APPENDIX B

UPDATED STATEWIDE POPULATION AND EMISSION INVENTORY FOR DIESEL-FUELED AGRICULTURAL IRRIGATION PUMPS

Winston H. Hickox
Agency Secretary

Air Resources Board

Alan C. Lloyd, Ph.D.
Chairman
1001 I Street • P.O. Box 2815 • Sacramento, California 95812 • www.arb.ca.gov

Gray Davis
Governor

MEMORANDUM

TO: Mike Tollstrup, Chief
Project Assessment Branch
Stationary Source Division

FROM: Randy Pasek, Chief
Emission Inventory Branch
Planning and Technical Support Division

DATE: April 30, 2003

SUBJECT: UPDATED STATEWIDE POPULATION AND EMISSION INVENTORY FOR DIESEL-FUELED AGRICULTURAL IRRIGATION PUMPS

With the assistance of local air district staff, we have updated the statewide emission inventory for diesel-fueled agricultural irrigation pumps. As part of this update process, we contacted seventeen air districts with significant irrigated agricultural acreage to obtain their best estimates of the current population and emissions from stationary and mobile diesel-fueled agricultural irrigation pumps. We also worked with district staff to ensure the updated inventory reflects the number of pumps that have been replaced to date under the Carl Moyer Program.

Table 1 provides the statewide population of diesel-fueled agricultural pumps and annual average emissions of ROG, NOx, and PM by region, district, and county. It should be noted that districts estimated to have fewer than 100 agricultural irrigation pumps were not contacted as part of this update and therefore are not reflected in the statewide inventory presented here. We estimate the updated emission inventory presented here represents over 90% of the total statewide population and emissions from diesel-fueled agricultural irrigation pumps. As shown in Table 1, we estimate there are approximately 8,200 diesel-fueled agricultural irrigation pumps statewide that emit 3.3 tons per day (tpd) of ROG, 32.4 tpd of NOx, and 2.4 tpd of PM on an average annual day. Based on discussions with district staff, we estimate that on a statewide basis, 65% of the pumps are stationary while 35% are mobile, with the stationary to mobile split varying considerably from district to district.

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Website: http://www.arb.ca.gov.

California Environmental Protection Agency

Printed on Recycled Paper

Since ROG and NOx emissions from agricultural irrigation pumps are of greatest concern during the summer months due to their role in ozone formation, we have also provided average summer day emissions in Table 2. The summer day emissions were developed from the annual average emissions using a statewide temporal profile that assumes 67% of the agricultural pump emissions occur in the summer months (May through October). As shown in Table 2, agricultural irrigation pumps are estimated to emit 4.3 tpd of ROG, 43.6 tpd of NOx, and 3.2 tpd of PM on an average summer day.

Annual emissions in tons per year from agricultural irrigation pumps can be calculated by multiplying the annual average emissions shown in Table 1 by 365 days. Using this approach, we estimate diesel-fueled agricultural irrigation pumps statewide emit 1,179 tons per year (tpy) of ROG, 11,839 tpy of NOx, and 868 tpy of PM. In estimating annual emissions, do not use the summer emissions provided in Table 2 as these are representative only of the summer months.

If you have any questions regarding the agricultural irrigation pump inventory described in this memorandum, please contact Michael Benjamin of my staff at (916) 323-2915.

cc: Peter Venturini, Chief
SSD

Bob Fletcher, Chief
PTSD

Table 1. Statewide Population and Annual Average Emissions for Diesel-Fueled Agricultural Irrigation Pumps

Region	Air District	County	COUNTY TOTALS ANNUAL AVERAGE EMISSIONS (TPD)					REGION TOTALS ANNUAL AVERAGE EMISSIONS (TPD)			
			POPULATION	ROG	NOx	PM	SOURCE[1]	POPULATION	ROG	NOx	PM
North Central Coast	Monterey Bay Unified APCD	Monterey	450	0.09	0.72	0.05	ADJ-ARB				
North Central Coast	Monterey Bay Unified APCD	Santa Cruz	62	0.01	0.10	0.01	ARB				
North Central Coast	Monterey Bay Unified APCD	San Benito	56	0.01	0.09	0.01	ARB	568	0.12	0.91	0.06
Sacramento Nonattainment	El Dorado County APCD	El Dorado	20	< 0.01	0.05	< 0.01	DIS				
Sacramento Nonattainment	Feather River AQMD	Sutter	181	0.18	2.06	0.15	DIS				
Sacramento Nonattainment	Placer County APCD	Placer	64	0.02	0.21	0.02	DIS				
Sacramento Nonattainment	Sacramento Metropolitan AQMD	Sacramento	122	0.03	0.38	0.03	DIS				
Sacramento Nonattainment	Yolo/Solano AQMD	Solano	134	0.05	0.65	0.05	DIS				
Sacramento Nonattainment	Yolo/Solano AQMD	Yolo	643	0.32	3.64	0.26	DIS	1164	0.60	6.98	0.50
Sacramento Valley Attainment	Butte County AQMD	Butte	163	0.03	0.26	0.02	ARB				
Sacramento Valley Attainment	Colusa County APCD	Colusa	100	0.02	0.16	0.01	ARB				
Sacramento Valley Attainment	Glenn County APCD	Glenn	130	0.03	0.21	0.01	ARB				
Sacramento Valley Attainment	Tehama County APCD	Tehama	200	0.04	0.32	0.02	ADJ-ARB	693	0.12	0.95	0.07
Salton Sea	Imperial County APCD	Imperial	200	0.04	0.32	0.02	ADJ-ARB	200	0.04	0.32	0.02
San Diego	San Diego County APCD	San Diego	75	0.02	0.12	0.01	ADJ-ARB	75	0.02	0.12	0.01
San Francisco	Bay Area AQMD	Alameda	35	0.01	0.06	< 0.01	ARB				
San Francisco	Bay Area AQMD	Contra Costa	44	0.01	0.07	0.01	ARB				
San Francisco	Bay Area AQMD	Marin	17	< 0.01	0.03	< 0.01	ARB				
San Francisco	Bay Area AQMD	Napa	74	0.01	0.12	0.01	ARB				
San Francisco	Bay Area AQMD	San Francisco	0	0.00	0.00	0.00	ARB				
San Francisco	Bay Area AQMD	San Mateo	21	< 0.01	0.03	< 0.01	ARB				
San Francisco	Bay Area AQMD	Santa Clara	82	0.02	0.13	0.01	ARB				
San Francisco	Bay Area AQMD	Solano	0	0.00	0.00	0.00	ARB				
San Francisco	Bay Area AQMD	Sonoma	147	0.03	0.23	0.02	ARB	420	0.08	0.67	0.04
San Joaquin Valley	San Joaquin Valley Unified APCD	Fresno	1415	0.42	5.09	0.39	DIS				
San Joaquin Valley	San Joaquin Valley Unified APCD	Kern	1066	0.44	4.15	0.30	DIS				
San Joaquin Valley	San Joaquin Valley Unified APCD	Kings	525	0.15	1.91	0.16	DIS				
San Joaquin Valley	San Joaquin Valley Unified APCD	Madera	414	0.13	1.48	0.11	DIS				
San Joaquin Valley	San Joaquin Valley Unified APCD	Merced	270	0.10	0.98	0.07	DIS				
San Joaquin Valley	San Joaquin Valley Unified APCD	San Joaquin	413	0.12	1.47	0.11	DIS				
San Joaquin Valley	San Joaquin Valley Unified APCD	Stanislaus	111	0.03	0.40	0.03	DIS				
San Joaquin Valley	San Joaquin Valley Unified APCD	Tulare	286	0.47	1.79	0.08	DIS	4500	1.85	17.25	1.26
South Central Coast	Santa Barbara County APCD	Santa Barbara	100	0.14	1.71	0.12	DIS				
South Central Coast	Ventura County APCD	Ventura	335	0.15	1.87	0.15	DIS	435	0.29	3.57	0.28
South Coast	South Coast AQMD	Los Angeles	54	0.02	0.35	0.02	DIS				
South Coast	South Coast AQMD	Orange	28	0.01	0.18	0.01	DIS				
South Coast	South Coast AQMD	Riverside	139	0.06	0.90	0.06	DIS				
South Coast	South Coast AQMD	San Bernardino	36	0.02	0.23	0.02	DIS	257	0.12	1.67	0.12
	Grand Total (tons/day)		8212	3.23	32.44	2.38		8212	3.22	32.44	2.37

1 Data Source:
DIS = District Estimate
ARB = ARB OFFROAD Model
ADJ-ARB = ARB OFFROAD Model adjusted to reflect district estimate

PTSD 4/23/2003

Table 2. Statewide Population and Summer Emissions for Diesel-Fueled Agricultural Irrigation Pumps

Region	Air District	County	COUNTY TOTALS SUMMER EMISSIONS (TPD)					REGION TOTALS SUMMER EMISSIONS (TPD)			
			POPULATION	ROG	NOx	PM	SOURCE[1]	POPULATION	ROG	NOx	PM
North Central Coast	Monterey Bay Unified APCD	Monterey	450	0.12	0.97	0.07	ADJ-ARB				
North Central Coast	Monterey Bay Unified APCD	Santa Cruz	62	0.02	0.13	0.01	ARB				
North Central Coast	Monterey Bay Unified APCD	San Benito	56	0.02	0.12	0.01	ARB	568	0.15	1.22	0.09
Sacramento Nonattainment	El Dorado County APCD	El Dorado	20	0.01	0.07	0.01	DIS				
Sacramento Nonattainment	Feather River AQMD	Sutter	181	0.24	2.77	0.20	DIS				
Sacramento Nonattainment	Placer County APCD	Placer	64	0.02	0.26	0.02	DIS				
Sacramento Nonattainment	Sacramento Metropolitan AQMD	Sacramento	122	0.04	0.51	0.04	DIS				
Sacramento Nonattainment	Yolo/Solano AQMD	Solano	134	0.07	0.87	0.06	DIS				
Sacramento Nonattainment	Yolo/Solano AQMD	Yolo	643	0.43	4.89	0.35	DIS	1164	0.81	9.39	0.68
Sacramento Valley Attainment	Butte County AQMD	Butte	163	0.04	0.35	0.03	ARB				
Sacramento Valley Attainment	Colusa County APCD	Colusa	100	0.03	0.21	0.02	ARB				
Sacramento Valley Attainment	Glenn County APCD	Glenn	130	0.03	0.28	0.02	ARB				
Sacramento Valley Attainment	Tehama County APCD	Tehama	200	0.05	0.43	0.03	ADJ-ARB	593	0.16	1.27	0.09
Salton Sea	Imperial County APCD	Imperial	200	0.05	0.43	0.03	ADJ-ARB	200	0.05	0.43	0.03
San Diego	San Diego County APCD	San Diego	75	0.02	0.16	0.01	ADJ-ARB	75	0.02	0.16	0.01
San Francisco	Bay Area AQMD	Alameda	35	0.01	0.08	0.01	ARB				
San Francisco	Bay Area AQMD	Contra Costa	44	0.01	0.10	0.01	ARB				
San Francisco	Bay Area AQMD	Marin	17	< 0.01	0.04	< 0.01	ARB				
San Francisco	Bay Area AQMD	Napa	74	0.02	0.16	0.01	ARB				
San Francisco	Bay Area AQMD	San Francisco	0	0.00	0.00	0.00	ARB				
San Francisco	Bay Area AQMD	San Mateo	21	0.01	0.05	< 0.01	ARB				
San Francisco	Bay Area AQMD	Santa Clara	82	0.02	0.17	0.01	ARB				
San Francisco	Bay Area AQMD	Solano	0	0.00	0.00	0.00	ARB				
San Francisco	Bay Area AQMD	Sonoma	147	0.04	0.31	0.02	ARB	420	0.11	0.90	0.06
San Joaquin Valley	San Joaquin Valley Unified APCD	Fresno	1415	0.57	6.84	0.53	DIS				
San Joaquin Valley	San Joaquin Valley Unified APCD	Kern	1066	0.59	5.58	0.41	DIS				
San Joaquin Valley	San Joaquin Valley Unified APCD	Kings	525	0.20	2.57	0.22	DIS				
San Joaquin Valley	San Joaquin Valley Unified APCD	Madera	414	0.17	1.99	0.15	DIS				
San Joaquin Valley	San Joaquin Valley Unified APCD	Merced	270	0.13	1.31	0.10	DIS				
San Joaquin Valley	San Joaquin Valley Unified APCD	San Joaquin	413	0.16	1.97	0.15	DIS				
San Joaquin Valley	San Joaquin Valley Unified APCD	Stanislaus	111	0.04	0.54	0.04	DIS				
San Joaquin Valley	San Joaquin Valley Unified APCD	Tulare	286	0.63	2.40	0.11	DIS	4500	2.48	23.20	1.70
South Central Coast	Santa Barbara County APCD	Santa Barbara	100	0.19	2.29	0.17	DIS				
South Central Coast	Ventura County APCD	Ventura	335	0.20	2.51	0.21	DIS	435	0.39	4.81	0.37
South Coast	South Coast AQMD	Los Angeles	54	0.03	0.47	0.03	DIS				
South Coast	South Coast AQMD	Orange	28	0.02	0.25	0.02	DIS				
South Coast	South Coast AQMD	Riverside	139	0.09	1.21	0.09	DIS				
South Coast	South Coast AQMD	San Bernardino	36	0.02	0.30	0.02	DIS	257	0.16	2.24	0.16
	Grand Total (tons/day)		8212	4.34	43.63	3.20		8212	4.34	43.63	3.20

1 Data Source:
DIS = District Estimate
ARB = ARB OFFROAD Model
ADJ-ARB = ARB OFFROAD Model adjusted to reflect district estimate

PTSD 4/23/2003