SJVUAPCD

Appendix B

Emissions Inventory

PROPOSED *2016 PLAN FOR THE 2008 8-HOUR OZONE STANDARD*

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Appendix B: Emissions Inventory

B.1 INTRODUCTION

An emissions inventory is a systematic listing of air pollution sources along with the amount of pollution emitted from each source or category over a given time period. Emissions inventories represent estimates of the air pollution emissions from given sources; they are not measurements of ambient concentrations. Emissions inventory data are used as the primary input for air quality modeling, used for developing control strategies, and provide a means to track progress in meeting emissions reduction commitments. More specifically, the inventories in this appendix are used to evaluate and propose control measures, to track emissions for Rate of Progress (ROP), to track Emissions Reduction Credits (ERCs), to establish motor vehicle conformity budgets for transportation planning, and to assist in demonstrating attainment of the NAAQS.

Pollution sources are grouped by major industry sectors. The following are examples of pollution sources by key sectors:

- Industrial or stationary point sources—power plants and oil refineries;
- Area-wide sources—consumer products and residential fuel combustion;
- On-road sources—passenger vehicles and heavy-duty trucks;
- Off-road mobile sources—aircraft, trains, ships, recreational boats, construction equipment, and farm equipment; and
- Non-anthropogenic (natural) sources—biogenic (or vegetation), geogenic (petroleum seeps), and wildfires.

Tables B-1 and B-2 reflect anthropogenic emissions (i.e., emissions generated by human activity). Only anthropogenic emissions are subject to regulatory requirements. However, biogenic volatile organic compounds emissions (BVOC) from vegetation are evaluated and estimated for photochemical modeling. Total volatile organic compound (VOC) emissions from biogenic sources can overwhelm anthropogenic VOC emissions, particularly during the Valley's ozone season (Table B-3). Appendix D, California Air Resources Board (ARB) Photochemical Modeling Protocol, contains a more thorough discussion of BVOCs.

The U.S. Environmental Protection Agency (EPA) establishes requirements pertaining to emissions information that must be included as part of the SIP submittal package. Plans for ozone are to include emissions inventories for oxides of nitrogen (NOx) and VOCs.

As discussed in Chapter 2 and throughout the *2016 8-Hour Ozone Plan*, the Valley's attainment challenges under the national 2008 8-hour ozone standard occur in the summer months. For this reason, this plan focuses on summer (May through October) average daily emissions inventories, with emissions presented as tons per day (tpd).

Emissions inventories are usually developed at various geographical resolutions encompassing district, air basin, and county levels. The inventories presented in this appendix are the total emissions for the San Joaquin Valley Air Basin.

This appendix includes emissions for the San Joaquin Valley Air Basin for the years 2012, 2015, and 2018 through 2031. The base year (the year from which the inventory is projected forward and backward) for these inventories is 2012. The year 2015 has been included as a reference point for the current year. Years 2018 through 2031 have been included, as they represent attainment milestones. 2031 is the latest possible attainment deadline for the federal 2008 8-hour ozone standard.

The tables in this appendix include:

- Table B-1 NOx Emissions (Summer Daily Averages in Tons per Day)
- Table B-2 VOC Emissions (Summer Daily Averages in Tons per Day)
- Table B-3 Valley-Wide Biogenic Emissions for 2012 in Tons per Day

B.2 EMISSIONS INVENTORY TABLES

Table B-1 NOx Emissions (Summer Daily Averages in Tons per Day)

NOx (tpd)																
SUMMARY CATEGORY NAME	**SUMMER AVERAGE**															
	2012	**2015**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**
STATIONARY SOURCES																
FUEL COMBUSTION																
ELECTRIC UTILITIES	4.5	4.3	4.5	4.5	4.5	4.5	4.5	4.6	4.6	4.7	4.7	4.8	4.8	4.9	4.9	5.0
COGENERATION	1.7	1.8	2.0	2.1	2.1	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.4	2.4	2.4
OIL AND GAS PRODUCTION (COMBUSTION)	3.2	2.8	2.5	2.5	2.4	2.3	2.2	2.2	2.1	2.0	2.0	1.9	1.8	1.8	1.7	1.7
PETROLEUM REFINING (COMBUSTION)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1
MANUFACTURING AND INDUSTRIAL	5.2	5.2	5.1	5.1	5.1	5.2	5.2	5.2	5.2	5.2	5.2	5.3	5.3	5.3	5.4	5.4
FOOD AND AGRICULTURAL PROCESSING	15.5	10.5	6.9	6.6	6.4	6.1	5.8	5.6	5.3	5.1	4.9	4.6	4.4	4.2	4.0	3.9
SERVICE AND COMMERCIAL	4.2	4.2	4.3	4.3	4.3	4.4	4.3	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.5
OTHER (FUEL COMBUSTION)	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
*** TOTAL FUEL COMBUSTION**	**35.2**	**29.4**	**26.1**	**25.9**	**25.5**	**25.3**	**24.9**	**24.7**	**24.4**	**24.3**	**24.1**	**23.9**	**23.8**	**23.6**	**23.5**	**23.4**
WASTE DISPOSAL																
SEWAGE TREATMENT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LANDFILLS	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
INCINERATORS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOIL REMEDIATION	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

NOx (tpd)																
SUMMARY CATEGORY NAME	**SUMMER AVERAGE**															
	2012	**2015**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**
OTHER (WASTE DISPOSAL)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*** TOTAL WASTE DISPOSAL**	**0.2**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**
CLEANING AND SURFACE COATINGS																
LAUNDERING	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DEGREASING	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COATINGS AND RELATED PROCESS SOLVENTS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PRINTING	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ADHESIVES AND SEALANTS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHER (CLEANING AND SURFACE COATINGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*** TOTAL CLEANING AND SURFACE COATINGS**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
PETROLEUM PRODUCTION AND MARKETING																
OIL AND GAS PRODUCTION	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2
PETROLEUM REFINING	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PETROLEUM MARKETING	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
OTHER (PETROLEUM PRODUCTION AND MARKETING)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*** TOTAL PETROLEUM PRODUCTION AND MARKETING**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**
INDUSTRIAL PROCESSES																
CHEMICAL	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
FOOD AND AGRICULTURE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

NOx (tpd)																
SUMMARY CATEGORY NAME	**SUMMER AVERAGE**															
	2012	**2015**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**
MINERAL PROCESSES	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
METAL PROCESSES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WOOD AND PAPER	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GLASS AND RELATED PRODUCTS	6.0	4.1	4.3	4.3	4.4	4.5	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
ELECTRONICS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHER (INDUSTRIAL PROCESSES)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*** TOTAL INDUSTRIAL PROCESSES**	**6.6**	**4.6**	**4.9**	**4.9**	**5.0**	**5.2**	**5.3**	**5.3**	**5.4**	**5.4**	**5.4**	**5.4**	**5.4**	**5.4**	**5.5**	**5.5**
**** TOTAL STATIONARY SOURCES**	**42.4**	**34.7**	**31.7**	**31.5**	**31.1**	**31.1**	**30.9**	**30.7**	**30.4**	**30.3**	**30.1**	**29.9**	**29.8**	**29.7**	**29.5**	**29.5**
AREA-WIDE SOURCES																
SOLVENT EVAPORATION																
CONSUMER PRODUCTS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ARCHITECTURAL COATINGS AND RELATED PROCESS SOLVENTS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PESTICIDES/FERTILIZERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ASPHALT PAVING / ROOFING	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*** TOTAL SOLVENT EVAPORATION**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
MISCELLANEOUS PROCESSES																
RESIDENTIAL FUEL COMBUSTION	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	4.0	4.0	4.0	4.0	4.0
FARMING OPERATIONS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CONSTRUCTION AND DEMOLITION	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PAVED ROAD DUST	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNPAVED ROAD DUST	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

NOx (tpd)																
SUMMARY CATEGORY NAME	**SUMMER AVERAGE**															
	2012	**2015**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**
FUGITIVE WINDBLOWN DUST	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FIRES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MANAGED BURNING AND DISPOSAL	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
COOKING	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHER (MISCELLANEOUS PROCESSES)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*** TOTAL MISCELLANEOUS PROCESSES**	4.7	4.8	4.8	4.8	4.8	4.8	4.7	4.7	4.7	4.7	4.8	4.8	4.8	4.8	4.8	4.9
**** TOTAL AREA-WIDE SOURCES**	4.7	4.8	4.8	4.8	4.8	4.8	4.7	4.7	4.7	4.7	4.8	4.8	4.8	4.8	4.8	4.9
MOBILE SOURCES																
ON-ROAD MOTOR VEHICLES																
LIGHT DUTY PASSENGER (LDA)	9.7	7.1	5.1	4.6	4.2	3.9	3.6	3.3	3.1	2.9	2.7	2.6	2.5	2.3	2.2	2.1
LIGHT DUTY TRUCKS - 1 (LDT1)	2.9	1.9	1.2	1.0	0.9	0.8	0.7	0.6	0.6	0.5	0.4	0.4	0.4	0.3	0.3	0.3
LIGHT DUTY TRUCKS - 2 (LDT2)	7.1	5.2	3.5	3.0	2.7	2.4	2.2	2.0	1.9	1.7	1.6	1.5	1.4	1.4	1.3	1.2
MEDIUM DUTY TRUCKS (MDV)	9.9	7.8	5.6	5.0	4.4	3.8	3.3	2.9	2.5	2.2	2.0	1.8	1.6	1.5	1.3	1.2
LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1)	2.8	2.3	1.8	1.7	1.5	1.4	1.3	1.2	1.1	1.0	0.9	0.8	0.7	0.7	0.6	0.5
LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2)	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
MEDIUM HEAVY DUTY GAS TRUCKS (MHDV)	0.8	0.5	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
HEAVY HEAVY DUTY GAS TRUCKS (HHDV)	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

NOx (tpd)																
SUMMARY CATEGORY NAME	**SUMMER AVERAGE**															
	2012	**2015**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**
LIGHT HEAVY DUTY DIESEL TRUCKS - 1 (LHDV1)	11.2	9.1	7.1	6.4	5.8	5.2	4.7	4.2	3.7	3.3	2.9	2.6	2.3	2.0	1.8	1.6
LIGHT HEAVY DUTY DIESEL TRUCKS - 2 (LHDV2)	2.9	2.2	1.6	1.4	1.2	1.1	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.3	0.2	0.2
MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV)	17.3	13.4	10.5	9.7	7.9	6.2	6.1	4.8	4.9	5.0	5.1	5.1	5.1	5.2	5.2	5.2
HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV)	115.2	78.4	63.1	61.6	59.0	54.9	50.5	32.0	31.8	31.6	31.4	31.0	30.9	30.7	30.6	30.5
MOTORCYCLES (MCY)	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
HEAVY DUTY DIESEL URBAN BUSES (UB)	3.5	2.7	2.0	1.7	1.6	1.4	1.3	1.1	1.0	0.9	0.8	0.7	0.6	0.6	0.5	0.4
HEAVY DUTY GAS URBAN BUSES (UB)	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
SCHOOL BUSES (SB)	1.1	1.0	0.9	0.8	0.8	0.7	0.7	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.3
OTHER BUSES (OB)	1.2	0.9	0.7	0.7	0.6	0.5	0.5	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
MOTOR HOMES (MH)	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
*** TOTAL ON-ROAD MOTOR VEHICLES**	**187.7**	**134.4**	**104.9**	**99.4**	**92.2**	**84.0**	**77.2**	**55.3**	**53.6**	**52.0**	**50.5**	**49.0**	**47.8**	**46.7**	**45.8**	**45.1**
OTHER MOBILE SOURCES																
AIRCRAFT	2.6	2.5	2.5	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
TRAINS	12.8	14.0	13.8	13.5	13.2	12.9	12.6	12.3	11.9	11.6	11.3	11.0	10.7	10.4	10.1	9.8
SHIPS AND COMMERCIAL BOATS	1.1	1.0	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.1	1.0
RECREATIONAL BOATS	2.2	2.0	1.9	1.9	1.8	1.8	1.8	1.7	1.7	1.7	1.6	1.6	1.6	1.6	1.5	1.5
OFF-ROAD RECREATIONAL VEHICLES	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2
OFF-ROAD EQUIPMENT	24.7	23.9	21.2	20.2	19.9	19.1	17.7	17.0	16.7	15.4	14.8	14.2	13.8	13.4	13.1	12.8

NOx (tpd)																
SUMMARY CATEGORY NAME	**SUMMER AVERAGE**															
	2012	**2015**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**
AGRICULTURAL CONSTRUCTION EQUIPMENT	5.8	5.1	4.5	4.33	4.1	3.8	3.6	3.4	3.2	3.0	2.8	2.6	2.5	2.3	2.2	2.0
AGRICULTURAL TRACTORS	47.2	42.1	37.8	36.5	34.4	32.4	30.5	28.7	27.1	25.6	24.1	22.8	21.5	20.3	19.2	18.2
OTHER FARM EQUIPMENT	8.3	7.2	6.3	6.1	5.6	5.2	4.8	4.4	4.1	3.8	3.5	3.3	3.1	2.9	2.7	2.5
FUEL STORAGE AND HANDLING	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*** TOTAL OTHER MOBILE SOURCES**	**104.7**	**98.0**	**89.0**	**88.1**	**84.6**	**80.7**	**76.5**	**73.1**	**70.2**	**66.6**	**63.7**	**61.1**	**58.7**	**56.4**	**54.4**	**52.4**
**** TOTAL MOBILE SOURCES**	**292.4**	**232.4**	**193.9**	**187.5**	**176.8**	**164.7**	**153.7**	**128.5**	**123.8**	**118.6**	**114.2**	**110.0**	**106.5**	**103.2**	**100.2**	**97.5**
GRAND TOTAL FOR SAN JOAQUIN VALLEY	**339.6**	**271.8**	**230.4**	**223.8**	**212.7**	**200.5**	**189.4**	**163.9**	**159.0**	**153.6**	**149.1**	**144.8**	**141.1**	**137.7**	**134.6**	**131.9**

Table B-2 VOC Emissions (Summer Daily Averages in Tons per Day)

VOC (tpd)																
SUMMARY CATEGORY NAME	**SUMMER AVERAGE**															
	2012	**2015**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**
STATIONARY SOURCES																
FUEL COMBUSTION																
ELECTRIC UTILITIES	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
COGENERATION	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
OIL AND GAS PRODUCTION (COMBUSTION)	1.2	1.1	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8
PETROLEUM REFINING (COMBUSTION)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
MANUFACTURING AND INDUSTRIAL	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
FOOD AND AGRICULTURAL PROCESSING	1.3	1.1	0.8	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5
SERVICE AND COMMERCIAL	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
OTHER (FUEL COMBUSTION)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*** TOTAL FUEL COMBUSTION**	**4.1**	**3.7**	**3.4**	**3.4**	**3.3**	**3.3**	**3.3**	**3.2**	**3.2**	**3.2**	**3.1**	**3.1**	**3.1**	**3.1**	**3.1**	**3.1**
WASTE DISPOSAL																
SEWAGE TREATMENT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LANDFILLS	1.5	1.6	1.6	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.9	1.9	1.9	2.0	2.0	2.0
INCINERATORS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOIL REMEDIATION	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
OTHER (WASTE DISPOSAL)	21.4	22.1	22.7	23.0	23.4	23.7	24.1	24.8	25.2	25.5	25.9	26.2	27.0	27.4	27.7	28.0
*** TOTAL WASTE DISPOSAL**	**23.0**	**23.9**	**24.5**	**24.9**	**25.2**	**25.6**	**26.0**	**26.8**	**27.2**	**27.6**	**27.9**	**28.3**	**29.2**	**29.5**	**29.9**	**30.2**
CLEANING AND SURFACE COATINGS																
LAUNDERING	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
DEGREASING	1.5	1.6	1.6	1.6	1.6	1.6	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
COATINGS AND RELATED PROCESS SOLVENTS	7.8	8.5	9.0	9.1	9.2	9.4	9.5	9.7	9.9	10.0	10.2	10.3	10.5	10.6	10.8	10.8
PRINTING	4.9	5.1	5.4	5.5	5.6	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.6

VOC (tpd)																
SUMMARY CATEGORY NAME	**SUMMER AVERAGE**															
	2012	**2015**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**
ADHESIVES AND SEALANTS	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
OTHER (CLEANING AND SURFACE COATINGS)	6.2	6.6	7.1	7.2	7.3	7.5	7.6	7.8	7.9	8.0	8.2	8.3	8.4	8.6	8.7	8.7
*** TOTAL CLEANING AND SURFACE COATINGS**	**21.0**	**22.5**	**23.7**	**24.1**	**24.4**	**24.8**	**25.2**	**25.6**	**26.0**	**26.4**	**26.8**	**27.2**	**27.6**	**28.0**	**28.4**	**28.4**
PETROLEUM PRODUCTION AND MARKETING																
OIL AND GAS PRODUCTION	13.1	12.2	11.4	11.2	10.9	10.7	10.5	10.2	10.0	9.8	9.6	9.4	9.2	9.0	8.8	8.6
PETROLEUM REFINING	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
PETROLEUM MARKETING	6.1	5.6	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.6	5.6	5.6	5.7	5.7	5.7
OTHER (PETROLEUM PRODUCTION AND MARKETING)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*** TOTAL PETROLEUM PRODUCTION AND MARKETING**	**20.0**	**18.7**	**17.8**	**17.5**	**17.3**	**17.0**	**16.8**	**16.6**	**16.3**	**16.1**	**15.9**	**15.8**	**15.6**	**15.4**	**15.3**	**15.1**
INDUSTRIAL PROCESSES																
CHEMICAL	4.8	5.0	5.2	5.3	5.4	5.5	5.7	5.8	5.9	6.0	6.2	6.4	6.5	6.7	6.8	7.0
FOOD AND AGRICULTURE	11.2	11.7	12.5	12.7	12.9	13.1	13.3	13.5	13.7	13.8	14.0	14.1	14.3	14.4	14.5	14.6
MINERAL PROCESSES	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4
METAL PROCESSES	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
WOOD AND PAPER	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GLASS AND RELATED PRODUCTS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ELECTRONICS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHER (INDUSTRIAL PROCESSES)	0.8	0.8	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1
*** TOTAL INDUSTRIAL PROCESSES**	**17.2**	**18.0**	**19.1**	**19.4**	**19.8**	**20.1**	**20.4**	**20.8**	**21.1**	**21.4**	**21.7**	**22.1**	**22.4**	**22.7**	**23.0**	**23.3**
**** TOTAL STATIONARY SOURCES**	**85.3**	**86.7**	**88.5**	**89.3**	**90.0**	**90.8**	**91.6**	**92.9**	**93.8**	**94.7**	**95.5**	**96.5**	**97.9**	**98.8**	**99.7**	**100.0**
AREA-WIDE SOURCES																
SOLVENT EVAPORATION																
CONSUMER PRODUCTS	21.5	20.8	21.7	22.0	22.3	22.6	22.9	23.2	23.6	23.9	24.2	24.6	24.9	25.2	25.6	25.9
ARCHITECTURAL COATINGS AND RELATED PROCESS SOLVENTS	10.2	10.4	10.9	11.0	11.2	11.4	11.6	11.7	11.9	12.1	12.3	12.5	12.6	12.8	13.0	13.2
PESTICIDES/FERTILIZERS	15.8	15.1	14.9	14.8	14.7	14.7	14.6	14.5	14.5	14.4	14.3	14.3	14.2	14.1	14.0	14.0

VOC (tpd)																
SUMMARY CATEGORY NAME	**SUMMER AVERAGE**															
	2012	**2015**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**
ASPHALT PAVING / ROOFING	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
*** TOTAL SOLVENT EVAPORATION**	**48.4**	**47.2**	**48.3**	**48.7**	**49.1**	**49.5**	**49.9**	**50.4**	**50.8**	**51.3**	**51.7**	**52.2**	**52.6**	**53.1**	**53.5**	**54.0**
MISCELLANEOUS PROCESSES																
RESIDENTIAL FUEL COMBUSTION	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
FARMING OPERATIONS	95.9	95.9	95.9	95.9	95.9	95.9	95.9	95.9	95.9	95.9	95.9	95.9	95.9	95.9	95.9	95.9
CONSTRUCTION AND DEMOLITION	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PAVED ROAD DUST	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNPAVED ROAD DUST	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FUGITIVE WINDBLOWN DUST	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FIRES	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
MANAGED BURNING AND DISPOSAL	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
COOKING	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
OTHER (MISCELLANEOUS PROCESSES)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*** TOTAL MISCELLANEOUS PROCESSES**	**98.6**	**98.5**	**98.6**	**98.6**	**98.6**	**98.6**	**98.6**	**98.6**	**98.6**	**98.7**	**98.7**	**98.7**	**98.7**	**98.7**	**98.7**	**98.7**
**** TOTAL AREA-WIDE SOURCES**	**147.0**	**145.7**	**146.9**	**147.3**	**147.7**	**148.1**	**148.6**	**149.0**	**149.5**	**149.9**	**150.4**	**150.9**	**151.3**	**151.8**	**152.2**	**152.7**
MOBILE SOURCES																
ON-ROAD MOTOR VEHICLES																
LIGHT DUTY PASSENGER (LDA)	17.8	13.0	9.0	8.2	7.5	7.1	6.7	6.3	6.1	5.9	5.8	5.6	5.5	5.3	5.2	5.0
LIGHT DUTY TRUCKS - 1 (LDT1)	6.3	4.6	3.1	2.7	2.4	2.2	2.0	1.9	1.7	1.6	1.5	1.4	1.3	1.2	1.1	0.9
LIGHT DUTY TRUCKS - 2 (LDT2)	8.8	7.0	5.2	4.8	4.4	4.2	4.0	3.9	3.8	3.7	3.6	3.5	3.4	3.3	3.2	3.1
MEDIUM DUTY TRUCKS (MDV)	8.7	8.1	6.9	6.5	6.1	5.7	5.3	4.9	4.6	4.4	4.2	4.0	3.8	3.6	3.5	3.3
LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1)	2.4	2.0	1.6	1.5	1.4	1.3	1.2	1.1	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6
LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2)	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0
MEDIUM HEAVY DUTY GAS TRUCKS (MHDV)	0.8	0.4	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

VOC (tpd)																
SUMMARY CATEGORY NAME	**SUMMER AVERAGE**															
	2012	**2015**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**
HEAVY HEAVY DUTY GAS TRUCKS (HHDV)	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LIGHT HEAVY DUTY DIESEL TRUCKS - 1 (LHDV1)	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2
LIGHT HEAVY DUTY DIESEL TRUCKS - 2 (LHDV2)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV)	1.5	1.0	0.7	0.6	0.4	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV)	8.5	3.2	2.0	2.0	1.9	1.9	1.8	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
MOTORCYCLES (MCY)	3.8	3.6	3.5	3.5	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
HEAVY DUTY DIESEL URBAN BUSES (UB)	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
HEAVY DUTY GAS URBAN BUSES (UB)	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SCHOOL BUSES (SB)	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHER BUSES (OB)	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MOTOR HOMES (MH)	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*** TOTAL ON-ROAD MOTOR VEHICLES**	**60.5**	**44.2**	**33.2**	**30.8**	**28.7**	**26.9**	**25.5**	**23.7**	**22.8**	**22.0**	**21.4**	**20.7**	**20.1**	**19.5**	**18.9**	**18.3**
OTHER MOBILE SOURCES																
AIRCRAFT	3.0	3.0	3.0	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
TRAINS	0.8	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4
SHIPS AND COMMERCIAL BOATS	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
RECREATIONAL BOATS	11.5	9.9	8.5	8.1	7.6	7.2	6.8	6.5	6.1	5.8	5.4	5.1	4.9	4.6	4.4	4.2
OFF-ROAD RECREATIONAL VEHICLES	3.5	3.1	3.0	3.0	2.9	2.8	2.7	2.7	2.6	2.5	2.5	2.4	2.4	2.3	2.3	2.3
OFF-ROAD EQUIPMENT	11.5	10.3	9.3	9.2	9.0	9.1	9.0	8.9	8.9	8.8	8.8	8.8	8.8	8.8	8.8	8.9
AGRICULTURAL CONSTRUCTION EQUIPMENT	0.8	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.3

VOC (tpd)																
SUMMARY CATEGORY NAME	**SUMMER AVERAGE**															
	2012	**2015**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**
AGRICULTURAL TRACTORS	7.4	6.6	5.9	5.6	5.4	5.2	4.9	4.7	4.5	4.3	4.2	4.0	3.8	3.7	3.5	3.3
OTHER FARM EQUIPMENT	3.1	2.4	1.9	1.7	1.6	1.5	1.4	1.3	1.3	1.2	1.1	1.1	1.0	1.0	1.0	0.9
FUEL STORAGE AND HANDLING	2.8	2.4	2.2	2.2	2.1	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.3
*** TOTAL OTHER MOBILE SOURCES**	**44.5**	**39.3**	**35.2**	**34.9**	**33.8**	**32.9**	**31.9**	**31.1**	**30.3**	**29.5**	**28.8**	**28.1**	**27.6**	**27.1**	**26.6**	**25.7**
**** TOTAL MOBILE SOURCES**	**105.0**	**83.5**	**68.3**	**65.7**	**62.5**	**59.8**	**57.4**	**54.8**	**53.1**	**51.5**	**50.1**	**48.8**	**47.7**	**46.5**	**45.5**	**43.9**
GRAND TOTAL FOR SAN JOAQUIN VALLEY	**337.3**	**315.9**	**303.7**	**302.2**	**300.2**	**298.8**	**297.6**	**296.7**	**296.3**	**296.1**	**296.1**	**296.1**	**296.8**	**297.1**	**297.4**	**296.7**

Table B-3 Valley-Wide Biogenic Emissions for 2007 in Tons per Day

Month	Isoprene	Methylbutenol	Terpenes	Other VOC	Total VOC
January	1.8	8.3	11.1	23.0	44.2
February	3.8	16.0	17.7	45.8	83.2
March	39.4	37.5	37.0	85.7	199.6
April	148.5	106.7	85.6	179.7	520.4
May	299.7	191.9	130.1	252.1	873.9
June	466.4	295.4	192.8	364.5	1319.0
July	566.4	332.8	245.6	444.2	1589.0
August	556.2	312.5	256.3	424.4	1549.5
September	269.5	169.3	157.0	237.6	833.4
October	39.8	57.4	59.6	94.3	251.0
November	4.1	15.8	16.4	34.7	71.0
December	1.5	7.3	8.7	26.6	44.0

B.3 EMISSION STATEMENTS

According to Section 182 (a)(3)(B) of the Clean Air Act (CAA), States with areas designated as nonattainment for ozone must require emission statement data from sources of volatile organic compounds (VOC) or oxides of nitrogen (NOx) in those areas. This requirement applies to all ozone nonattainment areas regardless of the classification (Marginal, Moderate, etc.). Emission statements should be submitted by November 15, 1993, and annually thereafter. Section 182 (a)(3)(B) (ii) of the CAA allows the State to waive the requirement for emission statements for classes or categories of sources with less than 25 tons per year of actual plant-wide NOx or VOC emissions if the State provides an inventory of emissions from the class or category based on the use of emission factors established by EPA or other methods acceptable to EPA.

The District adopted Rule 1160 “Emission Statements” on November 18, 1992 that applies to all owners and operators of any stationary source category which emits or may emit nitrogen oxides or reactive organic compounds and submits all information to the state as required by Section 182 (a)(3)(B) of the CAA. The District has been submitting emissions inventory data to the state since 1993 and has continued to do so each year thereafter. Unlike other inventory systems that are static, the District not only submits the required information, but looks to enhance its inventory system each year as new requirements are known or foreseen. This ensures that future information and data requirements are able to be collected, processes are streamlined, and data is managed in an efficient manner.

The District requests annual emissions inventories from all permitted sources in the San Joaquin Valley. This process starts in January of each year; the District sends (paper or email) each permitted facility an inventory statement or inventory survey form. An emissions inventory statement is required for those facilities that have actual emissions of greater than or equal to 25 tons and an emissions inventory survey form is required

for sources that have potential emissions less than 25 tons. It should be noted that the 25 ton threshold is not only applied to NOx and VOC, but to CO, SOx, and PM10 / PM2.5 as well. The District processes approximately 4,500 facilities annually. This data is submitted to ARB by August of each year.

B.4 EMISSIONS INVENTORY DOCUMENTAITON FOR THE SAN JOAQUIN VALLEY 2016 75 PPB 8-HOUR OZONE STATE IMPLEMENTATION PLAN

[This section provided by California Air Resources Board]

Emissions inventories are one of the fundamental building blocks in the development of a State Implementation Plan (SIP or Plan). In simple terms, an emissions inventory is a systematic listing of the sources of air pollution along with the amount of pollution emitted from each source or category over a given time period. This document presents a summary of the data sources, along with revisions and improvements made to the emissions inventory included in the San Joaquin Valley 8-hour Ozone Plan.

The California Air Resources Board (ARB) and San Joaquin Valley Unified Air Pollution Control District (District) have developed a comprehensive, accurate, and current emissions inventory consistent with the requirements set forth in Section 182(a)(1) of the federal clean air act. ARB and District staff conducted a thorough review of the inventory to ensure that the emission estimates reflect accurate emission reports for point sources, and that estimates for mobile and area-wide sources are based on the most recent models and methodologies. Staff also reviewed the growth profiles for point and areawide source categories, and updated them as necessary to ensure that the emission projections are based on data that reflect historical trends, current conditions, and recent economic and demographic forecasts.

Emissions Inventory Overview

Emissions inventories are estimates of the amount and type of pollutants emitted into the atmosphere by industrial facilities, mobile sources, and areawide sources such as consumer products and paint. They are fundamental components of an air quality plan, and serve critical functions such as:

1) the primary input to air quality modeling used in attainment demonstrations;
2) the emissions data used for developing control strategies; and
3) a means to track progress in meeting the emission reduction commitments.

The United States Environmental Protection Agency (U.S. EPA) regulations require that the emissions inventory contain emissions data for the two precursors to ozone formation: oxides of nitrogen (NOx) and volatile organic compounds (VOC).

Agency Responsibilities

ARB and District staff worked jointly to develop the emissions inventory for the San Joaquin Valley 8-hour ozone nonattainment area. The District worked closely with operators of major stationary facilities in their jurisdiction to develop the point source emission estimates. ARB staff developed the emission inventory for mobile sources, both on-road and off-road. The District and ARB shared responsibility for developing estimates for the nonpoint (areawide) sources such as paved road dust and agricultural burning. ARB worked with several State and local agencies such as the Department of Transportation (Caltrans), the Department of Motor Vehicles (DMV), the Department of

Pesticide Regulation (DPR), the California Energy Commission (CEC), and regional transportation agencies to assemble activity information necessary to develop the mobile and area-wide source emission estimates.

Base Year and Forecasted Inventories

The base year inventory forms the basis for all future year projections and also establishes the emission levels against which progress in emission reductions will be measured. U.S. EPA regulations establish that the base year inventory should be preferably consistent with the triennial reporting schedule required under the Air Emissions Reporting Requirements (AERR) rule. However, U.S. EPA allows a different year to be selected if justified by the state. ARB worked with the local air districts to determine the base year that should be used across the State. Since the South Coast Air Quality Management District typically aligns their base year inventory with the data collection period for their Multiple Air Toxics Exposure Study, which was last conducted in 2012, ARB selected 2012 as the base year to maintain consistency across the various plans being developed in the State.

In addition to a base year inventory, U.S. EPA regulations also require future year inventory projections for specific milestone years. Forecasted inventories are a projection of the base year inventory that reflects expected growth trends for each source category and emission reductions due to adopted control measures. ARB develops emission forecasts by applying growth and control profiles to the base year inventory.

Growth profiles for point and areawide sources are derived from surrogates such as economic activity, fuel usage, population, housing units, etc., that best reflect the expected growth or decline rates for each specific source category. Growth projections were obtained primarily from government entities with expertise in developing forecasts for specific sectors, or in some cases, from econometric models. Control profiles, which account for emission reductions resulting from adopted rules and regulations, are derived from data provided by the regulatory agencies responsible for the affected emission categories.

Projections for mobile source emissions are generated by models that predict activity rates and vehicle fleet turnover by vehicle model year. As with stationary sources, the mobile source models include control algorithms that account for all adopted regulatory actions.

Temporal Resolution

Planning inventories typically include annual as well as seasonal (summer and winter) emission estimates. Annual emission inventories represent the total emissions over an entire year (tons per year), or the daily emissions produced on an average day (tons per day). Seasonal inventories account for temporal activity variations throughout the year, as determined by category-specific temporal profiles. Since ozone concentrations tend to be highest during the summer months, the emission inventory used in the Plan is based on the summer season (May through October).

Geographical Scope

The inventories presented in this Plan include emissions for the seven full counties (Fresno, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare) and the portion of Kern County that comprise the San Joaquin Valley Air Basin.

Quality Assurance and Quality Control

ARB has established a quality assurance and quality control (QA/QC) process involving ARB and District staff to ensure the integrity and accuracy of the emissions inventories used in the development of air quality plans. QA/QC occurs at the various stages of SIP emission inventory development. Base year emissions are assembled and maintained in the California Emission Inventory Development and Reporting System (CEIDARS). ARB inventory staff works with District staff, who are responsible for developing and reporting point source emission estimates, to verify these data are accurate. The locations of point sources, including stacks, are checked to ensure they are valid. Area-wide source emission estimates are developed by ARB staff as well as some District staff. The methodologies for estimating these are reviewed by ARB and district staff before their inclusion in the emission inventory. Additionally, CEIDARS is designed with automatic system checks to prevent errors such as double counting of emission sources. The system also makes various reports available to assist staff in their efforts to identify and reconcile anomalous emissions.

Future year emissions are estimated using the California Emission Projection Analysis Model (CEPAM). Growth and control factors are reviewed for each category and year along with the resulting emission projections. Year to year trends are compared to similar and past datasets to ensure general consistency. Emissions for specific categories are checked to confirm they reflect the anticipated effects of applicable control measures. Mobile categories are verified with mobile source staff for consistency with the on-road and off-road emission models.

A summary of the information supporting the San Joaquin Valley 8-hour ozone SIP emissions inventory is presented in the sections below.

Point Sources

The emissions inventory reflects actual emissions from industrial point sources reported to the District by the facility operators through calendar year 2012. The stationary sources subject to these reporting requirements are determined by the District based on the requirements set forth in U.S. EPA's AERR rule. U.S. EPA requires that the data elements in the emission inventory within the boundaries of the nonattainment areas be consistent with the detail required by the AERR rule. The data elements in the 2012 baseline inventory are consistent with the data elements required by the AERR rule.

Estimation methods include source testing, direct measurement by continuous emissions monitoring systems, or engineering calculations. The point source categories are listed in Table 1.

Table 1
Point Source Categories

Source Category	Subcategory
Fuel Combustion	Electric Utilities Cogeneration Oil and Gas Production (Combustion) Petroleum Refining (Combustion) Manufacturing and Industrial Food and Agricultural Processing Service and Commercial Other (Fuel Combustion)
Waste Disposal	Sewage Treatment Landfills Incinerators Soil Remediation Other (Waste Disposal)
Cleaning and Surface Coatings	Laundering Degreasing Coatings and Related Process Solvents Printing Adhesives and Sealants Other (Cleaning and Surface Coatings)
Petroleum Production and Marketing	Oil and Gas Production Petroleum Refining Petroleum Marketing Other (Petroleum Production and Marketing)

Table 1
Point Source Categories

Source Category	Subcategory
Industrial Processes	Chemical
	Food and Agriculture
	Mineral Processes
	Metal Processes
	Wood and Paper
	Glass and Related Products
	Electronics
	Other (Industrial Processes)

Stationary Area Sources

The point source inventory also includes emissions from stationary area sources, which are categories such as internal combustion engines and gasoline dispensing facilities that are not inventoried individually, but are estimated as a group and reported as a single source category. The District's methodologies encompassing over sixty individual stationary area source subcategories are available at: http://www.valleyair.org/Air_Quality_Plans/EmissionsMethods/EmissionsMethods.htm

While emission estimates for most stationary area sources are provided by the District, the estimates for the following categories were developed by ARB:

Stationary Nonagricultural Diesel Engines

This category includes emissions from backup and prime generators and pumps, air compressors, and other miscellaneous stationary diesel engines that are widely used throughout the industrial, service, institutional, and commercial sectors. The emission estimates, including emission forecasts, are based on a 2003 ARB methodology derived from the OFFROAD model. Additional information on this methodology is available at: http://www.arb.ca.gov/ei/areasrc/FULLPDF/FULL1-2.pdf

Agricultural Irrigation Pumps

Emissions from agricultural irrigation pumps are estimated from a model developed by ARB staff. Air districts with significant irrigated agricultural acreage provided estimates of the population and emissions from stationary and mobile diesel-fueled agricultural irrigation pumps. These data were reconciled with equipment population estimates from the 2003 US Department of Agriculture Farm and Ranch Irrigation Survey (FRIS). The inventory also reflects the number of pumps that have been replaced to date under the Carl Moyer Program. Emissions are forecasted using irrigated cropland acreage trends. Additional information on this methodology is available at: http://www.arb.ca.gov/regact/agen06/attach2.pdf

Laundering

This category includes emissions from perchloroethylene (perc) dry cleaning establishments. The emission estimates are based on a 2002 ARB methodology that used nationwide perc consumption rates allocated to the county level based on population and an emission factor of 10.125 pounds per gallon used. Emissions were grown from the original estimates to 2012 using population growth trends from the California Department of Finance. Additional information on this methodology is available at:
http://www.arb.ca.gov/ei/areasrc/onehtm/one3-1.htm

Degreasing

This category includes emissions from the use of solvents in degreasing operations in the manufacturing and maintenance industries. The emission estimates from this source category are based on a 1996 study by E.H. Pechan and Associates, Inc. (Pechan) titled, "Solvent Cleaning/Degreasing Source Category Emission Inventory." To estimate degreasing emissions, Pechan collected activity data by surveying solvent users in two major groups: manufacturing and maintenance. Emissions were estimated for 32 equipment and solvent pairs. For the manufacturer's survey, the emission factor for pure solvents is the density of the particular solvent. The emission factor for solvent blends is the density of the solvent multiplied by the total organic gas (TOG) content of the solvent. Exhaust controls were taken into account if used. For the maintenance survey, the emission factors are the density of the solvent with no exhaust controls. The 1993 emissions estimates were grown to 2012 based on manufacturing output data developed by Pechan. Additional information on this methodology is available at:
http://www.arb.ca.gov/ei/areasrc/onehtm/one3-2.htm

Oil and Gas Production

ARB staff updated the emission inventory for oil and natural gas production, which included the revision of emission estimates and the addition of emission categories that previously were not estimated. The revised emissions were calculated with a software tool developed by U.S. EPA that generates county-level emissions for upstream oil and gas activity. This tool uses 2011 as the base year, with activity data taken from the California Division of Oil, Gas, and Geothermal Resources (DOGGR) and an industry database, and default emission factors provided in an associated report. Staff incorporated data from ARB's 2007 Oil and Gas Industry Survey (e.g., typical component counts) and feedback from individual air districts (e.g., minimum controls required to operate in a certain district, with associated control factors) to improve these parameters and further adjust the tool's output. Emissions estimates for 2012 and other years were forecasted using the historical trend in statewide oil production from DOGGR, which assumes a 2.2 percent annual decline.

Gasoline Dispensing Facilities

ARB staff developed an updated methodology to estimate emissions from fuel transfer and storage operations at gasoline dispensing facilities (GDFs). The methodology addresses emissions from underground storage tanks, vapor displacement during vehicle refueling, customer spillage, and hose permeation. The

updated methodology uses emission factors developed by ARB staff that reflect more current in-use test data and also accounts for the emission reduction benefits of onboard refueling vapor recovery (ORVR) systems. The emission estimates are based the 2012 statewide gasoline sales data from the California Board of Equalization that were apportioned to the county level using fuel consumption estimates from ARB's on-road mobile sources model (EMFAC). Additional information on this category is available at:
http://www.arb.ca.gov/ei/areasrc/arbpetprodmarkpm.htm

Areawide Sources

Areawide sources are categories such as consumer products, fireplaces, and agricultural burning for which emissions occur over a wide geographic area (see Table 2). Emissions for these categories are estimated by both ARB and the local air districts using various models and methodologies.

Table 2
Areawide Sources

Source Category	Subcategory
Solvent Evaporation	Consumer Products
	Architectural Coatings and Related Solvents
	Pesticides/Fertilizers
	Asphalt Paving and Roofing
Miscellaneous Processes	Residential Fuel Combustion
	Farming Operations
	Fires
	Managed Burning and Disposal
	Cooking

A summary of the areawide methodologies is presented below:

Consumer Products

The consumer products category reflects the three most recent surveys conducted by ARB staff for the years 2003, 2006, and 2008. Together these surveys collected updated product information and ingredient information for approximately 350 product categories. Based on the survey data, ARB staff determined the total product sales and total VOC emissions for the various product categories. The growth trend for most consumer product subcategories is based on the latest DOF human population growth projections, except for aerosol coatings. Staff determined that a no-growth profile would be more appropriate for aerosol coatings based on survey data that show relatively flat sales of these products over the last decade. Additional information on ARB's consumer products surveys is available at:
http://www.arb.ca.gov/consprod/survey/survey.htm.

Architectural Coatings

The architectural coatings category reflects emission estimates based on the comprehensive survey for the 2004 calendar year. The emission estimates include benefits of the 2003 and 2007 ARB Suggested Control Measures. These emissions are grown based on the growth in housing units. Additional information about ARB's architectural coatings program is available at:
http://www.arb.ca.gov/coatings/arch/arch.htm

Pesticides

The Department of Pesticide Regulation (DPR) develops month-specific emission estimates for agricultural and structural pesticides. Each calendar year, DPR updates the inventory based on the Pesticides Use Report, which provides updated information from 1990 to the most current data year available. The inventory includes estimates through the 2012 calendar year. Emission forecasts for years 2013 and beyond are based on the average of the most recent five years.

Asphalt Paving/Roofing

Asphalt paving and asphalt roofing emissions were estimated using methodologies developed by the District. VOC emissions are estimated based on tons of paving applied in 2008 or the amount of asphalt used for roofing in 2007, and a default emission factor for each type of asphalt operation. The growth profile for asphalt paving is based on construction employment from the REMI forecasting model. No growth is assumed for asphalt roofing, as the industry has been moving toward the use of more advanced alternative materials. The inventory reflects the emission reductions from District Rule 4641. The District methodologies are available at:
http://www.valleyair.org/Air_Quality_Plans/EmissionsMethods/MethodForms/Current/AsphaltPaving2008.pdf,
and
http://www.valleyair.org/Air_Quality_Plans/EmissionsMethods/MethodForms/Current/AsphaltRoofing2007.pdf

Residential Wood Combustion

The residential wood combustion methodology uses fuel consumption data from various surveys, including newer sales data for manufactured logs, and emission factors from U.S. EPA's National Emission Inventory. The fireplace wood consumption rate for 2008 and previous years is based on a 1997 firewood usage survey sponsored by the District. To reflect the episodic wood burning curtailment requirements in District Rule 4901 that became fully effective in 2009, the fireplace wood consumption rate for 2009 and subsequent years is based on the values suggested in a report by U.S. EPA staff and others entitled "A Recommended Procedure for Compiling Emission Inventory National, Regional and County Level Activity Data for the Residential Wood Combustion Source Category." Staff assumed no growth for this category because of limits in new construction and the stringency of the District's rule. Additional information on this methodology is available at:
http://www.arb.ca.gov/ei/areasrc/arbmiscprocresfuelcom.htm

Residential Natural Gas Combustion

The inventory for residential natural gas combustion emissions is based on 2006 data provided by the District. Emissions are estimated based on the percentages of total natural gas consumed by various residential uses (space heating, water heating, cooking, other) obtained from the California Energy Commission (CEC), and U.S. EPA AP-42 emission factors. Emissions were grown from 2006 using CEC projections of natural gas consumption. The water heating inventory reflects the emission reductions from District Rule 4902. The District's methodology is available at: http://www.valleyair.org/Air_Quality_Plans/EmissionsMethods/MethodForms/Current/ResidentialNG2006.pdf

Farming Operations

The dairy, feedlot, and range cattle emission estimates reflect livestock population data from the U.S. Department of Agriculture's (USDA) 2012 Census of Agriculture, and emission factors for dairy support cattle provided by District staff. The emission estimates for other livestock categories are based on the USDA 2007 Census of Agriculture. Dairy emissions growth assumptions were set to no-growth based on an analysis of the SJV historical dairy cow population, which shows a relatively flat profile since 2007. Other livestock categories reflect a no-growth assumption based on an earlier analysis that found no significant growth. The emissions reflect updated District control profiles to account for control requirements, including VOC controls from District Rule 4570. Additional information on ARB's methodology is available at: http://www.arb.ca.gov/ei/areasrc/arbmiscprocresfarmop.htm

Fires

Emissions from structural and automobile fires were estimated using ARB's March 1999 methodology. Structural fire emissions estimates are based on rates of structural and content material loss per fire, average combustible content, and an emission factor per ton of material burned. Automobile fire emissions are based the number of vehicle fires per year and a composite emission factor from US EPA's AP-42 (April 1973). Structural fire emissions were grown based on the growth in occupied households, and automobile fire emissions were grown based on population projections from the California Department of Finance. ARB's methodology is available at: http://www.arb.ca.gov/ei/areasrc/arbmiscprocfires.htm

Managed Burning & Disposal

The managed burning and disposal category is based on emissions data reported by District staff for 2012. Emissions are calculated using crop specific emission factors and fuel loadings. The agricultural burning emissions were grown based on linear regression analyses of the 2000-2009 farmland acreage. Staff used a no-growth assumption for forest management emissions based on analyses of District reported data that don't show a discernible trend. No-growth was also used for weed abatement, as the emission levels for this category have been fairly stable since 2005. ARB's methodology for managed burning is available at: http://www.arb.ca.gov/ei/see/see.htm.

Commercial Cooking

The commercial cooking inventory is based on emissions data reported by the District for 2008. The emissions estimates were developed from the number of restaurants, the number and types of cooking equipment, the food type, and emission factors from U.S. EPA's 2002 National Emissions Inventory. The growth profile reflects the latest population projections provided by the California Department of Finance (DOF). The inventory also reflects the emission reductions from District Rule 4692. Additional information on the District's methodology is available at: http://www.arb.ca.gov/ei/areasrc/districtmeth/sjvalley/CommercialCooking2006.pdf

Point and Areawide Source Emissions Forecasting

Emission forecasts (2013 and subsequent years) are based on growth profiles that in many cases incorporate historical trends up to the base year or beyond. The growth surrogates used to forecast the emissions from these categories are presented in Table 3 below.

Table 3
Growth Surrogates for Point and Areawide Sources

Source Category	Subcategory	Growth Surrogate
Electric Utilities	Natural Gas	CEC Integrated Energy Policy Report (IEPR 2013)
	Other Fuels	Annual Energy Outlook 2011(AEO 2011): Energy consumption forecasts
Cogeneration	Natural Gas	IEPR 2013
	Other Fuels	AEO 2011
Oil and Gas Production (Combustion)	All	DOGGR statewide total oil production (2.2% annual decline)
Petroleum Refining	All	No growth – facilities operating at capacity
Manufacturing & Industrial	Natural Gas	IEPR 2013
	Other Fuels	AEO 2011
Food & Agricultural Processing	Ag Irrigation Pumps	Farmland acreage
	Other	IEPR 2013 & AEO 2011
Service & Commercial	Natural Gas	IEPR 2013
	Other Fuels	AEO 2011
Other (Fuel Combustion)	I.C. Reciprocating Engines	Cal. Department of Finance (DOF) population projections
	Other	AEO 2011
Sewage Treatment	All	Regional Economic Models, Inc. (REMI) industry-specific outputs
Landfills	Stationary Aggregated (SA) Sources	DOF population projections

Table 3
Growth Surrogates for Point and Areawide Sources

Source Category	Subcategory	Growth Surrogate
	Point Sources	REMI industry-specific outputs
Incinerators	All	REMI industry-specific outputs
Soil Remediation	All	REMI industry-specific outputs
Other (Waste Disposal)	SA Sources	DOF Population projections
Other (Waste Disposal)	Point Sources	REMI industry-specific outputs
Laundering	SA Sources	DOF Population projections
	Point Sources	REMI industry-specific outputs
Degreasing	Cold Cleaning, Petroleum Naphtha	No growth post 2008 due to sharp decline in petroleum naphta use
Degreasing	Other	REMI industry-specific outputs
Coatings & Related Process Solvents	All	REMI industry-specific outputs
Printing	All	REMI industry-specific outputs
Adhesives & Sealants	All	REMI industry-specific outputs
Other (Cleaning & Surface Coatings)	All	REMI industry-specific outputs
Oil & Gas Production	All	DOGGR statewide total oil production (2.2% annual decline)
Petroleum Marketing	Gasoline Dispensing Facilities	Gasoline consumption projections (EMFAC2014)
	Natural Gas Transmission Losses	DOGGR and CEC natural gas consumption
	Point Sources	REMI industry-specific outputs
Other (Petroleum Production & Marketing)	All	REMI industry-specific outputs
Chemical	All	REMI chemical manufacturing output
Food & Agriculture	All	REMI food manufacturing output
Mineral Processes	Cement Concrete Manufacturing & Fabrication	REMI cement and concrete products manufacturing output
	Cement (Portland & Others) Manufacturing	AEO 2011
	Other	REMI non-metallic mineral product manufacturing output
Metal Processes	All	REMI industry-specific outputs
Wood & Paper	All	REMI wood product and paper manufacturing output
Glass & Related Products	Flat Glass	Construction equipment curve, capped at pre-recession levels
	Container Glass	No growth

Table 3
Growth Surrogates for Point and Areawide Sources

Source Category	Subcategory	Growth Surrogate
Other (Industrial Processes)	All	REMI manufacturing Output
Consumer Products	Consumer Products	Population projections
Consumer Products	Aerosol Coatings	No growth
Architectural Coatings & Thinners	All	Household projections
Pesticides & Fertilizers	Agricultural Pesticides	Farmland acreage
	Structural Pesticides	Housing expenditures
Asphalt Paving & Roofing	Asphalt Paving	Construction employment
	Asphalt Roofing	No growth
Residential Fuel Combustion	Wood Stoves & Fireplaces	No growth
	Others	Natural gas consumption
Farming Operations	Dairy Livestock	No growth
	Other Livestock	No growth
Fires	Structural Fires	Household projections
	Automobile Fires	Population projections
Managed Burning & Disposal	Ag Burning - Prunings or Field Crops	Farm land acreage
	Forest Management	No Growth
	Weed Abatement	No Growth
Cooking	All	Population projections

Control Profiles

The emissions inventory reflects emission reductions from point and areawide sources subject to District rules. The local rules reflected in the inventory are listed in Table 4 below.

Table 4
District Rules Included in the SIP Inventory

Rule No.	Rule Title	Source Categories Impacted
4103	Open Burning	Agricultural burning
4204	Cotton Gins	Agricultural crop processing losses - Cotton ginning facilities
4305	Boilers, Process Heaters, and Steam Generators	Fuel combustion - Boilers, Process Heaters, and Steam Generators
4306	Boilers, Process Heaters, and Steam Generators	Fuel combustion - Boilers, Process Heaters, and Steam Generators
4307	Boilers, Process Heaters, and Steam Generators	Fuel combustion - Boilers, Process Heaters, and Steam Generators
4308	Boilers, Process Heaters, and Steam Generators	Fuel combustion - Boilers, Process Heaters, and Steam Generators
4309	Dryers, Dehydrators, and Ovens	Laundering; manufacturing & industrial; service & commercial
4320	Boilers, Process Heaters, and Steam Generators - Advanced Options for Emission Reduction	Fuel combustion - Boilers, Process Heaters, and Steam Generators
4352	Solid Fuel Fired Boilers, Steam Generators and Process Heaters	Fuel combustion - Boilers, Process Heaters, and Steam Generators
4354	Glass Melting Furnaces	Glass and related processes
4401	Steam-Enhanced Crude Oil Production Well Vents	Oil and gas production
4402	Crude Oil Production Sumps	Oil and gas production
4404	Heavy Oil Test Station - Kern County	Oil and gas production
4408	Glycol Dehydration Systems	Oil and gas production
4409	Components at Gas/Oil Production Facilities	Oil and gas production
4453	Refinery Vacuum Producing Devices or Systems	Petroleum refining
4455	Components at Refineries & Chemical Plants	Petroleum refining
4550	Conservation Management Practices	Agricultural operations, dust, and managed burning
4565	Biosolids, Animal Manure, and Poultry Litter Operations	Composting operations

Table 4
District Rules Included in the SIP Inventory

Rule No.	Rule Title	Source Categories Impacted
4566	Organic Material Composting Operations	Composting operations
4570	Confined Animal Facilities	Livestock operations
4601	Architectural Coatings	Architectural coatings
4602	Motor Vehicle and Mobile Equipment Coating Operations	Coating and related processes
4603	Surface Coating of Metal Parts and Products	Coating and related processes
4604	Can and Coil Coating Operations	Coating and related processes
4605	Aerospace Assembly and Component Coating Operations	Coating and related processes
4606	Wood Coating Operations	Coating and related processes
4607	Graphic Arts	Coating and related processes; printing
4610	Glass Coating Operations	Coating and related processes
4612	Automotive Coatings	Coating and related processes
4621	Gasoline Transfer into Stationary Storage Containers, Delivery Vessels, and Bulk Plants	Petroleum marketing
4622	Gas Transfer into Vehicle Storage Tanks	Petroleum marketing
4623	Storage of Organic Liquids	Oil and gas production; petroleum refining; petroleum marketing
4624	Organic Liquid Loading	Petroleum marketing
4625	Wastewater Separators	Petroleum refining - Wastewater treatment
4641	Cutback, Slow Cure, and Emulsified Asphalt Paving and Maintenance Operations	Asphalt paving & roofing
4642	Solid Waste Disposal Sites	Landfills; waste disposal
4651	Volatile Organic Compound Emissions from Decontaminated Soil	Waste disposal - Soil remediation
4653	Adhesives and Sealants	Adhesives & sealants
4661	Organic Solvents	Coatings and related process solvents; cleaning and surface coatings
4662	Organic Solvent Degreasing Operations	Degreasing; thinning and cleanup solvent uses
4663	Organic Solvent Cleaning, Storage and Disposal	Degreasing; thinning and cleanup solvent uses; cleaning & surface coating
4672	Petroleum Solvent Dry Cleaners	Laundering

Table 4
District Rules Included in the SIP Inventory

Rule No.	Rule Title	Source Categories Impacted
4681	Rubber Tire Manufacturing	Chemical - Rubber and rubber products manufacturing
4682	Polystyrene	Chemical - Plastic and plastic products manufacturing
4684	Polyester Resin Operations	Chemical - Plastic and plastic products manufacturing
4691	Vegetable Oil Processing Operations	Food and agriculture
4692	Commercial Charbroiling	Cooking
4693	Bakery Ovens	Food and agriculture
4701	Internal Combustion Engines (Phase 1)	Fuel combustion
4702	Internal Combustion Engines (Phase 2)	Fuel combustion
4703	Stationary Gas Turbines	Fuel combustion
4901	Wood Burning Fireplaces and Wood Burning Heaters	Residential wood combustion
4902	Residual Water Heaters	Residential fuel combustion - Water heating
REG VIII	Regulation VIII -- PM Control for Fugitive Dust	Construction and demolition; paved and unpaved road dust; fugitive windblown dust; mineral processes

On-Road Mobile Sources

Emissions from on-road mobile sources, which include passenger vehicles, buses, and trucks, were estimated using ARB's EMFAC2014 model. The on-road emissions were calculated by applying EMFAC2014 emission factors to the transportation activity data provided by the local SJV transportation agencies from their 2014 adopted Regional Transportation Plan.

EMFAC2014 includes data on California's car and truck fleets and travel activity. Light-duty motor vehicle fleet age, vehicle type, and vehicle population were updated based on 2012 California Department of Motor Vehicles data. The model also reflects the emissions benefits of ARB's recent rulemakings such as the Pavley Standards and Advanced Clean Cars Program, and includes the emissions benefits of ARB's Truck and Bus Rule and previously adopted rules for other on-road diesel fleets.

EMFAC2014 utilizes a socio-econometric regression modeling approach to forecast new vehicle sales and to estimate future fleet mix. Light-duty passenger vehicle population includes 2012 Department of Motor Vehicles (DMV) registration data along with updates to mileage accrual using Smog Check data. Updates to heavy-duty trucks include model year specific emission factors based on new test data, and population estimates using DMV data for in-state trucks and International Registration Plan (IRP) data for out-of-state trucks.

Additional information and documentation on the EMFAC2014 model is available at: http://www.arb.ca.gov/msei/categories.htm#emfac2014

Off-Road Mobile Sources

Emissions from off-road sources were estimated using either a newer suite of category-specific models or, where a new model was not available, the OFFROAD2007 model. Many of the newer models were developed to support recent regulations, including in-use off-road equipment, ocean-going vessels and others. The sections below summarize the updates made to specific off-road categories.

Oil and Gas Wells: Workover Rigs, Drill Rigs and Support Equipment Allocation

The allocation of drill and work-over rigs and support equipment (such as pumps) for oil and gas wells was updated within the SJV Air Basin to reflect the physical location of wells instead of the registration location. This allocation was done at the county level, where the number of wells within a county in the SJV Air Basin was used to determine that county's share of emissions from specified equipment. The physical location and count of wells was updated using Division of Oil, Gas and Geothermal Resources (DOGGR) Well Finder data, from September, 2013, supplied to ARB by the District. (DOGGR data are available at: http://www.conservation.ca.gov/dog/Pages/Wellfinder.aspx)

Ocean-Going Vessels (OGV)

Staff updated the OGV activity growth rates and NOx emission calculations in September 2013. These updates reflect more recently available long-term economic forecasts and historical data from 2006 to 2012. ARB staff updated the long-term growth factors for container ships, auto ships, tankers, and cruise ships. Additional information is available at:
http://www.arb.ca.gov/msei/categories.htm#offroad_motor_vehicles

Cargo Handling Equipment

The emissions inventory for the Cargo Handling Equipment category has been updated to reflect new information on equipment population, activity, recessionary impacts on growth, and engine load. The new information includes regulatory reporting data which provide an accounting of all the cargo handling equipment in the State including their model year, horsepower and activity. Additional information is available at:
http://www.arb.ca.gov/msei/categories.htm#offroad_motor_vehicles

Pleasure Craft and Recreational Vehicles

A new model was developed in 2011 to estimate emissions from pleasure craft and recreational vehicles. In both cases, population, activity, and emission factors were re-assessed using new surveys, registration information, and emissions testing. Additional information is available at:
http://www.arb.ca.gov/msei/categories.htm#offroad_motor_vehicles

In-Use Off-Road Equipment

ARB developed this model in 2010 to support the analysis for amendments to the In-Use Off-Road Diesel Fueled Fleets Regulation. Staff updated the underlying activity forecast to reflect more recent economic forecast data, which suggests a slower rate of recovery through 2024 than previously anticipated. Additional information is available at: http://www.arb.ca.gov/msei/categories.htm#offroad_motor_vehicles

Locomotives

In 2014, ARB developed a revised inventory for line-haul locomotive activity in California. The new model is based primarily on activity data reported to ARB by the major rail lines for calendar year 2011. To estimate emissions, ARB used duty cycle, fuel consumption and activity data reported by the rail lines. Activity is forecasted for individual train types and is consistent with ARB's ocean-going vessel and truck growth rates. Fuel efficiency improvements are projected to follow Federal Railroad Association projections and turnover assumptions are consistent with U.S. EPA projections. Additional information is available at:
http://www.arb.ca.gov/msei/categories.htm#offroad_motor_vehicles

Transport Refrigeration Units (TRU)

This model reflects updates to activity, population, growth and turn-over data, and emission factors developed to support the 2011 amendments to the Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units. Additional

information is available at:
http://www.arb.ca.gov/msei/categories.htm#offroad_motor_vehicles

Fuel Storage and Handling

Emissions for fuel storage and handling were estimated using the OFFROAD2007 model. Additional information is available at:
http://www.arb.ca.gov/msei/categories.htm#offroad_motor_vehicles

Diesel Agricultural Equipment

The inventory for agricultural diesel equipment (such as tractors, harvesters, combines, sprayers and others) was revised based on a 2008 survey of thousands of farmers, custom operators, and first processors. The survey data, along with information from the 2007 USDA Farm Census, was used to revise almost every aspect of the agricultural inventory, including population, activity, age distribution, fuel use, and allocation. This updated inventory replaces general information on farm equipment in the United States with one specific to California farms and practices. The updated inventory was compared against other available data sources such as Board of Equalization fuel reports, USDA tractor populations and age, and Eastern Research Group tractor ages and activity, to ensure the results were reasonable and compared well against outside data sources. Agricultural growth rates through 2050 were developed through a contract with URS Corp and UC Davis, in cooperation with the SJV agricultural community. Additional information is available at:
http://www.arb.ca.gov/msei/categories.htm#offroad_motor_vehicles

Mobile Source Forecasting

The table below summarizes the data and methods used to forecast future-year mobile source emissions by broad source category groupings.

Table 5
Growth Surrogates for Mobile Sources

Category	Growth Methodology
On-Road Sources	
All	Match total VMT projections provided by Municipal Planning Organizations
Off-Road Gasoline Fueled Equipment	
Lawn & Garden	Household growth projection
Off-Road Equipment	Employment growth projection
Recreational Boats	Housing starts (short-term) and human population growth (long-term)
Recreational Vehicles	Housing starts (short-term) and human population growth (long-term)
Off-Road Diesel-Fueled Equipment	
Commercial Harbor Craft	Growth rates provided by District, except for tugs and fishing vessels. Fishing fleet growth rates were adjusted to reflect a decline in fish landings. Assumed no growth for tugboats.
Construction and Mining	California construction employment data from U.S. Bureau of Labor Statistics
Farm Equipment	2011 study of forecasted growth by URS Corp, with SJV Advisory Committee funding.
Industrial Equipment	California construction employment data from Bureau of Labor Statistics
Oil Drilling	California oil and gas extraction gross domestic product from the U.S. Bureau of Economic analysis, oil company diesel fuel use published by the U.S. Energy Information Administration, California rotary rig counts from Baker Hughes, and California oil and gas extraction employment from the U.S. Bureau of Labor Statistics
Ocean-Going Vessels	Projected commodity tonnage in the Freight Analysis Framework (FAF) Model developed by the Federal Highway Administration
Trains (line haul)	International/premium train growth tied to OGV forecast; Domestic train growth tied truck growth
Transport Refrigeration Units	Projection of historical Truck/Trailer TRU sales from ACT Research, adjusted for recession.