



Area Source Emissions Inventory: *Methodology Updates*

May 28, 2025

**Area Source Improvement and Community Inventory Development Section
Air Quality Planning and Science Division**

Email: areasourceinventory@arb.ca.gov

Website: <https://ww2.arb.ca.gov/index-methodologies-major-category>

Area Sources Overview

Approximately 400 area source categories, contributing to nearly 30% of total PM_{2.5} emissions *

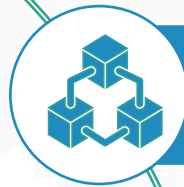
CARB and districts are responsible for updating specific categories

Existing methodologies require a comprehensive update to reflect current practices and data

Near-term: Prioritize and update categories that are critical for the new **9µg/m³ PM_{2.5}** standard

Longer-term: Systematically review and update all existing area source methods as appropriate

Objectives of the Updates



Develop robust emissions inventories for both SIP and community programs



Improve estimates for key PM, NH₃, and NO_x area source categories



Leverage current best-available activity and emission factor data



Promote consistent methodologies across air districts



Support districts with limited resources

General Timeline for 2025 Updates

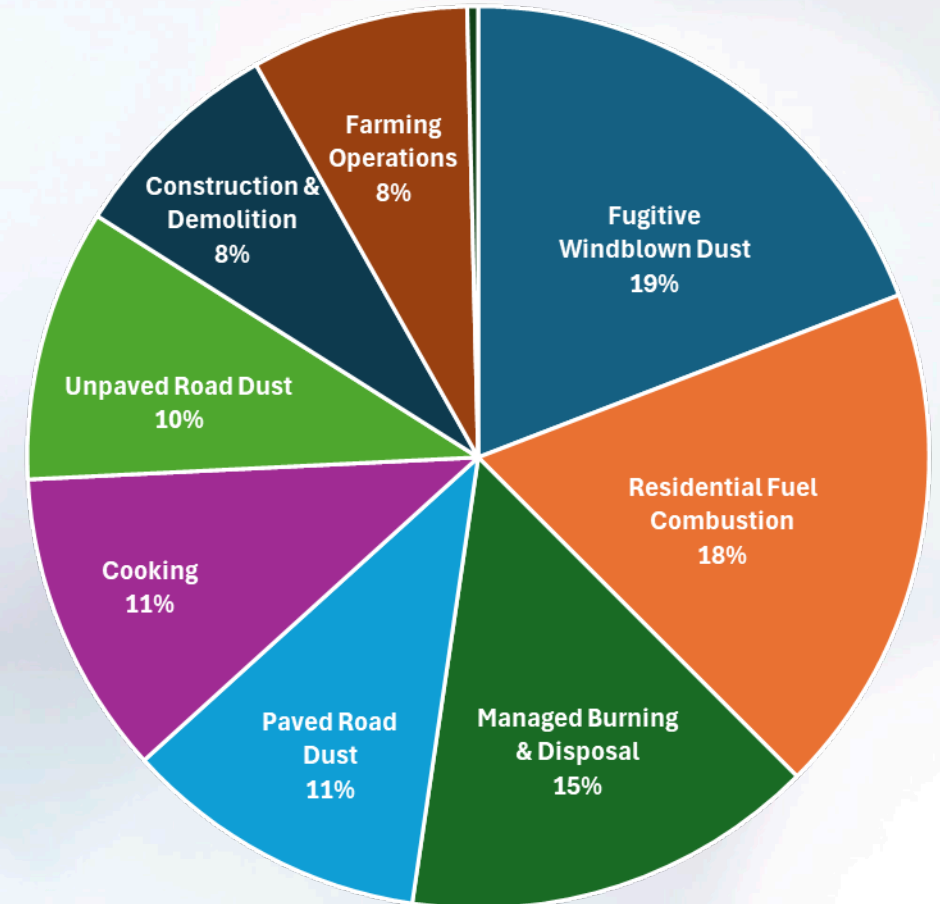


Communication and Collaboration with Interested Stakeholders

Categories Being Updated in 2025

Area Source Categories *	Staff Lead
<ul style="list-style-type: none"> Dairy/Livestock Waste and Feedlot Dust Silage Soil NOx and NH3 	Kevin Eslinger
<ul style="list-style-type: none"> Commercial Cooking 	Adrian Cayabyab
<ul style="list-style-type: none"> Farming Operations Dust Unpaved Farm/Non-farm Road Dust 	Yaning Miao
<ul style="list-style-type: none"> Paved Road Dust Windblown Dust Ag and Non-Ag Diesel Engines ** 	Ranga Rajan Thiruvengkatachari
<ul style="list-style-type: none"> Building/Road Construction Dust Residential Wood Combustion 	Abhishek Dhiman
<ul style="list-style-type: none"> Residential Waste Burning ** Domestic Ammonia ** 	David Allgood

Relative contributions to PM_{2.5} in the current CEPAM 2023 inventory, which could potentially be changed after the updates



Types of Updates

Activity Updates (Existing Methods)

- Emissions updated using most recent and best available data

Method Updates

- Several ag categories (e.g., soil NO_x; dairy cattle; silage; farming operations dust)
- Other area sources (e.g., commercial cooking; fugitive dust from unpaved roads, construction, windblown dust, backyard burning)

EIC Updates

- Retired and updated EICs (e.g., farming operations, unpaved road dust)
- Create new EICs (e.g., manure land application)

List of All Area Source Categories Being Considered for Preliminary and Final Emissions Inventory Updates

Discussed at the [December 5, 2024 SIP Workshop](#)

Area Source Emissions Inventory Updates

Source Category	Website Link to Current Inventory Methodology
Categories Being Updated, Discussed at the SIP Workshop in December 2024	
<u>Dairy cattle waste/feedlot dust</u>	https://ww2.arb.ca.gov/carb-miscellaneous-process-methodologies-farming-operations
Silage	N/A
<u>Soil NOx and Ammonia (NH3)</u>	https://ww3.arb.ca.gov/ei/areasrc/fullpdf/Soil%20NOx%20CEIDARS%20Methodology_ADA%20Compliance_FixedFig4_Apr-6-2022_Final.pdf
<u>Commercial Cooking</u>	https://ww2.arb.ca.gov/district-miscellaneous-process-methodologies-cooking
<u>Fugitive dust from farming operations</u>	https://ww2.arb.ca.gov/carb-miscellaneous-process-methodologies-farming-operations
<u>Fugitive dust from unpaved farm roads</u>	https://ww3.arb.ca.gov/ei/areasrc/fullpdf/full7-11_2016.pdf
<u>Fugitive dust from non-farm unpaved roads</u>	https://ww2.arb.ca.gov/carb-miscellaneous-process-methodologies-unpaved-road-and-traffic-area-dust
<u>Fugitive dust from paved roads</u>	https://ww2.arb.ca.gov/carb-miscellaneous-process-methodologies-paved-road-dust
<u>Fugitive Windblown Dust</u>	https://ww2.arb.ca.gov/carb-miscellaneous-process-methodologies-fugitive-windblown-dust
<u>Fugitive dust from construction and demolition</u>	https://ww2.arb.ca.gov/carb-miscellaneous-process-methodologies-construction-and-demolition
<u>Residential Wood Combustion</u>	https://ww2.arb.ca.gov/carb-miscellaneous-process-methodologies-residential-fuel-combustion

Area Source Emissions Inventory Updates

Source Category	Website Link to Current Inventory Methodology
Categories Being Updated or Under Consideration. Not Discussed at the SIP Workshop in December 2024	
Residential Waste Burning	N/A
Domestic Ammonia	N/A
Ag Diesel Internal Combustion Engines	https://ww2.arb.ca.gov/carb-fuel-combustion-methodologies-agricultural
Non-ag Diesel Internal Combustion Engines	https://ww2.arb.ca.gov/carb-fuel-combustion-methodologies-other-fuel-combustion
Categories Not Covered in Today's Presentation (Responsibility of Other CARB Groups)	
Off-road agricultural equipment	https://ww2.arb.ca.gov/sites/default/files/2021-08/AG2021_Technical_Documentation_0.pdf
Agricultural burning (excluding prescribed fires)	https://ww2.arb.ca.gov/district-miscellaneous-process-methodologies-managed-burning-and-disposal
Prescribed Burning: Forest Management; Range Improvement	https://ww2.arb.ca.gov/district-miscellaneous-process-methodologies-managed-burning-and-disposal
Natural Wildfires	https://ww2.arb.ca.gov/carb-natural-non-anthropogenic-source-methodologies-wildfires

Outline of Today's Presentation

- Updates to **13 area source categories** covered by 6 lead staff
 - Activity Data
 - Methodology
 - Engagement
 - Relevant EICs
 - Summary of Current Status
- Designated Q&A Sessions **in the middle and at the end** of the presentation, or submit questions in the Zoom chat anytime

Area Source Categories	Staff Lead
<ul style="list-style-type: none"> • Dairy/Livestock Waste and Feedlot Dust • Silage • Soil NOx and NH3 	<p>Kevin Eslinger</p>
<ul style="list-style-type: none"> • Commercial Cooking 	<p>Adrian Cayabyab</p>
<ul style="list-style-type: none"> • Farming Operations Dust • Unpaved Farm/Non-farm Road Dust 	<p>Yaning Miao</p>
<p>Break for Questions</p>	
<ul style="list-style-type: none"> • Paved Road Dust • Windblown Dust • Ag and Non-Ag Diesel Engines * 	<p>Ranga Rajan Thiruvengkatachari</p>
<ul style="list-style-type: none"> • Building/Road Construction Dust • Residential Wood Combustion 	<p>Abhishek Dhiman</p>
<ul style="list-style-type: none"> • Residential Waste Burning* • Domestic Ammonia * 	<p>David Allgood</p>



Farming Operations Dairy Cattle Waste and Dust Emissions

Emissions from cattle waste
and land application of
manure

Activity Update: Yes
Method Update: Yes
EIC Update: Yes

Activity Data:

- 2023 CADD dairy cattle population (existing methodology uses a baseline inventory year population based on USDA Ag Census)

Methodology:

- Existing + New
- Current methodology last published in 2004
- New methodology will include land application of manure
- Emissions = (population x emission factor) + (amount of manure applied on land x emission factors)

Engagement:

- Collaborate with air districts, EJ groups, and industry
- August 22, 2024: CADD [workshop](#)
- December 5, 2024: SIP workshop
- May 28, 2025: Area Source Workshop

Relevant EICs

EICs	Description
620-618-0262-0101	Dairy cattle
620-618-0261-0101*	Manure land application - Dairy cattle

*Manure land application is a new EIC being added

California Dairy & Livestock Database (CADD)

Dairy Population Data Sources

Agency	Data Sources
Regional Waterboards (RB)	Annual Reports for 2012-2023 Inspection Reports for 2012-2023 Waste Management Plans, Nutrient Management Plans, and Notices of Intent
State Waterboard	California Integrated Water Quality System (CIWQS) database
San Joaquin Air Pollution Control District (SJVAPCD)	Air permits for 2019
California Department of Food & Agriculture (CDFA)	Dairy Digester Research & Development Program project-level data through March 2023 Alternative Manure Management Program project-level data through March 2023
California Air Resources Board (CARB)	California Climate Investment implemented projects database; accessed October 2023
United States Environmental Protection Agency (USEPA)	AgSTAR Livestock Anaerobic Digester Database through January 2023
National Aeronautics & Space Administration (NASA)	Vista-CA using data sources spanning 2005-2019 (Google Earth layers)

Summary

- **Activity Data:**

- CADD dairy cattle population includes better data, including specificity by year, COABDIS, etc
- Dairy cattle category/sub-categories are the only reasonably well-quantified animal populations in CADD - other livestock categories are still needed

- **Emission Factors:** adjusting animal populations does not affect EFs

- **Emissions Trend:** no specific direction

- Updating dairy populations differs for each area & for each calendar year
- Should not be significant regardless of year
- Will know more as we continue to process the high quality 2023 CADD data received last month from CARB's Research Division (base year for inventory)

- **Adding Ammonia From Land Application of Dairy Manure:**

- **Emission factor:** Environ 2002
- **Emission trend:**  Upward

Farming Operations Silage

Emissions from silage in dairy farms

Activity Update: Yes
Method Update: Yes
EIC Update: No

Activity Data:

- 2023 CADD dairy cattle population data

Methodology:

- Existing + New
- No published methodology
- Current ROG inventory mostly from SJVAPCD's dairy silage inventory (2021 from District); no or incomplete silage emissions for other areas
- Use of SJVAPCD's methodology statewide
- SJVAPCD methodology includes pile size, pile numbers, silage type, total mix ration, etc.

Engagement:

- Collaborate with air districts, EJ groups, and industry
- August 22, 2024: CADD [workshop](#)
- December 5, 2024: SIP workshop
- Announced in AgTech & CDQAP
- May 28, 2025: Area Source Workshop

Relevant EICs

EIC	Description
620-618-0263-0000	Silage

Summary

- **Activity Data**

- Dairies using silage onsite will have SJVAPCD's methodology applied to each dairy farm outside SJV

- **Emission Factors**

- SJVAPCD created VOC emission factors for silage piles and feed-out on dairies, including corn, alfalfa, and wheat/cereal silage

- **Emission Trend:**  Upward

Soil NOx and Ammonia

Emissions from unmanaged lands (forest, shrub, grass, fallow) and application of nitrogen to managed lands (crop, urban)

Activity Update: Yes
Method Update: TBD
EIC Update: Yes

Activity Data:

- CARB *Soil Nitrogenous Emissions Subject Matter Expert Review Panel (SMERP)* contract
- May 2025 contract completion

Methodology:

- New/TBD (next step: SMERP report)

Engagement:

- Collaborate with air districts, EJ groups, and industry
- 2024 Nomination process involvement
- AgTech updates
- May 14, 2024: SMERP kick-off workshop
- February 13, 2025: SMERP progress update meeting
- May 2025: Draft contract report review
- June 2025: Anticipated final report workshop

Relevant EICs

EIC	Description
530-918-5800-0000	Agricultural Fertilizers

When Soil NO_x emissions can be reasonably estimated, they will be included under agricultural fertilizer emissions

EIC	Description
620-618-0261-0101 through 0110*	Manure Land Application by Animal Type
620-618-0262-0101 through 0110	Agricultural Waste (Manure) by Animal Type

*Manure land application is a new EIC being added

Summary

- **Activity & Next Steps**

- Next: stay tuned for the anticipated end-of-June Soil NO_x workshop to discuss the May 28th final report
- Activity data related to nitrogen and water will be needed to improve inventory estimates

- **Emissions**

- Analysis of current inventory, multiple modeling approaches, and potential inventory improvements will continue
- Email kevin.eslinger@arb.ca.gov to be added to the notification listserv

Area Source Categories	Staff Lead
<ul style="list-style-type: none"> • Dairy/Livestock Waste and Feedlot Dust • Silage • Soil NOx and NH3 	Kevin Eslinger
<ul style="list-style-type: none"> • Commercial Cooking 	Adrian Cayabyab
<ul style="list-style-type: none"> • Farming Operations Dust • Unpaved Farm/Non-farm Road Dust 	Yaning Miao
Break for Questions	
<ul style="list-style-type: none"> • Paved Road Dust • Windblown Dust • Ag and Non-Ag Diesel Engines* 	Ranga Rajan Thiruvengkatachari
<ul style="list-style-type: none"> • Building/Road Construction Dust • Residential Wood Combustion 	Abhishek Dhiman
<ul style="list-style-type: none"> • Residential Waste Burning* • Domestic Ammonia* 	David Allgood

Commercial Cooking

Emissions from commercial charbroiling and deep fat frying

Activity Update: Yes
Method Update: Yes
EIC Update: No

Activity Data:

- Number of restaurants
- Type and number of cooking devices
 - Chain-driven/under-fired charbroilers
 - Deep fat fryers
 - Flat/clamshell griddles
- Amount of meat and potatoes cooked

Methodology:

- Existing + New
- No statewide methodology
- Emissions = amount of food cooked on each device x pollutant specific emission factors

Engagement:

- Collaborate with air districts and EJ groups
- December 5, 2024: SIP workshop
- May 28, 2025: Area Source Workshop

Relevant EICs

EIC	Description
690-680-6000-0000	Commercial Charbroiling
690-682-6000-0000	Commercial Deep-Fat Frying
690-684-6000-0000	Other Commercial Cooking

Summary

- **Activity Data**

- **Restaurant counts:** 2024 Dun & Bradstreet
- **Meat Activity Data:** CARB sponsored PRI report (Potepan, 2001)
- **Potato Activity Data:** USDA farm weight of frozen potatoes per capita (53.25 lb/person-year in 2022)

- **Emissions Factors**

- Further Development of Emission Test Methods and Emission Factors for Various Commercial Cooking Operations" Joseph Norbeck, 1997, prepared for South Coast AQMD

- **Emission Trend:** ↓ Downward

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Farming Operations Dust

Dust from harvesting, tilling, land preparation activities

Activity Update: Yes

Method Update: Maybe

EIC Update: Yes

Activity Data:

- Harvest acreage by crop type
- Crop calendar

Methodology:

- Existing + New (tentative)
- Current methodology uses 2012 harvest acres
- Emissions = harvested crop acreage x by crop specific emission factors

Engagement:

- Collaborate with air districts, EJ groups, and industry
- December 5, 2024: SIP workshop
- May 28, 2025: Area Source Workshop

Relevant EICs and Proposed Revision

- Current inventory has 2 EICs
- To better characterize crop-specific dust emissions, proposing to expand to 21 crop specific EICs each for tilling and harvesting

EIC	Description	Comment
620-614-5400-0000	Farming Operations - Tilling Dust	To be Retired
620-615-5400-0000	Farming Operations - Harvest Operations Dust	To be Retired

New Crop-Specific EICs

EIC	Description	EIC	Description
620-614-5400-5481	Farming Operations - Tilling Dust - Alfalfa	620-615-5400-5481	Farming Operations - Harvest Operations - Dust - Alfalfa
620-614-5400-5482	Farming Operations - Tilling Dust - Tree Nuts - Including Almonds	620-615-5400-5482	Farming Operations - Harvest Operations - Dust - Tree Nuts - Including Almonds
620-614-5400-5483	Farming Operations - Tilling Dust - Citrus	620-615-5400-5483	Farming Operations - Harvest Operations - Dust - Citrus
620-614-5400-5484	Farming Operations - Tilling Dust - Corn	620-615-5400-5484	Farming Operations - Harvest Operations - Dust - Corn
620-614-5400-5485	Farming Operations - Tilling Dust - Cotton	620-615-5400-5485	Farming Operations - Harvest Operations - Dust - Cotton
620-614-5400-5486	Farming Operations - Tilling Dust - Dry Beans	620-615-5400-5486	Farming Operations - Harvest Operations - Dust - Dry Beans
620-614-5400-5487	Farming Operations - Tilling Dust - Garbanzo	620-615-5400-5487	Farming Operations - Harvest Operations - Dust - Garbanzo
620-614-5400-5488	Farming Operations - Tilling Dust - Garlic	620-615-5400-5488	Farming Operations - Harvest Operations - Dust - Garlic
620-614-5400-5489	Farming Operations - Tilling Dust - Grapes-Raisin	620-615-5400-5489	Farming Operations - Harvest Operations - Dust - Grapes-Raisin
620-614-5400-5490	Farming Operations - Tilling Dust - Grapes-Table	620-615-5400-5490	Farming Operations - Harvest Operations - Dust - Grapes-Table
620-614-5400-5491	Farming Operations - Tilling Dust - Grapes-Wine	620-615-5400-5491	Farming Operations - Harvest Operations - Dust - Grapes-Wine
620-614-5400-5492	Farming Operations - Tilling Dust - Lettuce	620-615-5400-5492	Farming Operations - Harvest Operations - Dust - Lettuce
620-614-5400-5493	Farming Operations - Tilling Dust - Melon	620-615-5400-5493	Farming Operations - Harvest Operations - Dust - Melon
620-614-5400-5494	Farming Operations - Tilling Dust - Onions	620-615-5400-5494	Farming Operations - Harvest Operations - Dust - Onions
620-614-5400-5495	Farming Operations - Tilling Dust - Rice	620-615-5400-5495	Farming Operations - Harvest Operations - Dust - Rice
620-614-5400-5496	Farming Operations - Tilling Dust - Safflower	620-615-5400-5496	Farming Operations - Harvest Operations - Dust - Safflower
620-614-5400-5497	Farming Operations - Tilling Dust - Sugar Beets	620-615-5400-5497	Farming Operations - Harvest Operations - Dust - Sugar Beets
620-614-5400-5498	Farming Operations - Tilling Dust - Tomatoes	620-615-5400-5498	Farming Operations - Harvest Operations - Dust - Tomatoes
620-614-5400-5499	Farming Operations - Tilling Dust - Vegetables	620-615-5400-5499	Farming Operations - Harvest Operations - Dust - Vegetables
620-614-5400-5500	Farming Operations - Tilling Dust - Wheat	620-615-5400-5500	Farming Operations - Harvest Operations - Dust - Wheat
620-614-5400-5501	Farming Operations - Tilling Dust - Other Crops	620-615-5400-5501	Farming Operations - Harvest Operations - Dust - Other Crops

Summary

- **Activity Data**

- **Harvested Acres:** 2022 CDFA harvest acres
- **Crop Calendar:** 2016 crop calendar
- **COABDIS spatial allocation:** Crop and geographic location based spatial allocation

- **Emission Factor:**

- Crop specific emission factor

- **Emission Trend:**

-  Land Preparation (Downward)
-  Harvest Operations (Upward)

- **Potential Adjustment May Come From:**

- Crop calendar
- Low dust harvester
- Fallow lands

Fugitive Dust from Unpaved Farm Roads

Dust from vehicle travel on unpaved farm roads

Activity Update: Yes
Method Update: No
EIC Update: No

Activity Data:

- Harvested acreage, VMT factors by crop type, crop calendar

Methodology:

- Existing (from 2016)
- Emissions = harvest acres x crop-specific VMT factors x emission factor
- Current methodology uses 2012 activity data


Engagement:

- Collaborate with air districts, EJ groups, and industry
- December 5, 2024: SIP workshop
- May 28, 2025: Area Source Workshop
- Collaborate with Districts and ag experts

Relevant EICs

EIC	Description
645-646-5400-0000	Unpaved Road Travel Dust- Farm Roads

Summary

- **Activity Data**
 - **Harvested Acres:** 2022 CDFA harvest acres
 - **VMT Factor:** 2003 VMT factors
 - **COABDIS spatial allocation:** Crop and geographic location based spatial allocation
- **Emission Factors:**
 - 2 lbs PM10/VMT
- **Emission Trends:**  Downward
- **Potential Adjustment May Come From:**
 - VMT factor
 - Crop calendar

Fugitive Dust from Non-farm Unpaved Roads

Dust from vehicle travel on non-farm unpaved roads

Activity Update: Yes
Method Update: Yes
EIC Update: Yes

Activity Data:

- Unpaved road miles and VMT

Methodology:

- New revised methodology to include REPLICA big data VMT on unpaved roads, instead of scaling unpaved road miles from paved roads and assuming 10 passes per day vehicle activity on all roads
- Current methodology, last updated in 2012, uses 2008/2009 activity data
- Emissions = VMT on unpaved roads x emission factor

Engagement:

- Collaborate with air districts, EJ groups, and industry
- December 5, 2024: SIP workshop
- May 28, 2025: Area Source Workshop

Relevant EICs and Revision

- Current inventory has 5 EICs for unpaved non-farm road travel
- New methodology and data sources: REPLICA data along can provide all unpaved roads information
- Proposing to retire road type based EICs (except City and County Roads for motor vehicle budgets)

EIC	Description	Comments
645-633-5400-0000	Unpaved Road Travel Dust- Non-Farm Roads (Public)	New EIC for total emissions
645-638-5400-0000	Unpaved Road Travel Dust- City And County Roads	To be Retained
645-644-5400-0000	Unpaved Road Travel Dust- B.L.M. Roads	To be Retired
645-640-5400-0000	Unpaved Road Travel Dust- U.S. Forest And Park Roads	To be Retired
645-648-5400-0000	Unpaved Road Travel Dust (Unspecified)	To be Retired
645-642-5400-0000	Unpaved Road Travel Dust- Timber Production Roads	To be Retired

Summary

- **Activity Data**

- **Unpaved Road Miles:** 2023 REPLICA data
- **VMT:** 2023REPLICA
- **Spatial Allocation:** Geographic location based COABDIS spatial allocation

- **Emission Factors:**

- 2 lbs PM10/VMT

- **Emission Trend:**  Upward

- **Potential Adjustment May Come From:**

- Submissions from districts

Area Source Categories	Staff Lead
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Break for Questions

We kindly ask that you introduce yourself with
Your Name and Organization before asking question

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Fugitive Dust from Paved Roads

Dust from vehicle travel on paved roads

Activity Update: Yes
Method Update: No
EIC Update: No

Activity Data:

- VMT and travel fraction by road type (e.g., freeway, local)

Methodology:

- Existing
- Current methodology, last updated in 2021, uses 2017 activity data
- Emissions = VMT by road type x emission factor

Engagement:

- Collaborate with air districts and EJ groups.
- December 5, 2024: SIP workshop
- May 28, 2025: Area Source Workshop

Relevant EICs

EIC	Description
640-635-5400-0000	Paved Entrained Road Dust-Freeways
640-637-5400-0000	Paved Entrained Road Dust-Major Streets
640-639-5400-0000	Paved Entrained Road Dust-Collector Streets
640-641-5400-0000	Paved Entrained Road Dust-Local Streets
640-643-5400-0000	Paved Entrained Road Dust-Rural Streets
640-636-5400-0000	Paved Entrained Road Dust-Unspecified Paved Roads

Summary

- **Activity Data**

- **VMT:** 2023 VMT data from EMFAC MPO.
- **Travel Fractions:** 2022 data from CalTrans.
- **Statewide Average Vehicle Weight:** Updated from 2.4 tons to 2.8 tons based on EMFAC Fleet Data and Weight-In-Motion (WIM)

- **Emission Factor**

- No updates to silt Loading and particle size fractions

- **Emission Trend:**  Downward

Fugitive Windblown Dust

Dust from wind blowing across surfaces (e.g., agricultural, pasture, unpaved, open areas)

Activity Update: Yes
Method Update: Yes
EIC Update: Maybe

Activity Data:

- Exposed Surface Area

Methodology:

- Long-term update
- Current methodology is based on CA-specific WEQs from 1997.
- Dust model development is currently in progress.

Engagement:

- Collaborate with air districts on identifying fallow lands
- Engage with EJ groups and industry
- December 5, 2024: SIP workshop
- May 28, 2025: Area Source Workshop

Relevant EICs

EIC	Description
650-650-5400-0000	Dust from Agricultural Lands (Non-Pasture)
650-651-5400-0000	Dust from Pasture Lands
650-652-5400-0000	Dust from Unpaved Roads and Associated Areas
650-653-5400-0000	Dust from exposed Lakebeds

*As work progresses, we can consider a new EIC for fallow lands

Summary

- **Input Data**

- **Meteorological Data:** Weather and Research Forecasting Model (WRF)
- **Land Cover:** US Geological Survey (USGS)
- **Crop Layers and Soil Texture Maps:** US Dept. of Agriculture (USDA)

- **Emission Factor**

- Hybrid of James et. al. (2001) and Alfaro et. al (2003) (Wind tunnel Studies)

- **Modeling Development and Evaluation**

- Develop a dust emission model building on work funded by the Western Regional Air Partnership (WRAP) and the research by Korcz et al. (2007)
- Evaluate the model results by comparing them against the Dust Algorithm currently implemented in the Community Multiscale Air Quality (CMAQ) model

- **Emission Trends:** Analysis Ongoing (Results available in 2026)

Ag Diesel ICE

Emissions from ag diesel internal combustion engines such as ag. irrigation pumps

Activity Update: Yes
Method Update: Yes
EIC Update: No

Activity Data:

- Population: District, FRIS, USGS

Methodology:

- Last methodology update in Aug 2006
- August 2018 update was editorial - EIC codes and Descriptions
- Emissions are a product of the population, EF and other operating conditions.
- EIC: 052-042-1200-0010, 052-042-1200-0011
- This category will be updated in the future based on the review of the existing methodology

Engagement:

- May 28, 2025: Area Source Workshop

Non-Ag Diesel ICE

Emissions from Generators, Air Compressors, Pumps, Misc. (crushers, grinders, cranes, etc.)

Activity Update: Yes
Method Update: Yes
EIC Update: No

Activity Data:

- Population: CARB's OFFROAD Model - PSR Database

Methodology:

- Last methodology update in Sep 2003
- CTR's* new reporting requirements will bring most ICEs in this category under the reporting framework.
- EIC: 099-040-1200-0000

Engagement:

- May 28, 2025: Area Source Workshop

Area Source Categories	Staff Lead
<ul style="list-style-type: none"> Dairy/Livestock Waste and Feedlot Dust Silage Soil NOx and NH3 	Kevin Eslinger
<ul style="list-style-type: none"> Commercial Cooking 	Adrian Cayabyab
<ul style="list-style-type: none"> Farming Operations Dust Unpaved Farm/Non-farm Road Dust 	Yaning Miao
Break for Questions	
<ul style="list-style-type: none"> Paved Road Dust Windblown Dust Ag and Non-Ag Diesel Engines* 	Ranga Rajan Thiruvengkatachari
<ul style="list-style-type: none"> Building/Road Construction Dust Residential Wood Combustion 	Abhishek Dhiman
<ul style="list-style-type: none"> Residential Waste Burning* Domestic Ammonia* 	David Allgood

Fugitive Dust from Building and Road Construction/Demolition

Dust from construction and Demolition activities

Activity Update: Yes
Method Update: Yes
EIC Update: No

Activity Data:

- Residential units and commercial area
- Road miles

Methodology:

- New methodology to include CalTrans road construction data and proprietary building construction data from issued permits
- Current methodology, last updated in 2002 (for building construction) and 1997 (road construction)
- Emissions = (residential units/ commercial area/ road miles) x emission factor

Engagement:

- Collaborate with air districts, EJ groups, and industry
- December 5, 2024: SIP workshop
- May 28, 2025: Area Source Workshop

Relevant EICs

EIC	Description
630-622-5400-0000	Building and Construction Dust - Residential
630-624-5400-0000	Building and Construction Dust - Commercial
630-626-5400-0000	Building and Construction Dust - Industrial
630-628-5400-0000	Building and Construction Dust - Institutional
630-630-5400-0000	Building and Construction Dust - Governmental
630-634-5400-0000	Road Construction Dust

Summary

Building Construction

- **Activity Data**

- 2023 Building Permit Data from Construction Industry Research Board (CIRB)
- Provides information on:
 - Location of construction
 - Acreage of construction
 - Valuation of construction

- **Emission Factor**

- 2024 EPA Wagon Wheel Tool

- **Emission Trend:** Analysis Ongoing

Summary

Road Construction

- **Activity Data**

- State Highway Operation and Protection Program (SHOPP) dataset from CalTrans
- Provides information on:
 - Location of Road Construction projects
 - Type of Road Construction
 - Valuation of the Road Construction projects

- **Emission Factor**

- 2024 EPA Wagon Wheel Tool

- **Emission Trend:** Analysis Ongoing

Residential Wood Combustion

Emissions from wood combustion in fireplaces and wood stoves

Activity Update: Yes
Method Update: Yes
EIC Update: Maybe

Activity Data:

- Latest census data and other survey data on wood combustion devices and technology
- New pollutant-specific emission factors for wood stoves based on recent study/testing by the Northeast States for Coordinated Air Use Management (NESCAUM)

Methodology:

- Existing + New
- Statewide methodology last published in 2011
- Recent methodologies include SJV 2016 and Portola 2023
- Differentiate between Main and Supplemental heating
- Emissions = amount of wood burned in each device x pollutant specific emission factors

Engagement:

- Collaborate with air districts and EJ groups
- December 5, 2024: SIP workshop
- May 28, 2025: Area Source Workshop

Relevant EICs

EIC*	Description
610-600-0230-0000	Wood Combustion - Wood Stoves
610-602-0230-0000	Wood Combustion - Fireplaces

*Districts have showed interest in having separate EIC for pellet stoves. Internal discussions are ongoing.

Summary

- **Activity Data**

- 2023 American Housing Survey (AHS) from Census
- Divided total heating between Main vs Supplemental heating

- **Survey Data**

- Missing values for many counties
- Filled in missing values using a Regression Model

- **Emissions Factors**

- 2024 EPA Wagon Wheel Tool

- **Burn Rates**

- Used EPA Burn Rates for Fireplaces and Woodstoves
- For Fireplace Inserts, used the Woodstove Burn Rates – Structurally and Functionally similar
- For Pellet Stoves, assumed a maximum of 2 tons/year usage and then adjusted it by county based on Woodstove Burn Rate distribution

Summary

- **Device Splits**

- Used EPA device splits
 - Woodstoves and Fireplace Inserts
 - Uncertified - **Applied Factor to account for more wood burning**
 - EPA certified - Catalytic
 - EPA certified - Non-Catalytic
 - More coherent with latest survey data from Mammoth Lakes and Portola Changeout Program

- **Emission Trend:**  Downward

Area Source Categories	Staff Lead
<ul style="list-style-type: none"> • Dairy/Livestock Waste and Feedlot Dust • Silage • Soil NOx and NH3 	Kevin Eslinger
<ul style="list-style-type: none"> • Commercial Cooking 	Adrian Cayabyab
<ul style="list-style-type: none"> • Farming Operations Dust • Unpaved Farm/Non-farm Road Dust 	Yaning Miao
Break for Questions	
<ul style="list-style-type: none"> • Paved Road Dust • Windblown Dust • Ag and Non-Ag Diesel Engines* 	Ranga Rajan Thiruvengkatachari
<ul style="list-style-type: none"> • Building/Road Construction Dust • Residential Wood Combustion 	Abhishek Dhiman
<ul style="list-style-type: none"> • Residential Waste Burning* • Domestic Ammonia* 	David Allgood

Residential Waste Burning

Emissions from burning of backyard vegetation waste

Activity Update: Yes
Method Update: Yes
EIC Update: No

Activity Data:

- Population (DOF)
- Rural/Urban Population Split (US Census)
- Forested acreage (NLCD)
- Forest litter per acre (1964 Study on Forest Litter)

Methodology:

- New, no published statewide methodology
- Existing Federal and District Methodologies (SJVAPCD, SMAQMD)

Engagement:

- Collaborate with air districts, EJ groups, and industry
- May 28, 2025: Area Source Workshop

Relevant EICs

EIC	Description
670-670-0200-0000	Non-agriculture open burning

Summary

- **Activity Data:**
 - **Population:** California Department of Finance
 - **Rural/Urban Population Split:** US Census
 - **Forested acreage:** National Land Coverage Database
 - **Forest litter per acre:** 1964 Bray, Litter Production in Forests of the World
- **Emissions Factor:**
 - EPA Wagon Wheel compendium (2020)
- **Emission Trend:** Analysis Ongoing

Domestic Ammonia

Emissions from domestic activities including human and pet activities

Activity Update: Yes
Method Update: Yes
EIC Update: No

Activity Data:

- Population and Households (DOF)
- Pet ownership (CDFA)
- Unsheltered homeless population (US Department of Housing and Urban Development)

Methodology:

- New
- No published methodology

Engagement:

- Collaborate with air districts, EJ groups, and industry
- May 28, 2025: Area Source Workshop

Relevant EICs

EIC	Description
699-995-2002-0000	Domestic Ammonia

Summary

- **Activity Data:**

- **Population/Households:** California Department of Finance.
- **Pet Ownership:** California Department of Food and Agriculture.
- **Household Fertilizer Usage:** California Department of Food and Agriculture, Fertilizing Materials Tonnage Report.
- **Unsheltered Homeless Population:** US Department of Housing and Urban Development, 2024 Annual Homelessness Assessment Report, Point-in-time Estimates.

- **Emissions Factors:**

- **Human Perspiration and Respiration:** Several studies on Human Ammonia Emissions Rates.
- **Pet waste:** Several studies on nitrogen generation from pet waste of domesticated pets.
- **Household ammonia:** Studies on ammonia emissions from household products.
- **Household fertilizer:** Fertilizer industry handbook.
- **Human Waste:** Ammonia Emissions Inventory development.

- **Emission Trend:** ↓ Downward

Contact Us: AreaSourceInventory@arb.ca.gov

Area Source Categories	Staff Lead	Contact
Dairy/Livestock Waste and Feedlot Dust	Kevin Eslinger	kevin.eslinger@arb.ca.gov
Silage		
Soil NOx and NH3		
Commercial Cooking	Adrian Cayabyab	adrian.cayabyab@arb.ca.gov
Farming Operations Dust	Yaning Miao	yaning.miao@arb.ca.gov
Unpaved Farm/Non-farm Road Dust		
Paved Road Dust	Ranga Rajan Thiruvengkatachari	rangarajan.thiruvengkatachari@arb.ca.gov
Windblown Dust		
Building/Road Construction Dust	Abhishek Dhiman/ Yaning Miao	abhishek.dhiman@arb.ca.gov ; yaning.miao@arb.ca.gov
Residential Wood Combustion	Abhishek Dhiman/ Ranga RT	abhishek.dhiman@arb.ca.gov ; rangarajan.thiruvengkatachari@arb.ca.gov
Residential Waste Burning (yard waste)	David Allgood	david.allgood@arb.ca.gov
Domestic Ammonia		
Ag and Non-Ag Diesel Engines	TBD	rangarajan.thiruvengkatachari@arb.ca.gov