

SMAQMD
AREA SOURCE SUMMARY - SACRAMENTO COUNTY

Section ##
Stationary Agricultural Irrigation Internal Combustion Engines

EMISSION INVENTORY SOURCE CATEGORY

Stationary Agricultural Irrigation Pumps

EMISSION INVENTORY CODES (CES CODES) AND DESCRIPTION

052-042-1200-0000 (83998) – Ag. Irrigation I.C. Engines (“Other Ag. Irrigation Pumps)

METHOD SUMMARY

This emission category, “Other Ag. Irrigation Pumps”, under Stationary Source Category accounts for the emissions from diesel-powered agricultural irrigation pumps which have not already been inventoried under portable diesel-powered agricultural pumps. This category includes both stationary and portable pumps. Portable diesel-powered agricultural pumps are estimated by CARB, and are inventoried under Offroad Mobile Category, EIC 870-882-1210-0000 (CES 81927) – Heavy Duty Farm Equipment. Gasoline and LPG-powered irrigation pumps contribute negligible amount, less than 1 percent, to the total irrigation pump emissions, and are not included in the inventory. Currently, there are not enough data to classify the pump emissions as stationary or portable. Consequently, the emission inventory for “Other Ag. Irrigation Pumps” is assumed to equal the total irrigation pump emissions minus the CARB’s portable pump emissions. CARB is working on developing a new agricultural pump inventory and the District will incorporate it into the inventory once it is finalized. Meanwhile, the difference between the total agricultural pump emissions and the CARB’s portable agricultural pump emissions is accounted under this emission category. For year 2000, the District estimated a total of 727 diesel irrigation pumps for the Sacramento ozone non-attainment area. Sacramento area specific annual average NOx emission factor per pump per year is derived by using 980 hours per year activity level, 65 percent load factor, and horsepower sizes and ages of the 366 Sacramento area irrigation pumps.

Table 1 below presents the total uncontrolled 2000 emission inventory for the Sacramento Non-attainment Region (SNAR) diesel irrigation pumps by county estimated by the District. The attached report, “Emission Inventory of Agricultural Fuel-Powered Irrigation Pump Used in Sacramento Non-Attainment Region”, dated 2/8/01, describes how the total SNAR emissions are estimated. The total emissions are distributed to each county by using the ratio of the number of pumps in each county to the total SNAR pump population. The total number of pumps in each county is estimated by summing its CARB’s portable pump population and its “Other Ag. Irrigation Pump” population. The number of “Other Ag. Irrigation Pumps” in each county is estimated by taking the difference between the total SNAR pump population and CARB’s SNAR portable pump population and multiplying the difference by the ratio of number of Moyer/SEED pumps in each county to the total Moyer/SEED pumps. CARB’s portable pump inventory is disaggregated by county.

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Table 1: 2000 Total SNAR AG Pump Uncontrolled Emission Inventory (District Estimate)						
County	Population	Emissions (Uncontrolled), TPY^a				
		TOG	CO	Nox	Sox	PM
El Dorado	17	2.42	5.33	24.81	0.29	1.74
Placer	34	4.64	10.24	47.61	0.55	3.33
Sacramento	98	13.52	29.82	138.71	1.61	9.71
Solano	93	12.84	28.31	131.70	1.53	9.22
Sutter*(1/3)	128	17.72	39.07	181.74	2.11	12.72
Yolo	358	49.52	109.21	507.94	5.89	35.56
Grand Total	727	100.67	221.99	1032.51	11.98	72.28

^aNOx is determined by multiplying pump population by 1.42 ton/year_pump; TOG is determined by using the ratio of TOG to NOx emission factor (58.9/604=0.0975); CO is determined by using the ratio of CO to NOx emission factor (130/604=0.215); PM10 is determined by using the ratio of PM10 to NOx emission factor (42.4/604=0.070), SOx is determined by using the ratio of SOx to NOx emission factor (7.05/604=0.0116). Emission factors are from AP42, Section 3.3(10/96).

Table 2 below presents the total SNAR actual (controlled) 2000 emission inventory for the diesel-powered irrigation pumps by county estimated by the District. By year 2000, Moyer/SEED programs have replaced over 30 percent of the total SNAR uncontrolled pumps with new NOx controlled pumps.

Table 2: 2000 Total SNAR AG Pump Actual (Controlled) Emission Inventory (District Estimate)						
County	Population	Emissions (Actual), TPY^b				
		TOG	CO	Nox	Sox	PM
El Dorado	17	2.42	5.33	24.81	0.29	1.74
Placer	34	4.64	10.24	47.61	0.55	3.33
Sacramento	98	13.52	29.82	133.02	1.61	9.71
Solano	93	12.84	28.31	113.72	1.53	9.22
Sutter*(1/3)	128	17.72	39.07	147.65	2.11	12.72
Yolo	358	49.52	109.21	403.71	5.89	35.56
Grand Total	727	100.67	221.99	870.53	11.98	72.28

^bNOx is determined by multiplying uncontrolled pump population by 1.42 ton/year_pump and controlled pump population by 0.73 ton/year_pump. The number of controlled pumps is the number of new pumps replaced by Moyer/SEED in each district. Whereas, the number of uncontrolled pumps in each district is the total pump population minus new pump population. The amount of other pollutants remains unchanged.

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Table 3 below presents the portable diesel irrigation pump inventory for the Sacramento area by county estimated by CARB. These emissions are accounted under Offroad Mobile Category, EIC 870-882-1210-0000 (CES 81927).

Table 3: 2000 SNAR Portable AG Pump Emission Inventory, TPY (CARB Estimate)					
County	TOG	CO	NOx	SOx	PM
El Dorado	1.31	4.05	9.02	0.10	0.73
Placer	2.52	7.70	17.30	0.20	1.35
Sacramento	6.17	19.05	42.34	0.49	3.36
Solano	3.80	11.79	26.21	0.30	2.08
Sutter*(1/3)	2.59	8.08	17.93	0.21	1.42
Yolo	6.79	21.06	46.76	0.54	3.72
Grand Total	23.18	71.73	159.55	1.85	12.67

Table 4 below presents the SNAR “Other Ag. Irrigation Pump” inventory by county estimated by the District. It is determined by subtracting the CARB’s 2000 portable agricultural pump inventory in Table 3 from the total SNAR agricultural pump actual inventory in Table 2. These emissions should be accounted under Stationary Source Category, EIC 052-042-1200-0000 (CES 83998).

Table 4: 2000 “Other Agricultural Irrigation Pumps, TPY (District Estimate)					
County	TOG	CO	NOx	SOx	PM
El Dorado	1.10	1.28	15.79	0.18	1.01
Placer	2.12	2.54	30.31	0.35	1.98
Sacramento	7.36	10.77	90.68	1.12	6.35
Solano	9.04	16.53	87.52	1.22	7.14
Sutter*(1/3)	15.13	31.00	129.72	1.90	11.30
Yolo	42.73	88.15	356.96	5.35	31.83
Grand Total	77.49	150.25	710.97	10.13	59.61

A printout of the Excel spreadsheet used for calculating the emission inventory is attached.

ACTIVITY DATA SOURCE: 1998 Farm and Ranch Irrigation Survey, 2000 SEED and Carl Moyer Databases, 2000 CARB Offroad Model.

EMISSION FACTOR SOURCE: AP-42, CARB Offroad Model.

TEMPORAL DATA:

Daily Activity: hours per day.
Weekly Activity: days per week.
Monthly Activity: weeks per year.

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Average Percent Monthly Activity											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0%	0%	1%	7%	17%	17%	19%	17%	7%	7%	6%	1%

DATE OF THE LAST UPDATE: N/A.

GROWTH PARAMETER: ag-prod.

EMISSION SUMMARY (2000 - ANNUAL AVERAGE TONS/DAY) UNRECONCILED

Sacramento County Only

<u>CES#</u>	<u>TOG</u>	<u>ROG</u>	<u>CO</u>	<u>NOX</u>	<u>SOX</u>	<u>PM</u>	<u>PM10</u>
83998	0.02	0.02	0.03	0.25	0.0	0.02	0.02

The above inventory represents the best estimate given the limited amount of data to work with. It is an actual inventory and it accounts for emission reductions from CARL Moyer and SEED programs. A control profile for CES 83998 – “Other Ag. Irrigation Pumps” and CES 81927 – Portable Ag. Pumps must be submitted to the California Emission Forecast System so that the Off-Road committed reduction (Moyer) and Emission Reduction Credits (SEED) will be reflected in the SIP inventory.

NEEDED CLARIFICATIONS/CORRECTIONS TO CURRENT METHOD

The total number of pumps is potentially much larger than this estimate. The Moyer program has captured 266 pumps so far this year in addition to the 365 pumps from 1999 and 2000. The farmers and pump distributors have indicated a trend in conversion of electric pumps to diesel pumps due to electrical energy reliability/cost. There is no data on the conversion rate. In addition, the equipment turnover (replacement of old diesel pumps with new diesel pumps which are subject to the offroad engine rule) need to be accounted in the control profile for future years. This estimate assumes that with the accelerated equipment turnover caused by Moyer/SEED programs the emission reduction from the natural equipment turnover is negligible.

FUTURE PLANS FOR METHOD UPDATE/REVISION

This emission category will be updated as better activity and population data become available.

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