552	256.1869073	0.025166
1.642075145	0.079182028	0.072847466	237.3393568	0.023314
1.493457413	0.068000239	0.062560219	237.339356	0.023314
0.800981371	0.030746758	0.028287017	213.4890891	0.020971
2.105594181	0.100679052	0.092624728	266.861361	0.026214
1.597280617	0.072499282	0.066699339	266.8613632	0.026214
2.470336376	0.132670179	0.122056564	296.6741937	0.029143
1.668967586	0.075685368	0.069630538	236.8289201	0.023264
1.384960684	0.064704523	0.059528161	236.8289208	0.023264
1.696703116	0.11829928	0.108835337	237.3393556	0.023314
1.976269057	0.106136141	0.09764525	237.3393564	0.023314
1.983330076	0.14381934	0.132313792	237.3393566	0.023314
1.592455274	0.067347287	0.061959504	213.4890881	0.020971
1.535855479	0.070509245	0.064868505	213.4890899	0.020971
1.760858385	0.122520942	0.112719267	237.3393556	0.023314
1.973440659	0.106723831	0.098185924	237.3393548	0.023314
1.744687198	0.123547119	0.11366335	237.3393563	0.023314
1.501059231	0.068359231	0.062890492	213.4890884	0.020971
2.075082482	0.111442945	0.10252751	249.206323	0.02448
1.540525179	0.073155092	0.067302685	224.1635446	0.02202
1.34171565	0.060899393	0.056027442	224.1635448	0.02202
1.975520269	0.106094928	0.097607334	263.2866362	0.025863
2.008309764	0.152291111	0.140107823	263.2866331	0.025863
2.182944744	0.118314201	0.108849065	263.2866322	0.025863
2.144590452	0.158683215	0.145988558	263.2866329	0.025863
1.777708076	0.083077846	0.076431618	236.8289213	0.023264
1.712141965	0.082833765	0.076207063	236.8289226	0.023264
2.192326059	0.117739555	0.10832039	263.2866317	0.025863
2.011655101	0.145096831	0.133489085	263.2866332	0.025863
1.75492749	0.081486567	0.074967642	236.8289221	0.023264
1.401636444	0.064517973	0.059356535	236.8289215	0.023264

1.869871425	0.100421078	0.092387391	249.206323	0.02448
1.791676691	0.12491153	0.114918608	249.2063233	0.02448
2.329700899	0.151473228	0.13935537	249.2063237	0.02448
1.888520245	0.13575543	0.124894996	249.2063242	0.02448
1.645585307	0.076145541	0.070053898	224.1635435	0.02202
1.57244097	0.075382266	0.069351685	224.1635438	0.02202
2.036043586	0.141959115	0.130602385	284.8072273	0.027977
2.370292256	0.127561819	0.117356874	284.807229	0.027977
2.065168134	0.147040855	0.135277586	284.8072269	0.027977
1.98068453	0.093867694	0.086358277	256.1869093	0.025166
1.512944028	0.069962174	0.0643652	256.1869098	0.025166
4.591958898	0.333323436	0.306657562	571.4540783	0.05608
3.762292434	0.190429837	0.17519545	571.4540783	0.05608
4.400041556	0.387945216	0.356909599	571.4540783	0.05608
3.398353134	0.194890791	0.179299528	514.0285459	0.050445
3.583820189	0.190182375	0.174967785	514.0285459	0.050445
6.999928172	0.759992202	0.699192825	571.4540783	0.05608
4.922448147	0.414908741	0.381716042	571.4540783	0.05608
8.013128746	0.67804491	0.623801317	571.4540783	0.05608
6.498046434	0.560513636	0.515672545	571.4540783	0.05608
5.292082068	0.328615669	0.302326415	514.0285459	0.050445
3.153777709	0.184516546	0.169755222	514.0285459	0.050445
5.320659644	0.60108488	0.552998089	571.4540783	0.05608
7.333347238	0.620372003	0.570742242	571.4540783	0.05608
5.110954174	0.442587703	0.407180687	571.4540783	0.05608
3.273078515	0.190591367	0.175344058	514.0285459	0.050445
2.991698402	0.173407105	0.159534536	514.0285459	0.050445
6.999928172	0.759992202	0.699192825	571.4540783	0.05608
3.772427205	0.179068586	0.164743099	571.4540783	0.05608
3.208883856	0.092081899	0.084715347	571.4540783	0.05608
3.133169298	0.24916021	0.229227393	571.4540783	0.05608
2.185224999	0.110756341	0.101895834	514.0285459	0.050445
2.184137645	0.104825751	0.096439691	514.0285459	0.050445
5.519766471	0.677849214	0.623621277	571.4540783	0.05608
9.878690614	0.939443293	0.86428783	571.4540783	0.05608
9.109349221	0.880148649	0.809736757	571.4540783	0.05608
7.11114541	0.464945149	0.427749537	514.0285459	0.050445
2.483030359	0.122072882	0.112307051	514.0285459	0.050445
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5.100919703	0.427436534	0.393241611	571.4540783	0.05608
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4.303885772	0.362734371	0.333715621	571.4540783	0.05608
2.041754014	0.112645297	0.103633674	514.0285459	0.050445
2.967664994	0.162980783	0.14994232	514.0285459	0.050445
4.95671468	0.354736255	0.326357354	571.4540783	0.05608
6.206053808	0.481906256	0.443353756	571.4540783	0.05608
4.328228336	0.31209793	0.287130096	571.4540783	0.05608
3.290253605	0.213008766	0.195968065	514.0285459	0.050445
3.904697826	0.235167806	0.216354382	514.0285459	0.050445
4.940574077	0.451580801	0.415454337	571.4540783	0.05608
4.62540362	0.29165547	0.268323033	571.4540783	0.05608
4.047236398	0.318627739	0.29313752	571.4540783	0.05608
2.695071581	0.142502541	0.131102338	514.0285459	0.050445
1.823760775	0.081292847	0.07478942	514.0285459	0.050445
3.83744794	0.199331313	0.183384808	571.4540783	0.05608
4.261790997	0.235096682	0.216288948	571.4540783	0.05608
4.229352778	0.342464525	0.315067363	571.4540783	0.05608
2.015611678	0.105255148	0.096834736	514.0285459	0.050445
2.30147633	0.111527351	0.102605163	514.0285459	0.050445
4.270248458	0.291050309	0.267766284	571.4540783	0.05608
4.248181345	0.233020781	0.214379118	571.4540783	0.05608
4.646628753	0.391872142	0.360522371	571.4540783	0.05608
2.366811957	0.123211031	0.113354148	514.0285459	0.050445
4.313337572	0.249500514	0.229540473	514.0285459	0.050445
3.615911557	0.181928462	0.167374185	571.4540783	0.05608
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3.509009763	0.262763744	0.241742645	571.4540783	0.05608
1.979835874	0.091731059	0.084392575	514.0285459	0.050445
2.70632134	0.151752189	0.139612014	514.0285459	0.050445
5.45582706	0.588892888	0.541781457	571.4540783	0.05608
6.525811387	0.521530906	0.479808433	571.4540783	0.05608
5.232910288	0.518583973	0.477097255	571.4540783	0.05608
4.135804567	0.250558868	0.230514159	514.0285459	0.050445
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4.724234348	0.420843821	0.387176315	571.4540783	0.05608
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3.33125299	0.197768592	0.181947105	514.0285459	0.050445
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6.125059788	0.758337022	0.69767006	571.4540783	0.05608

5.771545586	0.443361426	0.407892512	571.4540783	0.05608
4.666471536	0.357520948	0.328919272	571.4540783	0.05608
7.956446343	0.562215389	0.517238158	514.0285459	0.050445
5.410787246	0.335529557	0.308687192	514.0285459	0.050445
4.172233281	0.274091751	0.252164411	571.4540783	0.05608
3.326884335	0.105970972	0.097493294	571.4540783	0.05608
3.120327516	0.223514988	0.205633789	571.4540783	0.05608
1.198926073	0.04234169	0.038954355	514.0285459	0.050445
2.207012692	0.121192602	0.111497194	514.0285459	0.050445
5.131139514	0.465005973	0.427805495	571.4540783	0.05608
4.474262986	0.264069484	0.242943926	571.4540783	0.05608
4.642738523	0.469449647	0.431893676	571.4540783	0.05608
3.213754457	0.194622501	0.179052701	514.0285459	0.050445
3.685338987	0.211055583	0.194171137	514.0285459	0.050445
4.000884767	0.280270748	0.257849088	571.4540783	0.05608
4.830214231	0.423419474	0.389545916	571.4540783	0.05608
4.357970034	0.24805147	0.228207353	571.4540783	0.05608
3.830621903	0.300655506	0.276603066	571.4540783	0.05608
2.215079041	0.114053219	0.104928961	514.0285459	0.050445
2.122860369	0.107153121	0.098580871	514.0285459	0.050445
4.319610219	0.295847605	0.272179796	571.4540783	0.05608
6.14071895	0.483744797	0.445045213	571.4540783	0.05608
5.927639013	0.527656524	0.485444002	571.4540783	0.05608
4.222398703	0.253986901	0.233667949	514.0285459	0.050445
4.780900398	0.27041394	0.248780825	514.0285459	0.050445
22.84016358	0.237907673	0.179436603	4997.779018	

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Sheet 9: On-Road Vehicle Operational Fuel Efficiency
EMFAC2021 San Joaquin Valley Fuel Efficiency Estimates for 2022

Table 9-1: 2022 San Joaquin Valley Average Vehicle Fuel Efficiency (Gasoline)

Vehicle Class	Population	Vehicle Miles Travelled Per Day	Gallons Per Day	Miles Per Gallon
HHDT	2.65	57.25	18.57	3.08
LDA	250,840.66	9,972,327.18	354,344.06	28.14
LDT1	22,635.03	734,810.70	31,294.97	23.48
LDT2	97,566.18	3,835,154.52	169,841.54	22.58
LHDT1	10,032.89	343,680.35	37,766.84	9.10
LHDT2	1,192.96	41,208.17	5,018.02	8.21
MCY	12,156.83	65,858.41	1,654.83	39.80
MDV	95,931.34	3,318,018.22	181,402.51	18.29
MH	1,600.89	13,846.61	3,139.81	4.41
MHDT	579.49	27,135.21	5,908.82	4.59
OBUS	190.89	8,510.79	1,830.68	4.65
SBUS	125.39	6,800.30	672.13	10.12
UBUS	48.77	3,674.27	782.05	4.70
TOTAL	492,903.96	18,371,081.96	793,674.82	23.15

Table 9-2: 2022 San Joaquin Valley Average Vehicle Fuel Efficiency (Diesel)

Vehicle Class	Population	Vehicle Miles Travelled Per Day	Gallons Per Day	Miles Per Gallon
HHDT	8,309.0	1,176,546.19	201,246.37	5.85
LDA	747.60	24,646.14	583.58	42.23
LDT1	7.05	82.55	3.37	24.47
LDT2	248.86	10,706.82	339.93	31.50
LHDT1	9,047.42	317,992.09	20,147.70	15.78
LHDT2	3,132.38	115,997.92	8,943.84	12.97
MCY	0.00	0.00	0.00	0.00
MDV	1,375.55	54,411.92	2,295.40	23.70
MH	647.06	5,702.87	606.22	9.41
MHDT	5,611.05	266,972.39	31,215.26	8.55
OBUS	81.55	5,850.55	842.18	6.95
SBUS	485.98	11,054.11	1,356.91	8.15
UBUS	81.19	5,625.26	641.01	8.78
TOTAL	29,774.64	1,995,588.79	268221.77	7.44

Table 9-3: 2022 San Joaquin Valley Average Vehicle Fuel Efficiency (Electricity)

Vehicle Class	Population	Vehicle Miles Travelled Per Day	Energy Consumption (kWh/day)	Miles Per kWh
HHDT	0.00	0.00	0.00	0.00
LDA	11,216.99	388,343.30	140,049.41	2.77
LDT1	23.23	728.05	261.87	2.78
LDT2	608.97	18,142.72	6,074.56	2.99
LHDT1	0.00	0.00	0.00	0.00
LHDT2	0.00	0.00	0.00	0.00
MCY	0.00	0.00	0.00	0.00
MDV	574.50	15,886.46	5,422.15	2.93
MH	0.00	0.00	0.00	0.00
MHDT	0.00	0.00	0.00	0.00
OBUS	0.00	0.00	0.00	0.00
SBUS	0.00	0.00	0.00	0.00
UBUS	17.16	766.36	1,335.95	0.57
TOTAL	12,440.85	423,866.88	153,143.94	2.77

Sheet 10: EMFAC Output

Source: EMFAC2021 (v1.0.2) Emissions Inventory
Region Type: County
Region: San Joaquin
Calendar Year: 2022
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for CVMT and EVMT, trips/day for Trips, kWh/day for Energy Consumption, tons/day for Emissi

Region	Calendar Ye	Vehicle Cat	Model Year	Speed	Fuel	Population	Total VMT	CVMT	EVMT
San Joaquin	2022	HHDT	Aggregate	Aggregate	Gasoline	2.652755	57.24618	57.24618	0
San Joaquin	2022	HHDT	Aggregate	Aggregate	Diesel	8308.956	1176546	1176546	0
San Joaquin	2022	HHDT	Aggregate	Aggregate	Natural Ga	205.0434	13547.93	13547.93	0
San Joaquin	2022	LDA	Aggregate	Aggregate	Gasoline	245832.5	9843786	9843786	0
San Joaquin	2022	LDA	Aggregate	Aggregate	Diesel	747.597	24646.14	24646.14	0
San Joaquin	2022	LDA	Aggregate	Aggregate	Electricity	6208.84	270760.5	0	270760.5
San Joaquin	2022	LDA	Aggregate	Aggregate	Plug-in Hyb	5008.15	246123.7	128540.8	117582.8
San Joaquin	2022	LDT1	Aggregate	Aggregate	Gasoline	22627.08	734599.7	734599.7	0
San Joaquin	2022	LDT1	Aggregate	Aggregate	Diesel	7.047783	82.54563	82.54563	0
San Joaquin	2022	LDT1	Aggregate	Aggregate	Electricity	15.27984	499.3637	0	499.3637
San Joaquin	2022	LDT1	Aggregate	Aggregate	Plug-in Hyb	7.945735	439.7289	211.0394	228.6895
San Joaquin	2022	LDT2	Aggregate	Aggregate	Gasoline	97154.08	3824225	3824225	0
San Joaquin	2022	LDT2	Aggregate	Aggregate	Diesel	248.8605	10706.82	10706.82	0
San Joaquin	2022	LDT2	Aggregate	Aggregate	Electricity	196.8674	7077.9	0	7077.9
San Joaquin	2022	LDT2	Aggregate	Aggregate	Plug-in Hyb	412.1009	21993.86	10929.04	11064.82
San Joaquin	2022	LHDT1	Aggregate	Aggregate	Gasoline	10032.89	343680.3	343680.3	0
San Joaquin	2022	LHDT1	Aggregate	Aggregate	Diesel	9047.422	317992.1	317992.1	0
San Joaquin	2022	LHDT2	Aggregate	Aggregate	Gasoline	1192.957	41208.17	41208.17	0
San Joaquin	2022	LHDT2	Aggregate	Aggregate	Diesel	3132.379	115997.9	115997.9	0
San Joaquin	2022	MCY	Aggregate	Aggregate	Gasoline	12156.83	65858.41	65858.41	0
San Joaquin	2022	MDV	Aggregate	Aggregate	Gasoline	95564.44	3308854	3308854	0
San Joaquin	2022	MDV	Aggregate	Aggregate	Diesel	1375.555	54411.92	54411.92	0
San Joaquin	2022	MDV	Aggregate	Aggregate	Electricity	207.6079	7423.518	0	7423.518
San Joaquin	2022	MDV	Aggregate	Aggregate	Plug-in Hyb	366.8941	17627.41	9164.472	8462.938
San Joaquin	2022	MH	Aggregate	Aggregate	Gasoline	1600.886	13846.61	13846.61	0
San Joaquin	2022	MH	Aggregate	Aggregate	Diesel	647.0576	5702.865	5702.865	0
San Joaquin	2022	MHDT	Aggregate	Aggregate	Gasoline	579.4901	27135.21	27135.21	0
San Joaquin	2022	MHDT	Aggregate	Aggregate	Diesel	5611.053	266972.4	266972.4	0
San Joaquin	2022	MHDT	Aggregate	Aggregate	Natural Ga	50.50235	2902.472	2902.472	0
San Joaquin	2022	OBUS	Aggregate	Aggregate	Gasoline	190.8864	8510.792	8510.792	0
San Joaquin	2022	OBUS	Aggregate	Aggregate	Diesel	81.54809	5850.547	5850.547	0
San Joaquin	2022	OBUS	Aggregate	Aggregate	Natural Ga	1.737809	106.0977	106.0977	0
San Joaquin	2022	SBUS	Aggregate	Aggregate	Gasoline	125.3894	6800.304	6800.304	0
San Joaquin	2022	SBUS	Aggregate	Aggregate	Diesel	485.9784	11054.11	11054.11	0
San Joaquin	2022	SBUS	Aggregate	Aggregate	Natural Ga	86.52134	2182.36	2182.36	0
San Joaquin	2022	UBUS	Aggregate	Aggregate	Gasoline	48.7687	3674.266	3674.266	0

San Joaquin	2022	UBUS	Aggregate	Aggregate	Diesel	81.19085	5625.256	5625.256	0
San Joaquin	2022	UBUS	Aggregate	Aggregate	Electricity	17.15976	766.3601	0	766.3601
San Joaquin	2022	UBUS	Aggregate	Aggregate	Natural Ga	57.64598	3693.83	3693.83	0

ions, 1000 gallons/day for Fuel Consumption

Trips	Energy Con	NOx_RUN	ENOx_IDLE	XNOx_STRE	XNOx_TOTE	PM2.5_RUN	PM2.5_IDL	PM2.5_STR	PM2.5_TOT
53.07633	0	0.00113	0	9.34E-05	0.001223	5.98E-07	0	1.5E-07	7.48E-07
135865.8	0	2.82473	0.744065	0.381656	3.950451	0.037289	0.000333	0	0.037622
1666.956	0	0.023448	0.002658	0	0.026106	4.96E-05	4.97E-06	0	5.46E-05
1136643	0	0.588829	0	0.368739	0.957569	0.015389	0	0.002638	0.018027
3218.197	0	0.007707	0	0	0.007707	0.000489	0	0	0.000489
31332.77	104535.9	0	0	0	0	0	0	0	0
20708.7	35513.51	0.001008	0	0.002605	0.003613	0.000219	0	5.2E-05	0.000271
97756.5	0	0.162056	0	0.057974	0.22003	0.00193	0	0.000385	0.002315
21.0833	0	0.000136	0	0	0.000136	2.16E-05	0	0	2.16E-05
69.47265	192.7956	0	0	0	0	0	0	0	0
32.85561	69.07105	1.66E-06	0	4.13E-06	5.79E-06	2.29E-07	0	5.32E-08	2.82E-07
449996.7	0	0.421961	0	0.216067	0.638028	0.00621	0	0.001046	0.007256
1177.281	0	0.000853	0	0	0.000853	0.000118	0	0	0.000118
1015.886	2732.654	0	0	0	0	0	0	0	0
1704.037	3341.904	8.57E-05	0	0.000214	0.0003	1.51E-05	0	3.53E-06	1.87E-05
149475.1	0	0.09983	0.000437	0.116647	0.216914	0.00066	0	6.25E-05	0.000722
113805.2	0	0.869758	0.023105	0	0.892863	0.017862	0.000267	0	0.018129
17773.28	0	0.010704	5.13E-05	0.013459	0.024214	7.18E-05	0	6.15E-06	7.8E-05
39401.38	0	0.232022	0.007737	0	0.239759	0.005233	9.15E-05	0	0.005325
24313.66	0	0.049391	0	0.004641	0.054032	0.000135	0	8.69E-05	0.000222
432433.2	0	0.582564	0	0.294134	0.876698	0.005575	0	0.0011	0.006675
6482.028	0	0.00649	0	0	0.00649	0.000468	0	0	0.000468
1069.37	2866.091	0	0	0	0	0	0	0	0
1517.107	2556.06	7.19E-05	0	0.000191	0.000263	1.72E-05	0	4.27E-06	2.15E-05
160.1527	0	0.007167	0	7.25E-05	0.007239	2.55E-05	0	7.12E-08	2.55E-05
64.70576	0	0.032522	0	0	0.032522	0.000836	0	0	0.000836
11594.44	0	0.027144	5.58E-05	0.006032	0.033232	4.8E-05	0	8.84E-06	5.68E-05
68076.61	0	0.515361	0.094789	0.104377	0.714527	0.005824	0.000283	0	0.006107
442.9405	0	0.000277	0.000363	0	0.00064	4.56E-06	1.19E-06	0	5.75E-06
3819.255	0	0.007941	1.36E-05	0.001908	0.009863	8.41E-06	0	1.16E-06	9.57E-06
970.2818	0	0.017193	0.001357	0.001528	0.020078	0.000319	2.01E-06	0	0.000321
15.4665	0	8.93E-06	2.83E-06	0	1.18E-05	1.88E-07	1.03E-08	0	1.98E-07
501.5577	0	0.001609	0.000128	0.000363	0.0021	6.62E-06	0	3.29E-07	6.95E-06
7036.967	0	0.06007	0.013029	0.003453	0.076551	0.000318	1.31E-05	0	0.000331
1252.829	0	0.001112	0.000498	0	0.00161	8.13E-06	1.2E-06	0	9.33E-06
195.0748	0	0.000884	0	0.000209	0.001094	4.83E-06	0	2.16E-07	5.05E-06

324.7634	0	0.003773	0	0	0.003773	3.94E-05	0	0	3.94E-05
68.63904	1335.953	0	0	0	0	0	0	0	0
230.5839	0	0.000317	0	0	0.000317	1.06E-06	0	0	1.06E-06

PM2.5_PM	PM2.5_PM	PM2.5_TOT	PM10_RUN	PM10_IDLE	PM10_STR	PM10_TOT	PM10_PM	PM10_PM	PM10_TOT
3.16E-07	2.41E-06	3.48E-06	6.5E-07	0	1.63E-07	8.13E-07	1.26E-06	6.9E-06	8.97E-06
0.011479	0.035077	0.084178	0.038975	0.000348	0	0.039323	0.045915	0.100221	0.185458
0.000134	0.000696	0.000885	5.4E-05	5.41E-06	0	5.94E-05	0.000538	0.001987	0.002584
0.021702	0.033036	0.072765	0.016737	0	0.002869	0.019606	0.086807	0.09439	0.200803
5.43E-05	8.37E-05	0.000627	0.000511	0	0	0.000511	0.000217	0.000239	0.000967
0.000597	0.000456	0.001053	0	0	0	0	0.002388	0.001302	0.00369
0.000543	0.000389	0.001203	0.000238	0	5.66E-05	0.000295	0.00217	0.001113	0.003578
0.00162	0.00298	0.006914	0.002099	0	0.000419	0.002518	0.006478	0.008514	0.01751
1.82E-07	3.8E-07	2.21E-05	2.26E-05	0	0	2.26E-05	7.28E-07	1.09E-06	2.44E-05
1.1E-06	8.46E-07	1.95E-06	0	0	0	0	4.4E-06	2.42E-06	6.82E-06
9.69E-07	6.97E-07	1.95E-06	2.49E-07	0	5.79E-08	3.07E-07	3.88E-06	1.99E-06	6.18E-06
0.008431	0.014835	0.030522	0.006754	0	0.001137	0.007892	0.033724	0.042387	0.084002
2.36E-05	4.02E-05	0.000182	0.000123	0	0	0.000123	9.44E-05	0.000115	0.000332
1.56E-05	1.19E-05	2.75E-05	0	0	0	0	6.24E-05	3.4E-05	9.64E-05
4.85E-05	3.48E-05	0.000102	1.65E-05	0	3.84E-06	2.03E-05	0.000194	9.95E-05	0.000314
0.000758	0.010342	0.011822	0.000717	0	6.79E-05	0.000785	0.003031	0.02955	0.033366
0.001052	0.009569	0.02875	0.018669	0.000279	0	0.018948	0.004206	0.027341	0.050496
9.08E-05	0.001447	0.001616	7.81E-05	0	6.69E-06	8.48E-05	0.000363	0.004134	0.004582
0.000384	0.004073	0.009781	0.00547	9.56E-05	0	0.005566	0.001534	0.011636	0.018736
7.26E-05	0.000305	0.000599	0.000144	0	9.21E-05	0.000236	0.00029	0.000871	0.001398
0.007295	0.01335	0.027319	0.006063	0	0.001196	0.007259	0.029179	0.038142	0.07458
0.00012	0.000213	0.000802	0.000489	0	0	0.000489	0.00048	0.00061	0.001579
1.64E-05	1.25E-05	2.88E-05	0	0	0	0	6.55E-05	3.56E-05	0.000101
3.89E-05	2.79E-05	8.82E-05	1.87E-05	0	4.64E-06	2.34E-05	0.000155	7.97E-05	0.000259
4.58E-05	0.000241	0.000312	2.77E-05	0	7.74E-08	2.78E-05	0.000183	0.000688	0.000898
2.51E-05	9.87E-05	0.00096	0.000874	0	0	0.000874	0.000101	0.000282	0.001257
8.97E-05	0.000472	0.000618	5.22E-05	0	9.62E-06	6.18E-05	0.000359	0.001347	0.001768
0.000883	0.004643	0.011633	0.006088	0.000296	0	0.006383	0.003531	0.013265	0.02318
9.6E-06	5.11E-05	6.65E-05	4.96E-06	1.29E-06	0	6.25E-06	3.84E-05	0.000146	0.000191
2.81E-05	0.000147	0.000185	9.15E-06	0	1.26E-06	1.04E-05	0.000113	0.000421	0.000544
1.93E-05	0.000132	0.000472	0.000333	2.11E-06	0	0.000335	7.74E-05	0.000377	0.000789
3.51E-07	1.89E-06	2.44E-06	2.04E-07	1.12E-08	0	2.15E-07	1.4E-06	5.4E-06	7.01E-06
1.5E-05	0.000118	0.00014	7.2E-06	0	3.58E-07	7.56E-06	6E-05	0.000337	0.000404
3.66E-05	0.000192	0.000559	0.000332	1.37E-05	0	0.000346	0.000146	0.000547	0.001039
7.22E-06	3.78E-05	5.44E-05	8.84E-06	1.3E-06	0	1.01E-05	2.89E-05	0.000108	0.000147
1.22E-05	0.000156	0.000173	5.25E-06	0	2.35E-07	5.49E-06	4.86E-05	0.000446	0.0005

4.68E-05	0.000239	0.000325	4.12E-05	0	0	4.12E-05	0.000187	0.000682	0.00091
7.51E-06	1.63E-05	2.38E-05	0	0	0	0	3E-05	4.65E-05	7.65E-05
2.03E-05	0.000157	0.000178	1.11E-06	0	0	1.11E-06	8.13E-05	0.000447	0.00053

CO2_RUNE	CO2_IDLEX	CO2_STREX	CO2_TOTEX	CH4_RUNE	CH4_IDLEX	CH4_STREX	CH4_TOTEX	N2O_RUNE	N2O_IDLEX
0.172934	0	0.003184	0.176118	3.71E-05	0	4.29E-09	3.71E-05	2.36E-05	0
2109.865	142.9865	0	2252.852	0.001602	0.002703	0	0.004305	0.33241	0.022528
22.17883	2.16566	0	24.34449	0.036606	0.007027	0	0.043633	0.004521	0.000441
3223.755	0	92.35441	3316.109	0.035178	0	0.103601	0.138779	0.060081	0
6.532885	0	0	6.532885	4.31E-05	0	0	4.31E-05	0.001029	0
0	0	0	0	0	0	0	0	0	0
42.70324	0	1.531221	44.23446	0.000154	0	0.00097	0.001124	0.000187	0
286.4672	0	10.23886	296.7061	0.008635	0	0.015938	0.024573	0.011122	0
0.037756	0	0	0.037756	1.3E-06	0	0	1.3E-06	5.95E-06	0
0	0	0	0	0	0	0	0	0	0
0.070223	0	0.002624	0.072847	2.54E-07	0	1.55E-06	1.8E-06	3.1E-07	0
1560.306	0	46.56645	1606.872	0.017625	0	0.049674	0.067299	0.03249	0
3.805296	0	0	3.805296	1.39E-05	0	0	1.39E-05	0.0006	0
0	0	0	0	0	0	0	0	0	0
3.635167	0	0.147592	3.782759	1.32E-05	0	8.02E-05	9.33E-05	1.6E-05	0
352.5798	1.353049	4.220679	358.1535	0.004611	0.001326	0.00614	0.012077	0.00554	3.34E-05
224.1758	1.367607	0	225.5434	0.003805	5.08E-05	0	0.003856	0.035319	0.000215
46.89249	0.185184	0.509566	47.58724	0.000424	0.000157	0.000702	0.001283	0.000613	3.99E-06
99.36901	0.752737	0	100.1217	0.001153	1.76E-05	0	0.00117	0.015656	0.000119
14.20391	0	1.489284	15.6932	0.015451	0	0.00561	0.021061	0.003222	0
1661.674	0	55.40408	1717.078	0.022776	0	0.064754	0.08753	0.039507	0
25.69583	0	0	25.69583	5.45E-05	0	0	5.45E-05	0.004048	0
0	0	0	0	0	0	0	0	0	0
3.045601	0	0.167196	3.212797	1.1E-05	0	7.09E-05	8.18E-05	1.33E-05	0
29.77011	0	0.005603	29.77572	0.000262	0	6.69E-06	0.000268	0.000427	0
6.786338	0	0	6.786338	4.18E-05	0	0	4.18E-05	0.001069	0
55.04734	0.349687	0.637998	56.03502	0.000923	0.000153	0.000695	0.001771	0.001172	4.03E-06
335.2503	14.18893	0	349.4392	0.000716	8.58E-05	0	0.000802	0.052819	0.002235
3.21862	0.319439	0	3.538059	0.002481	0.000903	0	0.003384	0.000656	6.51E-05
17.13928	0.081464	0.140063	17.3608	0.000218	3.98E-05	0.000169	0.000427	0.000352	1.02E-06
9.174736	0.253002	0	9.427738	3.87E-05	3.94E-06	0	4.26E-05	0.001445	3.99E-05
0.126661	0.002649	0	0.12931	9.97E-05	6.65E-06	0	0.000106	2.58E-05	5.4E-07
5.989861	0.353769	0.030342	6.373973	3.38E-05	0.000349	3.46E-05	0.000417	0.000119	1.29E-05
13.94811	1.24186	0	15.18997	4.39E-05	4.52E-06	0	4.84E-05	0.002198	0.000196
3.011161	0.403543	0	3.414704	0.007561	0.001395	0	0.008956	0.000614	8.23E-05
7.389942	0	0.026504	7.416446	1.59E-05	0	2.97E-05	4.55E-05	8.02E-05	0

7.175739	0	0	7.175739	2.12E-05	0	0	2.12E-05	0.001131	0
0	0	0	0	0	0	0	0	0	0
4.246949	0	0	4.246949	0.010191	0	0	0.010191	0.000866	0

N2O_STREX	N2O_TOTE	ROG_RUNE	ROG_IDLEX	ROG_STREX	ROG_TOTE	ROG_DIUR	ROG_HOTS	ROG_RUNL	ROG_TOTA
1.71E-06	2.53E-05	0.000247	0	2.33E-08	0.000247	3.65E-05	9.98E-06	8.96E-05	0.000383
0	0.354938	0.034493	0.058195	0	0.092688	0	0	0	0.092688
0	0.004963	0.001311	0.000122	0	0.001433	0	0	0	0.001433
0.044617	0.104697	0.138583	0	0.488486	0.627069	0.465804	0.130698	0.335273	1.558844
0	0.001029	0.000928	0	0	0.000928	0	0	0	0.000928
0	0	0	0	0	0	0	0	0	0
0.000484	0.000671	0.000481	0	0.003889	0.00437	0.002794	0.000951	0.00083	0.008944
0.004952	0.016074	0.039525	0	0.087489	0.127014	0.104909	0.026623	0.08139	0.339935
0	5.95E-06	2.79E-05	0	0	2.79E-05	0	0	0	2.79E-05
0	0	0	0	0	0	0	0	0	0
7.74E-07	1.08E-06	7.89E-07	0	6.17E-06	6.96E-06	2.8E-06	9.22E-07	8.48E-07	1.15E-05
0.021108	0.053598	0.072021	0	0.240442	0.312464	0.193089	0.051779	0.140947	0.698278
0	0.0006	0.000299	0	0	0.000299	0	0	0	0.000299
0	0	0	0	0	0	0	0	0	0
4.01E-05	5.62E-05	4.09E-05	0	0.00032	0.000361	0.000162	5.12E-05	4.84E-05	0.000623
0.008721	0.014295	0.023392	0.005007	0.031153	0.059552	0.037502	0.009565	0.051396	0.158015
0	0.035534	0.081924	0.001095	0	0.083018	0	0	0	0.083018
0.001021	0.001637	0.002038	0.000588	0.003524	0.00615	0.004022	0.001025	0.005361	0.016558
0	0.015774	0.024816	0.000379	0	0.025195	0	0	0	0.025195
0.000267	0.003489	0.107024	0	0.042786	0.14981	0.068286	0.096579	0.102869	0.417544
0.023759	0.063266	0.099864	0	0.343818	0.443682	0.236436	0.062043	0.175847	0.918008
0	0.004048	0.001173	0	0	0.001173	0	0	0	0.001173
0	0	0	0	0	0	0	0	0	0
3.52E-05	4.85E-05	3.43E-05	0	0.000285	0.000319	0.000176	5.38E-05	5.31E-05	0.000603
7.49E-06	0.000435	0.001162	0	2.86E-05	0.001191	0.00887	0.002315	5.27E-05	0.012428
0	0.001069	0.000901	0	0	0.000901	0	0	0	0.000901
0.00039	0.001567	0.004805	0.000636	0.004134	0.009575	0.002977	0.000723	0.006078	0.019353
0	0.055054	0.015411	0.001848	0	0.017259	0	0	0	0.017259
0	0.000721	3.54E-05	1.29E-05	0	4.83E-05	0	0	0	4.83E-05
0.000131	0.000484	0.001079	0.000156	0.000926	0.002161	0.000745	0.000176	0.000782	0.003864
0	0.001485	0.000832	8.48E-05	0	0.000917	0	0	0	0.000917
0	2.64E-05	1.42E-06	9.5E-08	0	1.52E-06	0	0	0	1.52E-06
3.62E-05	0.000168	0.000155	0.001471	0.000189	0.001815	0.000138	3.69E-05	7.79E-05	0.002069
0	0.002393	0.000945	9.73E-05	0	0.001042	0	0	0	0.001042
0	0.000696	0.000108	1.99E-05	0	0.000128	0	0	0	0.000128
1.9E-05	9.93E-05	5.22E-05	0	0.000126	0.000178	2.86E-05	7.55E-06	2.02E-05	0.000234

0	0.001131	0.000456	0	0	0.000456	0	0	0	0.000456
0	0	0	0	0	0	0	0	0	0
0	0.000866	0.000149	0	0	0.000149	0	0	0	0.000149

TOG_RUNE	TOG_IDLEX	TOG_STREX	TOG_TOTE	TOG_DIURN	TOG_HOTS	TOG_RUNL	TOG_TOTA	CO_RUNEX	CO_IDLEX
0.000361	0	2.55E-08	0.000361	3.65E-05	9.98E-06	8.96E-05	0.000497	0.015141	0
0.039267	0.066251	0	0.105518	0	0	0	0.105518	0.139167	0.817585
0.038256	0.007196	0	0.045452	0	0	0	0.045452	0.188776	0.014959
0.202171	0	0.534828	0.736999	0.465804	0.130698	0.335273	1.668774	10.28002	0
0.001056	0	0	0.001056	0	0	0	0.001056	0.011462	0
0	0	0	0	0	0	0	0	0	0
0.000702	0	0.004258	0.00496	0.002794	0.000951	0.00083	0.009534	0.071803	0
0.057643	0	0.095789	0.153431	0.104909	0.026623	0.08139	0.366353	1.799589	0
3.18E-05	0	0	3.18E-05	0	0	0	3.18E-05	0.000158	0
0	0	0	0	0	0	0	0	0	0
1.15E-06	0	6.76E-06	7.91E-06	2.8E-06	9.22E-07	8.48E-07	1.25E-05	0.000118	0
0.105072	0	0.263253	0.368326	0.193089	0.051779	0.140947	0.75414	4.833406	0
0.000341	0	0	0.000341	0	0	0	0.000341	0.002312	0
0	0	0	0	0	0	0	0	0	0
5.97E-05	0	0.00035	0.00041	0.000162	5.12E-05	4.84E-05	0.000672	0.006128	0
0.034134	0.007306	0.034109	0.075549	0.037502	0.009565	0.051396	0.174011	0.533829	0.041451
0.093265	0.001246	0	0.094511	0	0	0	0.094511	0.240618	0.009073
0.002974	0.000858	0.003858	0.00769	0.004022	0.001025	0.005361	0.018098	0.052132	0.004935
0.028252	0.000431	0	0.028683	0	0	0	0.028683	0.068022	0.003141
0.126337	0	0.046494	0.172831	0.068286	0.096579	0.102869	0.440565	1.161449	0
0.145565	0	0.376434	0.521999	0.236436	0.062043	0.175847	0.996325	5.269539	0
0.001335	0	0	0.001335	0	0	0	0.001335	0.019101	0
0	0	0	0	0	0	0	0	0	0
5E-05	0	0.000312	0.000362	0.000176	5.38E-05	5.31E-05	0.000645	0.005125	0
0.001696	0	3.13E-05	0.001728	0.00887	0.002315	5.27E-05	0.012964	0.028346	0
0.001025	0	0	0.001025	0	0	0	0.001025	0.003106	0
0.007012	0.000928	0.004526	0.012466	0.002977	0.000723	0.006078	0.022244	0.104789	0.00953
0.017544	0.002104	0	0.019648	0	0	0	0.019648	0.048707	0.043299
0.002532	0.000922	0	0.003453	0	0	0	0.003453	0.00941	0.002331
0.001575	0.000228	0.001014	0.002816	0.000745	0.000176	0.000782	0.004519	0.024402	0.001209
0.000947	9.66E-05	0	0.001044	0	0	0	0.001044	0.002359	0.001206
0.000102	6.79E-06	0	0.000109	0	0	0	0.000109	0.0004	2.05E-05
0.000227	0.002146	0.000207	0.00258	0.000138	3.69E-05	7.79E-05	0.002833	0.003653	0.011367
0.001076	0.000111	0	0.001187	0	0	0	0.001187	0.002775	0.002128
0.007716	0.001424	0	0.00914	0	0	0	0.00914	0.024698	0.00224
7.62E-05	0	0.000138	0.000214	2.86E-05	7.55E-06	2.02E-05	0.00027	0.001131	0

0.000519	0	0	0.000519	0	0	0	0.000519	0.000522	0
0	0	0	0	0	0	0	0	0	0
0.010404	0	0	0.010404	0	0	0	0.010404	0.104657	0

CO_STREX	CO_TOTEX	SOx_RUNE	SOx_IDLEX	SOx_STREX	SOx_TOTEX	NH3_RUNE	Fuel Consumption
0.000206	0.015347	1.71E-06	0	3.15E-08	1.74E-06	1.81E-06	0.018571
0	0.956752	0.019979	0.001354	0	0.021333	0.270553	201.2464
0	0.203735	0	0	0	0	0.013043	2.813852
4.642904	14.92292	0.03187	0	0.000913	0.032783	0.353619	349.6796
0	0.011462	6.19E-05	0	0	6.19E-05	8.42E-05	0.58358
0	0	0	0	0	0	0	0
0.029902	0.101705	0.000422	0	1.51E-05	0.000437	0.005328	4.664469
0.820987	2.620577	0.002832	0	0.000101	0.002933	0.029988	31.28729
0	0.000158	3.58E-07	0	0	3.58E-07	2.82E-07	0.003373
0	0	0	0	0	0	0	0
4.74E-05	0.000166	6.94E-07	0	2.59E-08	7.2E-07	9.77E-06	0.007682
2.220176	7.053583	0.015425	0	0.00046	0.015886	0.146162	169.4427
0	0.002312	3.61E-05	0	0	3.61E-05	3.66E-05	0.339926
0	0	0	0	0	0	0	0
0.002461	0.008588	3.59E-05	0	1.46E-06	3.74E-05	0.000505	0.398887
0.479542	1.054821	0.003486	1.34E-05	4.17E-05	0.003541	0.016984	37.76684
0	0.249691	0.002124	1.3E-05	0	0.002137	0.049512	20.1477
0.059163	0.116229	0.000464	1.83E-06	5.04E-06	0.00047	0.002042	5.018015
0	0.071163	0.000942	7.13E-06	0	0.000949	0.02097	8.943836
0.226327	1.387776	0.00014	0	1.47E-05	0.000155	0.000618	1.654828
2.460974	7.730513	0.016427	0	0.000548	0.016975	0.121677	181.0637
0	0.019101	0.000243	0	0	0.000243	0.000186	2.295398
0	0	0	0	0	0	0	0
0.002191	0.007315	3.01E-05	0	1.65E-06	3.18E-05	0.000424	0.338785
0.000626	0.028972	0.000294	0	5.54E-08	0.000294	0.000683	3.139812
0	0.003106	6.43E-05	0	0	6.43E-05	0.00075	0.606221
0.093168	0.207487	0.000544	3.46E-06	6.31E-06	0.000554	0.001341	5.908823
0	0.092006	0.003175	0.000134	0	0.003309	0.056777	31.21526
0	0.011741	0	0	0	0	0.003391	0.408946
0.019588	0.045199	0.000169	8.05E-07	1.38E-06	0.000172	0.000422	1.830675
0	0.003566	8.69E-05	2.4E-06	0	8.93E-05	0.001241	0.842176
0	0.000421	0	0	0	0	0.000124	0.014946
0.004868	0.019888	5.92E-05	3.5E-06	3E-07	6.3E-05	0.000337	0.672127
0	0.004903	0.000132	1.18E-05	0	0.000144	0.001491	1.356914
0	0.026938	0	0	0	0	0.00255	0.394688
0.002234	0.003366	7.31E-05	0	2.62E-07	7.33E-05	0.000182	0.782055

0	0.000522	6.8E-05	0	0	6.8E-05	0.001158	0.641006
0	0	0	0	0	0	0	0
0	0.104657	0	0	0	0	0.00395	0.490883

California Department of Parks and Recreation
Carnegie State Vehicular Recreation Area
Resource Management Area Program EIR

Appendix E: Special-Status Species List
Carnegie SVRA 2024 General Plan Update

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Table 2-9. Special-Status Plant Species Documented in and Near the Planning Area – Species Within the Planning Area

Species	California Rare Plant Rank*	Comments
Forked hareleaf *Lagophylla dichotoma*	1.B.1	The woodland communities and grasslands provide potentially suitable habitat for this species. It was observed in the planning area in 2003, but specific locations were not recorded because the species was not listed in the CRPR system at that time. Taxonomic changes made since the surveys in 2003 indicate the species identified in the planning area may actually be *L. diabloensis*, a CRPR 1B.2 species.
Chaparral harebell *Campanula exigua*	1B.2	This species grows in rocky places in chaparral, usually in serpentinite soils. Suitable habitat may be present in rocky outcrops within the planning area. The fire-prone chaparral hillsides within the planning area provide suitable habitat for this species. It was observed within the black sage – bush mallow vegetation community during the 2016 surveys. This area had burned during the August 2015 Tesla fire.
Hospital Canyon larkspur *Delphinium californicum* ssp. *interius*	1.B.2	Openings in the scrub communities and moist areas in the woodland communities provide potentially suitable habitat for this species. It has been documented at six locations in the planning area, including two locations initially identified by Ecosystems West in 2003. The species was observed at one of these locations in 2014, but there were fewer plants occupying a much smaller area than recorded in 2003. This species was found at four additional locations in 2014.
Stinkbells *Fritillaria agrestis*	4.2	The scrub and woodland communities and the grasslands provide potentially suitable habitat for this species. It has been observed in the southwestern portion of the planning area within the blue oak woodland vegetation community. This species was not found during plant surveys conducted in 2003 (Ecosystems West 2004); however, an undescribed fritillary species was found. AECOM and TRA Environmental Sciences observed fritillary plants in areas where Ecosystems West had observed the undescribed fritillary; however, all of the fritillary plants present had aborted their flower buds and could not be positively identified. This species was positively identified during surveys conducted in 2016 (MIG 2016).
Sylvan scorzonella *Microseris sylvatica*	4.2	The woodland and scrub communities and grasslands provide potentially suitable habitat for this species. It has been documented in the planning area (State Parks 2000) This species was not found during plant surveys conducted in 2003 (Ecosystems West 2004) but was found during plant surveys in 2016 (MIG 2016).
Jepson's woolly sunflower *Eriophyllum jepsonii*	4.3	The scrub and woodland communities provide potentially suitable habitat for this species, which has been observed in many locations throughout the planning area, the most recent recorded observations made during the 2016 surveys (MIG 2016).
Fritillary *Fritillaria* sp.	None	Fritillary plants that do not correspond to any known species in California were observed in two locations in 2003. These plants do not have a state or federal status, but they may be a variant of stinkbells or an undescribed species. AECOM and TRA Environmental Sciences observed fritillary plants in areas where Ecosystems West had observed the undescribed fritillary; however, all of the fritillary plants present had aborted their flower buds and could not be positively identified.

Notes:
* California Rare Plant Rank (CRPR) definitions:
   1.B.1: Rare, threatened, or endangered in California and elsewhere, and seriously endangered in California
   1.B.2: Rare, threatened, or endangered in California and elsewhere, and fairly endangered in California
   1.B.3: Rare, threatened, or endangered in California and elsewhere, but not very endangered in California
   4.2: Uncommon and fairly endangered in California
   4.3: Uncommon but not very endangered in California

Table 2-10. Special-Status Plant Species Documented in and Near the Planning Area–Species Documented Within 5 Miles of the Planning Area

Species	California Rare Plant Rank*	Comments
Large-flowered fiddleneck *Amsinckia grandiflora*	1.B.1	This species is federally and state listed as endangered. The woodland communities and grassland provide potentially suitable habitat.
Big tarplant *Blepharizonia plumosa*	1.B.1	This species is also a focal species in the *East Alameda County Conservation Strategy*. The grasslands provide potentially suitable habitat for this species, which was identified at 12 locations, west of the planning area, during surveys conducted in 2003 (Ecosystems West 2004) and in 2016 (MIG 2016).
Round-leaved filaree *California macrophyllum*	1.B.1	The woodland communities and grasslands provide potentially suitable habitat for this species. It has been documented in two specific locations within the planning area (Ecosystems West 2004), and there is a record with vague location information in the vicinity of the planning area. The two specific locations where this plant was previously recorded were revisited during separate surveys by AECOM and TRA Environmental Sciences in 2014 and this species was not relocated.
Diamond-petaled California poppy *Eschscholzia rhombipetala*	1.B.1	Alkaline clay soils in the grasslands provide potentially suitable habitat for this species. This species was observed north of Tesla Road in the vicinity of the planning area (CNDDB 2022).
Loma Prieta hoita *Hoita strobilina*	1.B.1	The woodland communities in the planning area provide potentially suitable habitat for this species, which is usually found in serpentinite soils in mesic areas. Soils of the Franciscan complex in the southern portion of the planning area may contain minor serpentine inclusions. There is record of this species being within 5 miles of the planning area.
Showy golden madia *Madia radiata*	1.B.1	The woodland communities and grasslands provide potentially suitable habitat for this species.
Caper-fruited tropidocarpum *Tropidocarpum capparideum*	1.B.1	Two records exist of this species with vague location information indicating they may be within 5 miles of the planning area, but the species is believed to have been extirpated from Alameda and San Joaquin Counties.
Alkali milk-vetch *Astragalus tener* var. *tener*	1.B.2	Potentially suitable clay soils are present in the grasslands within the planning area.
San Joaquin spearscale *Atriplex joaquinana*	1.B.2	This species is also a focal species in the *East Alameda County Conservation Strategy*. Alkaline soils in the grasslands provide potentially suitable habitat for this species.
Big-scale balsamroot *Balsamorhiza macrolepis*	1.B.2	The scrub and woodland communities and grassland provide potentially suitable habitat for this species.
Lemmon's jewelflower *Caulanthus lemmonii*	1.B.2	The California juniper woodland and grasslands provide potentially suitable habitat for this species. A record exists of this species with vague information about a location in the vicinity of the planning area.
Mt. Hamilton fountain thistle *Cirsium fontinale* var. *campylon*	1.B.2	This species is found in serpentine seeps in chaparral, cismontane woodland, and annual grasslands. No serpentine seeps are present in the planning area.

Species	California Rare Plant Rank*	Comments
Talus fritillary *Fritillaria falcata*	1.B.2	This species is found in serpentinite soils, usually talus, in chaparral, cismontane woodland, and lower montane coniferous forest. Suitable serpentine habitat may be present, as serpentine indicator species have been found in the planning area and soils of the Franciscan complex in the southern portion of the planning area may contain minor serpentine inclusions.
Diablo helianthella *Helianthella castanea*	1.B.2	This species is found in rocky soils in a variety of upland habitat types, but most often in chaparral–oak woodland interface. Woodland and grassland communities provide potentially suitable habitat.
Brewer's western flax *Hesperolinon breweri*	1.B.2	This species is found in chaparral, cismontane woodland, and annual grasslands, usually on serpentine soils. This species was found near the planning area (Alameda-Tesla property) at one location in the planning area in 2014. This find represents a range extension for this species, which was previously known only from Napa, Solano, and Contra Costa Counties.
Shining navarretia *Navarretia nigelliformis* ssp. *radians*	1.B.2	The woodland communities and grasslands provide potentially suitable habitat for this species.
Sharsmith's onion *Allium sharsmithiae*	1.B.3	This species grows in serpentinite soils in chaparral and cismontane woodland. Suitable serpentine habitat may be present, as serpentine indicator species have been found in the planning area, and soils of the Franciscan complex in the southern portion of the planning area may contain minor serpentine inclusions.
Tehama County western flax *Hesperolinon tehamense*	1.B.3	This species grows in serpentinite soils in chaparral and cismontane woodland. Suitable serpentine habitat may be present, as serpentine indicator species have been found in the planning area and soils of the Franciscan complex in the southern portion of the planning area may contain minor serpentine inclusions.
Chaparral ragwort *Senecio aphanactis*	2.2	The scrub and woodland communities provide potentially suitable habitat for this species, which has been documented in two locations in the Alameda-Tesla property, adjacent to the planning area. Seven colonies of chaparral ragwort were found in these two locations in 2003 (Ecosystems West 2004). These locations were visited in 2014 by AECOM and TRA Environmental Sciences botanists and the species was not found. A reference population outside the planning area was visited and the species was not found. It is assumed that the species did not survive to bloom in 2014 because of poor climatic conditions. Before its regional discovery in 1998, the last record of this species in Northern California was a 1933 herbarium record from Nortonville Hills near Antioch (State Parks 2000). An additional occurrence was found in Alameda County in 2003 (Coyote Hills Regional Park).
Santa Clara thorn-mint *Acanthomintha lanceolata*	4.2	The scrub and woodland communities provide potentially suitable habitat for this species, which has been documented in three locations in the vicinity of the planning area during 2016 surveys (MIG 2016).
California androsace *Androsace elongata* ssp. *acuta*	4.2	The scrub and woodland communities and the grasslands provide potentially suitable habitat for this species, which has been documented in four locations in the vicinity of the planning area (MIG 2016).

Species	California Rare Plant Rank*	Comments
Carlotta Hall's lace fern *Aspidotis carlotta-halliae*	4.2	This species grows in chaparral and cismontane woodlands, generally in serpentinite soils. Suitable serpentine habitat may be present, as serpentine indicator species have been found in the planning area and soils of the Franciscan complex in the southern portion of the planning area may contain minor serpentine inclusions. This species has not been identified during any surveys or database searches within or near the planning area. Additionally, this species is generally restricted to Marin and Santa Clara Counties.
Phlox-leave serpentine bedstraw *Galium andrewsii* ssp. *gatense*	4.2	This species grows in chaparral and cismontane woodlands, generally in rocky and serpentinite soils. This species was observed in the vicinity of the planning area during the 2016 surveys (MIG 2016).
Michael's rein orchid *Piperia michaelii*	4.2	This species grows in chaparral and cismontane woodlands and was found growing along Corral Hollow Creek, in the vicinity of the planning area during the 2016 surveys (MIG 2016).
Santa Clara red ribbons *Clarkia concinna* ssp. *automixa*	4.3	The scrub and woodland communities provide potentially suitable habitat for this species. There is record of this species being within 5 miles of the planning area.

Notes:

* California Rare Plant Rank (CRPR) definitions:

 1.B.1: Rare, threatened, or endangered in California and elsewhere, and seriously endangered in California

 1.B.2: Rare, threatened, or endangered in California and elsewhere, and fairly endangered in California

 1.B.3: Rare, threatened, or endangered in California and elsewhere, but not very endangered in California

 4.2: Uncommon and fairly endangered in California

 4.3: Uncommon but not very endangered in California

Additional CRPR species have been documented in the 12-quadrangle search area but are not known to occur within 5 miles of the planning area. Although potentially suitable habitat is present for these species in the planning area, they are considered to have low potential to occur because they have not been found in the planning area during previous floristic surveys and known occurrences are located many miles away. These species are:

- Carlotta Hall's lace fern (*Aspidotis carlotta-halliae*)
- heartscale (*Atriplex cordulata* var. *cordulata*)
- brittlescale (*Atriplex depressa*)
- lesser saltscale (*Atriplex minuscula*)
- big-scale balsamroot (*Balsamorhiza macrolepis*)
- Mt. Diablo fairy-lantern (*Calochortus pulchellus*)
- Oakland star-tulip (*Calochortus umbellatus*)
- Congdon's tarplant (*Centromadia parryi* ssp. *congdonii*)
- dwarf soaproot (Chlorogalum pomeridianum var. *minus*)
- hispid salty bird's-beak (*Chloropyron molle* ssp. *hispidum*)
- palmate-bracted bird's-beak (*Chloropyron palmatum*)
- Brewer's clarkia (*Clarkia breweri*)
- small-flowered morning-glory (*Convolvulus simulans*)
- Recurved larkspur (*Delphinium recurvatum*)
- bay buckwheat (*Eriogonum umbellatum* var. *bahiiforme*)
- San Joaquin spearscale (*Extriplex joaquinana*)
- Diablo helianthella (*Helianthella castanea*)
- serpentine leptosiphon (*Leptosiphon ambiguus*)
- large-flowered leptosiphon (*Leptosiphon grandiflorus*)
- Mt. Hamilton coreopsis (*Leptosyne hamiltonii*)
- spring lessingia (*Lessingia tenuis*)
- Mt. Diablo cottonweed (*Micropus amphibolus*)

Special-Status Wildlife

The determination of which special-status wildlife species have the potential to occur in the planning area is based on:

- vegetation communities present on the site,
- USFWS species lists for Alameda and San Joaquin Counties,
- observations of special-status wildlife species from park personnel and ongoing monitoring activities, and
- studies conducted in the planning area and on adjacent parcels of land with similar habitat types.

A complete list of sources used for this analysis was provided previously in the introduction to the "Biotic Resources" section.

Twenty-six special-status wildlife species have been observed or are assumed present in the planning area based on the habitats present in the planning area, the area's location relative to the species' known occurrence range, and previous surveys or assessments performed there (Table 2-11). Figure 2-16 shows the distribution of CNDDB records of special-status wildlife occurrences documented within 5 miles of the planning area. Figure 2-17 shows the detections of special-status bird, reptile, and amphibian species made during HMS surveys conducted by State Parks. (Not all observations of special-status species made in the planning area have been reported to the CNDDB and specific location information is not available for all observations. Therefore, not all special-status species reported in the planning area are reflected in the species occurrence figures.)

Table 2-11. Special-Status Wildlife Species Observed or Assumed to Be Present in the Planning Area–Invertebrates

Species	Status*	Comments
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	FT	This species may occur in portions of the planning area where elderberry (*Sambucus* sp.) shrubs are present. Elderberry shrubs have been documented within Corral Hollow Floodplain, Franciscan Loop West, and Kiln Canyon (State Parks 2005b; 2021). Potential valley elderberry longhorn beetle exit holes were observed within numerous elderberry shrubs along Franciscan Loop West and Kiln Canyon Road.

* Status:
   FT = federally listed as threatened

Table 2-12. Special-Status Wildlife Species Observed or Assumed to Be Present in the Planning Area–Reptiles and Amphibians

Species	Status*	Comments
Alameda whipsnake *Coluber lateralis euryxanthus*	FT, CT	This species is found in coastal scrub, chaparral, and grassland habitats. It is known to occur in western San Joaquin County, southern Alameda County, and northern Santa Clara County. The planning area is within designated critical habitat for the species. A whipsnake determined to be a hybrid of chaparral whipsnake and Alameda whipsnake was observed at Carnegie SVRA in 2007 (State Parks n.d.[c]). Whipsnake observations were made in 2013 and 2014, but the species could not be positively identified during either of these sightings. It is assumed that Alameda whipsnake could occur in the planning area.
California glossy snake *Arizona elegans occidentalis*	CSC	This species is found in chaparral, sage-scrub, and alluvial soils. This species was observed along Tesla Road, adjacent to the planning area (Vollmar 2023).

Species	Status*	Comments
California red-legged frog *Rana draytonii*	FT, CSC	The ponds and backwaters of drainages such as Corral Hollow Creek provide potential habitat for this species. California red-legged frogs typically require water bodies with at least 22 weeks of water for breeding. Therefore, not all water features in the planning area provide suitable habitat for the species. Surveys conducted in 2018 documented California red-legged frog within Lime Kiln Pond in the southern portion of the planning area (State Parks 2019a). The planning area is within designated critical habitat for this species.
California tiger salamander - central California DPS *Ambystoma californiense* pop. 1	FT, CT	California tiger salamanders in the planning area are considered part of the Central Valley distinct population segment. This species utilizes vernal pools and other seasonal wetlands for breeding and upland grasslands during the dry season. California tiger salamanders have been documented in Lower Juniper Pond within the planning area and several additional ponds just outside of the planning area (State Parks 2015a; 2019).
Coast horned lizard *Phrynosoma blainvillii*	CSC	This species is found throughout California west of the Sierra Nevada, with the exception of extreme northwest, in a variety of scrub and grassland habitats. California horned lizard has been incidentally observed in the planning area (State Parks 2015a).
Foothill yellow-legged frog – central coast DPS *Rana boylii* pop. 4	CE; petitioned for listing under ESA. USFWS has determined that listing may be warranted	Streams and creeks in the planning area provide potential habitat for this species. Surveys for foothill yellow-legged frogs have documented occurrences of frogs in Corral Hollow Creek in the vicinity of the planning area the in 2000 (State Parks 2000, n.d.[f]. Vollmar 2023). This species was not observed during 2018 surveys but is likely that they are still present within the planning area (State Parks 2019a).
San Joaquin whipsnake *Coluber flagellum ruddocki*	CSC	The species is found in scrubland, woodland, and grassland habitats throughout California, and this subspecies is found in California from the Sacramento Valley south to the Grapevine area. This species has been observed in the planning area (State Parks 2015a).
Silvery legless lizard *Anniella pulchra*	CSC	This subspecies is found from the central portion of California west to the coast. Its habitat is typically sandy soils in chaparral, pine-oak woodland, and riparian habitats. This species has not been documented to occur in the planning area. However, the planning area contains suitable habitat for this species.
Western pond turtle *Actinemys marmorata*	CSC petitioned for listing under ESA	Perennial ponds in and near the planning area provide potential habitat for this species. Western pond turtles have been documented to occur in Kiln Canyon Basin. This species was observed within the Tesla Stock Pond adjacent to the planning area but was not observed within the planning area. A record of this species is located north of Tesla Road near the planning area (Vollmar 2023).
Western spadefoot *Spea hammondii*	CSC; petitioned for listing under ESA. USFWS has determined that listing may be warranted	Seasonal pools in the planning area provide potential breeding habitat for this species and annual grassland habitats provide potential upland refugia in the planning area. This species was observed at Tyson's Pond during 2018 surveys. While there was no evidence of breeding at this location, Tyson's Pond is the only pond within the planning area that retains water long enough to support breeding (State Parks 2019a). There are multiple records of this species along Corral Hollow Creek floodplain within and adjacent to the planning area. The nearest CNDDB Occurrence number is #152.

Notes: ESA = federal Endangered Species Act; HMS = Habitat Monitoring System; USFWS = U.S. Fish and Wildlife Service
* Statuses:
CSC = California species of special concern (California Department of Fish and Wildlife [CDFW])
CT = state-listed as threatened
CE = state-listed as endangered
FE = federally listed as endangered
FT = federally listed as threatened

Table 2-13. Special-Status Wildlife Species Observed or Assumed to Be Present in the Planning Area–Birds

Species	Status*	Comments
Burrowing owl *Athene cunicularia*	CSC (breeding sites and some wintering sites)	Annual grassland habitats in the planning area could potentially support burrowing owls. A burrowing owl was observed adjacent to the planning area during reconnaissance surveys within the Alameda-Tesla property. Burrowing owls have also been observed on the adjacent LLNL Site 300.
California horned lark *Eremophila alpestris actia*	CSC	This species occurs in annual grassland and open woodland habitats throughout the Central Valley. Horned larks are known to occur in the planning area (State Parks 2015a).
Ferruginous hawk *Buteo regalis*	W	Ferruginous hawks winter in California. In the planning area, this species has been observed foraging in grassland areas during HMS surveys in 2006 (State Parks n.d.[b]). This species was not observed within HMS surveys conducted in 2011 through 2014 (State Parks 2015a).
Golden eagle *Aquila chrysaetos*	BE, CFT (nesting and wintering)	This species forages in open grassland habitats and nests in large trees, snags, and transmission towers. The species is relatively common in the Alameda-Tesla property adjacent to the planning area, where it is known to nest (State Parks n.d.[f]) and is frequently detected during HMS annual monitoring surveys. Golden eagle pairs have been documented foraging and nesting in the vicinity of Carnegie SVRA for several years. In 2023, a nest pair was observed incubating in an alternative nest site near the planning area, about 0.3 miles south of their typical nest within the transmission tower (Hunt 2002; Hunt and Hunt 2006, 2013).
Grasshopper sparrow *Ammodramus savannarum*	CSC (nesting)	This species is generally associated with open grassland habitats containing patches of bare ground. It nests on the ground. Grasshopper sparrow was detected in the planning area during HMS surveys in 2012, and it could nest in the planning area.
Loggerhead shrike *Lanius ludovicianus*	CSC (nesting)	This species occurs in annual grassland and open woodland habitats. Loggerhead shrikes are regularly detected on HMS survey transects throughout the planning area.
Northern harrier *Circus cyaneus*	CSC (nesting)	Annual grassland habitats in the planning area are suitable foraging and nesting habitat for this species. This species is known to occur in the vicinity of the planning area (State Parks 2005a; State Parks 2015a).
Olive-sided flycatcher *Contopus cooperi*	CSC (nesting)	This species breeds primarily in late-successional coniferous forests and forages mostly in openings or at forest edges. Olive-sided flycatcher was observed in the planning area during HMS surveys in 2011, but the planning area does not contain the species' preferred breeding habitat, so it is not expected to nest in the planning area.
Swainson's hawk *Buteo swainsoni*	CT	This species requires large, open grasslands with suitable nest trees; nests in oaks or cottonwoods in or near riparian habitats; forages in grasslands, lightly grazed pastures/crops, irrigated pastures, and grain fields. This species has been documented nesting more than 7 miles northeast of planning area (CNDDB 2022). Riparian areas where large trees exist in the planning area could provide habitat.
Tricolored blackbird *Agelaius tricolor*	CT	This species is found in freshwater marsh and other emergent wetland habitats. It forages in open grasslands and agricultural areas. Suitable nesting habitat for this species occurs along Corral Hollow Creek, and this species has been observed within the planning area, but specific location information was not recorded.

Species	Status*	Comments
White-tailed kite *Elanus leucurus*	CSC, CFT (nesting)	This species forages in open grassland habitats and nests on the edges of riparian habitats and open woodlands. This species has been documented in the planning area during HMS surveys in 2011.
Yellow warbler *Setophaga petechia*	CSC	This species occurs in riparian habitat close to water in streams or wet meadows. Yellow warbler was observed during HMS surveys in 2010, 2011, 2013, and 2014, and it could nest in riparian habitat in the planning area.

Notes: HMS = Habitat Monitoring System

* Statuses:

  BE = protected by Bald Eagle and Golden Eagle Protection Act

  CFT = California fully protected species

  CSC = California species of special concern (California Department of Fish and Wildlife [CDFW])

  CT = state-listed as threatened

  W = CDFW watch list

Some of the stock ponds in the planning area support special-status species, namely western pond turtle, western spadefoot, California red-legged frog, and California tiger salamander. These species have persisted at Carnegie SVRA despite ongoing OHV activity. However, because of their status, specific management actions may be required in some areas of the planning area known to support special-status species.

Elderberry shrubs are present at the SVRA. Elderberry shrubs with branches greater than 1 inch in diameter are considered potential habitat for the valley elderberry longhorn beetle, an invertebrate that is federally listed as threatened. Surveys conducted in 2021 found potential valley elderberry longhorn beetle exit holes in elderberry shrubs in Franciscan Loop West and along Kiln Canyon Road.

HMS surveys identified various mammals including Yuma myotis, fringed myotis, and hoary bat within the Alameda-Tesla property adjacent to the planning area. While these species could be found within the planning area, they are not considered in Table 2-14 as they do not meet the requirements of "special status species" as defined in the introduction of Section 2.3.2.3

Table 2-14. Special-Status Wildlife Species Observed or Assumed to Be Present in the Vicinity of Planning Area–Mammals

Species	Status*	Comments
American badger *Taxidea taxa*	CSC	This species is found in a variety of grassland and shrubland habitats. This species has been observed in the planning area during ongoing monitoring by State Parks as part of the HMS (State Parks n.d.[c]).
Pallid bat *Antrozous pallidus*	CSC	This species occurs throughout California in a variety of desert scrub, grassland, and coniferous forest habitats. Suitable roosting habitat exists in the Tesla Coal Mine and Lime Kiln Cave in the vicinity of the planning area and possibly in rock outcroppings throughout the planning area. This species was detected at Tyson's Pond and Lime Kiln Cave during summer 2014 and acoustic surveys conducted in 2016 (de Silva, pers. comm. 2014; MIG 2016).
San Joaquin kit fox *Vulpes macrotis mutica*	FE, CT	This species' range extends from the southern San Joaquin Valley near Bakersfield north to Alameda County. In the planning area, it could potentially occur within grassland habitats. San Joaquin kit foxes have been documented in the planning area in 2002 (CNDDB 2022) and USFWS expects that this species is present at least periodically (USFWS 2022).

Species	Status*	Comments
San Joaquin pocket mouse *Perognathus inornatus*	BLM	This species occurs in open grassland in the Central Valley and extending into the Salinas Valley. The San Joaquin pocket mouse has been documented in the planning area during small mammal trapping as part of the HMS and studies conducted by State Parks in 2020 (State Parks n.d.[c]; 2020).
Townsend's big-eared bat *Corynorhinus townsendii*	CSC	This species occurs in a variety of habitats in California including desert scrub, riparian areas, grasslands, and coniferous forests. Bat-specific acoustic surveys conducted in 2016 did not detect this species anywhere within the planning area. Historically and recently, the Tesla Mine near the planning area provided roosting habitat for Townsend's big eared bat. It is assumed that the species can forage in the planning area at least periodically, given its distribution in California. Suitable roosting habitat exists in the Tesla Coal Mine near the planning area and Lime Kiln Cave within the planning area and possibly in rock outcroppings in the planning area. The 2008 and 2014 HMS reports mentions the species as occurring in the planning area (State Parks n.d.[d]; State Parks 2015a). This species was identified in the Tesla Coal Mine by State Parks staff members in September 2014 (de Silva, pers. comm., 2014).
Western mastiff bat *Eumops perotis californicus*	CSC	This species occurs in a variety of habitats including ponderosa pine forests, desert scrub, and oak woodlands. It roosts in rock outcrops. This species was detected at Tyson's Pond during acoustic surveys conducted in 2016. Rock outcroppings in the planning area may provide suitable roost habitat.

Notes: CESA = HMS = Habitat Monitoring System
* Statuses:
   CSC = California species of special concern (California Department of Fish and Wildlife [CDFW])
   CT = state-listed as threatened
   FE = federally listed as endangered
   FT = federally listed as threatened

California Tiger Salamander

California tiger salamander larvae were found in Tyson's Basin Pond in the planning area during the 2018 dipnet surveys. This species has also been detected in North Parcel, Mitchell Ravine, and Mobile Home Ponds (State Parks n.d.[f]) immediately to the west of the planning area. Several California tiger salamander larvae were also found in Lower Juniper Pond during HMS surveys conducted in 2011 and in Tyson's Pond during 2018 surveys (State Parks 2015a; State Parks 2019a).

**California tiger salamanders have been found in ponds
in the planning area during regular habitat monitoring activities.**

California Red-legged Frog

California red-legged frogs are known to occur in Lime Kiln Pond within the planning area. Additionally, surveys conducted at the Carnegie SVRA in 2003 resulted in several observations of California red-