Appendix G

Air Quality Emission Calculations

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Table 1. General Conformity Applicability Evaluation (Unmitigated Emissions)

County/ Nonattainment Area	Emissions (tons per year)								
	VOC		NOx		CO	SOx	PM10	PM2.5	
	Sacramento Metro[1]	Butte County	Sacramento Metro[1]	Butte County	Sacramento Area[2]	Sacramento[3,4]	Sacramento Co.	Sacramento[4]	Butte County
Butte[5]	n/a	(0.02)	n/a	(0.45)	n/a	n/a	n/a	n/a	(4)
Colusa	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Glenn	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sacramento	0.0	n/a	0	n/a	0	0	0	0	n/a
Shasta	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sutter[6]	1.6	n/a	14	n/a	n/a	2	n/a	1	n/a
Yolo	0.6	n/a	6	n/a	4	1	n/a	1	n/a
Total	2.2	(0.02)	20	(0.45)	4	3	0	2	(4)
Classification	Severe-15				Maintenance	PM2.5 Precursor	Maintenance	Nonattainment	
De Minimis Threshold (tpy)	25				100	100	100	100	
Exceed?	No	No	No	No	No	No	No	No	No

Note:

[1]The Sacramento Metro 8-hour O3 nonattainment area consist of Sacramento and Yolo Counties and parts of El Dorado, Placer, Solano, and Sutter Counties. Emissions occurring within the attainment area of these counties are excluded from the total emissions.

[2]The Sacramento Area CO maintenance area is based on the Census Bureau Urbanized Area and consists of parts of Placer, Sacramento, and Yolo Counties. The general conformity applicability evaluation is based on emissions that would occur within the entire county to be conservative.

[3]All counties are designated as attainment areas for SO2; however, since SO2 is a precursor to PM2.5, its emissions must be evaluated under general conformity.

[4]The 24-hour PM2.5 nonattainment area for Sacramento includes Sacramento County and parts of El Dorado, Placer, Solano, and Yolo Counties. The general conformity applicability analysis assumes that all emissions that could occur within each county would occur within the Sacramento nonattainment area to be conservative.

[5]Only cropland idling proposed for Butte County; therefore, there would be a net reduction in emissions.

[6]VOC and NOx emissions are excluded from Sutter County for Garden Highway Mutual Water Company, Pelger Mutual Water Company, and Reclamation District 1004 because they are located in areas designated as attainment for the federal 8-hour O3 NAAQS.

Table 2. Emissions Outside of 8-Hour Ozone Nonattainment Area (tons per year)

Water Agency	County	VOC	NOx
Biggs-West Gridley Water District	Sutter	n/a	n/a
Pelger Mutual Water Company	Sutter	0.0	0
Reclamation District 1004	Sutter	0.1	2
Total		0.1	2

Summary of Peak Daily Groundwater Substitution Emissions by County (Unmitigated)

Table 3. Peak Daily VOC Emissions (Unmitigated)

	Peak Daily VOC Emissions (lbs/day)						
Water Agency	**Colusa**	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				Electric			0
Canal Farms	Electric						0
Conaway Preservation Group						9	9
Eastside Mutual Water Company	2						2
Glenn-Colusa Irrigation District	Electric	Electric					0
Glenn-Colusa Irrigation District (to Westside WD)	9	9					18
Maxwell Irrigation District	4						4
Natomas Central Mutual Water Company			Electric		Electric		0
Pelger Mutual Water Company					1		1
Pleasant Grove-Verona Mutual Water Company					25		25
Princeton-Codora-Glenn Irrigation District	10	10					20
Provident Irrigation District	11	11					22
Reclamation District 108	Electric					Electric	0
Reclamation District 1004	2	2			2		5
River Garden Farms						Electric	0
Roberts Ditch Irrigation District	Electric						0
Sycamore Mutual Water Company	Electric						0
T&P Farms	Electric						0
Te Velde Revocable Family Trust						Electric	0
Total	**37**	**32**	**0**	**0**	**28**	**9**	**105**

Table 4. Peak Daily NOx Emissions (Unmitigated)

	Peak Daily NOx Emissions (lbs/day)						
Water Agency	**Colusa**	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				Electric			0
Canal Farms	Electric						0
Conaway Preservation Group						91	91
Eastside Mutual Water Company	32						32
Glenn-Colusa Irrigation District	Electric	Electric					0
Glenn-Colusa Irrigation District (to Westside WD)	38	38					76
Maxwell Irrigation District	70						70
Natomas Central Mutual Water Company			Electric		Electric		0
Pelger Mutual Water Company					19		19
Pleasant Grove-Verona Mutual Water Company					220		220
Princeton-Codora-Glenn Irrigation District	125	125					250
Provident Irrigation District	134	134					267
Reclamation District 108	Electric					Electric	0
Reclamation District 1004	24	24			24		71
River Garden Farms						Electric	0
Roberts Ditch Irrigation District	Electric						0
Sycamore Mutual Water Company	Electric						0
T&P Farms	Electric						0
Te Velde Revocable Family Trust						Electric	0
Total	**423**	**320**	**0**	**0**	**262**	**91**	**1,096**

Summary of Peak Daily Groundwater Substitution Emissions by County (Unmitigated)

Table 5. Peak Daily CO Emissions (Unmitigated)

	Peak Daily CO Emissions (lbs/day)						
Water Agency	**Colusa**	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				Electric			0
Canal Farms	Electric						0
Conaway Preservation Group						68	68
Eastside Mutual Water Company	30						30
Glenn-Colusa Irrigation District	Electric	Electric					0
Glenn-Colusa Irrigation District (to Westside WD)	91	91					183
Maxwell Irrigation District	64						64
Natomas Central Mutual Water Company			Electric		Electric		0
Pelger Mutual Water Company					25		25
Pleasant Grove-Verona Mutual Water Company					107		107
Princeton-Codora-Glenn Irrigation District	27	27					54
Provident Irrigation District	29	29					58
Reclamation District 108	Electric					Electric	0
Reclamation District 1004	13	13			13		40
River Garden Farms						Electric	0
Roberts Ditch Irrigation District	Electric						0
Sycamore Mutual Water Company	Electric						0
T&P Farms	Electric						0
Te Velde Revocable Family Trust						Electric	0
Total	**254**	**160**	**0**	**0**	**145**	**68**	**628**

Table 6. Peak Daily SOx Emissions (Unmitigated)

	Peak Daily SOx Emissions (lbs/day)						
Water Agency	**Colusa**	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				Electric			0
Canal Farms	Electric						0
Conaway Preservation Group						18	18
Eastside Mutual Water Company	11						11
Glenn-Colusa Irrigation District	Electric	Electric					0
Glenn-Colusa Irrigation District (to Westside WD)	32	32					64
Maxwell Irrigation District	23						23
Natomas Central Mutual Water Company			Electric		Electric		0
Pelger Mutual Water Company					6		6
Pleasant Grove-Verona Mutual Water Company					26		26
Princeton-Codora-Glenn Irrigation District	8	8					17
Provident Irrigation District	9	9					18
Reclamation District 108	Electric					Electric	0
Reclamation District 1004	4	4			4		12
River Garden Farms						Electric	0
Roberts Ditch Irrigation District	Electric						0
Sycamore Mutual Water Company	Electric						0
T&P Farms	Electric						0
Te Velde Revocable Family Trust						Electric	0
Total	**86**	**53**	**0.00**	**0**	**36**	**18**	**193**

Summary of Peak Daily Groundwater Substitution Emissions by County (Unmitigated)

Table 7. Peak Daily PM10 Emissions (Unmitigated)

	Peak Daily PM10 Emissions (lbs/day)						
Water Agency	**Colusa**	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				Electric			0
Canal Farms	Electric						0
Conaway Preservation Group						8	8
Eastside Mutual Water Company	2						2
Glenn-Colusa Irrigation District	Electric	Electric					0
Glenn-Colusa Irrigation District (to Westside WD)	1	1					3
Maxwell Irrigation District	4						4
Natomas Central Mutual Water Company			Electric		Electric		0
Pelger Mutual Water Company					2		2
Pleasant Grove-Verona Mutual Water Company					15		15
Princeton-Codora-Glenn Irrigation District	2	2					4
Provident Irrigation District	2	2					4
Reclamation District 108	Electric					Electric	0
Reclamation District 1004	1	1			1		2
River Garden Farms						Electric	0
Roberts Ditch Irrigation District	Electric						0
Sycamore Mutual Water Company	Electric						0
T&P Farms	Electric						0
Te Velde Revocable Family Trust						Electric	0
Total	**12**	**6**	**0.000**	**0**	**17**	**8**	**43**

Table 8. Peak Daily PM2.5 Emissions (Unmitigated)

	Peak Daily PM2.5 Emissions (lbs/day)						
Water Agency	**Colusa**	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				Electric			0
Canal Farms	Electric						0
Conaway Preservation Group						8	8
Eastside Mutual Water Company	2						2
Glenn-Colusa Irrigation District	Electric	Electric					0
Glenn-Colusa Irrigation District (to Westside WD)	1	1					3
Maxwell Irrigation District	4						4
Natomas Central Mutual Water Company			Electric		Electric		0
Pelger Mutual Water Company					2		2
Pleasant Grove-Verona Mutual Water Company					15		15
Princeton-Codora-Glenn Irrigation District	2	2					4
Provident Irrigation District	2	2					4
Reclamation District 108	Electric					Electric	0
Reclamation District 1004	1	1			1		2
River Garden Farms						Electric	0
Roberts Ditch Irrigation District	Electric						0
Sycamore Mutual Water Company	Electric						0
T&P Farms	Electric						0
Te Velde Revocable Family Trust						Electric	0
Total	**12**	**6**	**0.000**	**0**	**17**	**8**	**43**

Summary of Annual Groundwater Substitution Emissions by County (Unmitigated)

Table 9. Annual VOC Emissions (Unmitigated)

Water Agency	Annual VOC Emissions (tons/yr)						
	Colusa	Glenn	Sacramento	Shasta	Sutter	Yolo	Total
Anderson-Cottonwood Irrigation District				Electric			0.00
Canal Farms	Electric						0.00
Conaway Preservation Group						0.55	0.55
Eastside Mutual Water Company	0.10						0.10
Glenn-Colusa Irrigation District	Electric	Electric					0.00
Glenn-Colusa Irrigation District (to Westside WD)	0.67	0.67					1.33
Maxwell Irrigation District	0.24						0.24
Natomas Central Mutual Water Company			Electric		Electric		0.00
Pelger Mutual Water Company					0.03		0.03
Pleasant Grove-Verona Mutual Water Company					1.61		1.61
Princeton-Codora-Glenn Irrigation District	0.66	0.66					1.31
Provident Irrigation District	0.70	0.70					1.40
Reclamation District 108	Electric					Electric	0.00
Reclamation District 1004	0.10	0.10			0.10		0.31
River Garden Farms						Electric	0.00
Roberts Ditch Irrigation District	Electric						0.00
Sycamore Mutual Water Company	Electric						0.00
T&P Farms	Electric						0.00
Te Velde Revocable Family Trust						Electric	0.00
Total	**2.46**	**2.12**	**0.00**	**0.00**	**1.74**	**0.55**	**6.88**

Table 10. Annual NOx Emissions (Unmitigated)

Water Agency	Annual NOx Emissions (tons/yr)						
	Colusa	Glenn	Sacramento	Shasta	Sutter	Yolo	Total
Anderson-Cottonwood Irrigation District				Electric			0.00
Canal Farms	Electric						0.00
Conaway Preservation Group						5.89	5.89
Eastside Mutual Water Company	1.92						1.92
Glenn-Colusa Irrigation District	Electric	Electric					0.00
Glenn-Colusa Irrigation District (to Westside WD)	2.28	2.28					4.56
Maxwell Irrigation District	4.51						4.51
Natomas Central Mutual Water Company			Electric		Electric		0.00
Pelger Mutual Water Company					0.48		0.48
Pleasant Grove-Verona Mutual Water Company					14.19		14.19
Princeton-Codora-Glenn Irrigation District	8.08	8.08					16.16
Provident Irrigation District	8.63	8.63					17.27
Reclamation District 108	Electric					Electric	0.00
Reclamation District 1004	1.52	1.52			1.52		4.57
River Garden Farms						Electric	0.00
Roberts Ditch Irrigation District	Electric						0.00
Sycamore Mutual Water Company	Electric						0.00
T&P Farms	Electric						0.00
Te Velde Revocable Family Trust						Electric	0.00
Total	**26.95**	**20.52**	**0.00**	**0.00**	**16.19**	**5.89**	**69.55**

Summary of Annual Groundwater Substitution Emissions by County (Unmitigated)

Table 11. Annual CO Emissions (Unmitigated)

Water Agency	Annual CO Emissions (tons/yr)						
	Colusa	Glenn	Sacramento	Shasta	Sutter	Yolo	Total
Anderson-Cottonwood Irrigation District				Electric			0.00
Canal Farms	Electric						0.00
Conaway Preservation Group						4.39	4.39
Eastside Mutual Water Company	1.77						1.77
Glenn-Colusa Irrigation District	Electric	Electric					0.00
Glenn-Colusa Irrigation District (to Westside WD)	8.75	8.75					17.50
Maxwell Irrigation District	4.16						4.16
Natomas Central Mutual Water Company			Electric		Electric		0.00
Pelger Mutual Water Company					0.63		0.63
Pleasant Grove-Verona Mutual Water Company					6.88		6.88
Princeton-Codora-Glenn Irrigation District	1.74	1.74					3.48
Provident Irrigation District	1.86	1.86					3.72
Reclamation District 108	Electric					Electric	0.00
Reclamation District 1004	0.85	0.85			0.85		2.56
River Garden Farms						Electric	0.00
Roberts Ditch Irrigation District	Electric						0.00
Sycamore Mutual Water Company	Electric						0.00
T&P Farms	Electric						0.00
Te Velde Revocable Family Trust						Electric	0.00
Total	**19.13**	**13.20**	**0.00**	**0.00**	**8.37**	**4.39**	**45.09**

Table 12. Annual SOx Emissions (Unmitigated)

Water Agency	Annual SOx Emissions (tons/yr)						
	Colusa	Glenn	Sacramento	Shasta	Sutter	Yolo	Total
Anderson-Cottonwood Irrigation District				Electric			0.00
Canal Farms	Electric						0.00
Conaway Preservation Group						1.15	1.15
Eastside Mutual Water Company	0.63						0.63
Glenn-Colusa Irrigation District	Electric	Electric					0.00
Glenn-Colusa Irrigation District (to Westside WD)	3.09	3.09					6.17
Maxwell Irrigation District	1.48						1.48
Natomas Central Mutual Water Company			Electric		Electric		0.00
Pelger Mutual Water Company					0.16		0.16
Pleasant Grove-Verona Mutual Water Company					1.66		1.66
Princeton-Codora-Glenn Irrigation District	0.53	0.53					1.07
Provident Irrigation District	0.57	0.57					1.14
Reclamation District 108	Electric					Electric	0.00
Reclamation District 1004	0.26	0.26			0.26		0.77
River Garden Farms						Electric	0.00
Roberts Ditch Irrigation District	Electric						0.00
Sycamore Mutual Water Company	Electric						0.00
T&P Farms	Electric						0.00
Te Velde Revocable Family Trust						Electric	0.00
Total	**6.56**	**4.45**	**0.000**	**0.00**	**2.08**	**1.15**	**14.23**

Summary of Annual Groundwater Substitution Emissions by County (Unmitigated)

Table 13. Annual PM10 Emissions (Unmitigated)

Water Agency	Annual PM10 Emissions (tons/yr)						
	Colusa	Glenn	Sacramento	Shasta	Sutter	Yolo	Total
Anderson-Cottonwood Irrigation District				Electric			0.00
Canal Farms	Electric						0.00
Conaway Preservation Group						0.52	0.52
Eastside Mutual Water Company	0.10						0.10
Glenn-Colusa Irrigation District	Electric	Electric					0.00
Glenn-Colusa Irrigation District (to Westside WD)	0.09	0.09					0.18
Maxwell Irrigation District	0.24						0.24
Natomas Central Mutual Water Company			Electric		Electric		0.00
Pelger Mutual Water Company					0.04		0.04
Pleasant Grove-Verona Mutual Water Company					0.96		0.96
Princeton-Codora-Glenn Irrigation District	0.13	0.13					0.25
Provident Irrigation District	0.14	0.14					0.27
Reclamation District 108	Electric					Electric	0.00
Reclamation District 1004	0.05	0.05			0.05		0.16
River Garden Farms						Electric	0.00
Roberts Ditch Irrigation District	Electric						0.00
Sycamore Mutual Water Company	Electric						0.00
T&P Farms	Electric						0.00
Te Velde Revocable Family Trust						Electric	0.00
Total	**0.74**	**0.40**	**0.0000**	**0.00**	**1.05**	**0.52**	**2.72**

Table 14. Annual PM2.5 Emissions (Unmitigated)

Water Agency	Annual PM2.5 Emissions (tons/yr)						
	Colusa	Glenn	Sacramento	Shasta	Sutter	Yolo	Total
Anderson-Cottonwood Irrigation District				Electric			0.00
Canal Farms	Electric						0.00
Conaway Preservation Group						0.52	0.52
Eastside Mutual Water Company	0.10						0.10
Glenn-Colusa Irrigation District	Electric	Electric					0.00
Glenn-Colusa Irrigation District (to Westside WD)	0.09	0.09					0.18
Maxwell Irrigation District	0.24						0.24
Natomas Central Mutual Water Company			Electric		Electric		0.00
Pelger Mutual Water Company					0.04		0.04
Pleasant Grove-Verona Mutual Water Company					0.96		0.96
Princeton-Codora-Glenn Irrigation District	0.12	0.12					0.25
Provident Irrigation District	0.13	0.13					0.26
Reclamation District 108	Electric					Electric	0.00
Reclamation District 1004	0.05	0.05			0.05		0.16
River Garden Farms						Electric	0.00
Roberts Ditch Irrigation District	Electric						0.00
Sycamore Mutual Water Company	Electric						0.00
T&P Farms	Electric						0.00
Te Velde Revocable Family Trust						Electric	0.00
Total	**0.73**	**0.40**	**0.0000**	**0.00**	**1.05**	**0.52**	**2.70**

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Anderson-Cottonwood Irrigation District	
Transfer Volume	4,800	acre feet/year
Location	Shasta	County

Table 15. Anderson-Cottonwood Irrigation District Criteria Pollutant Emissions

Description	Well	Fuel Type	Power Rating (hp)	Emission Tier	Pump Rate (AF)	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (acre feet/year)	Operation (hours/year)
	Barney Street	Electric	200	n/a	4,350	5,500	83%	3,996	3,946
	Crowley Gulch	Electric	50	n/a	875	1,000	17%	804	4,365
						Total	**100%**	**4,800**	**8,311**

Note: All wells are electric; therefore, no local criteria pollutant emissions.

Conversion Factors

1 hour =	60	minutes
1 acre-foot =	325,851	gallons

http://www.water.ca.gov/pubs/dwrnews/california_water_facts_card/waterfactscard.pdf

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Canal Farms	
Transfer Volume	860	acre feet/year
Location	Colusa	County

Federal Attainment Status

PM10	A	*Engines not subject to ATCM if remotely-located.*
PM2.5	A	
O3	A	

Table 16. Canal Farms Criteria Pollutant Emissions

Description	Well	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (acre feet/year)	Operation (hours/year)
Dennis Well North	Dennis Well North	E	0	110	n/a	3,500	50%	430	667
Dennis Well South	Dennis Well South	E	0	110	n/a	3,500	50%	430	667
					Total	**7,000**	**100%**	**860**	**1,334**

Note: All wells are electric; therefore, no local criteria pollutant emissions.

Legend

Horsepower estimated based on average size engine for fuel type in study area

Conversion Factors

1 hour =	60	minutes
1 acre-foot =	325,851	gallons

http://www.water.ca.gov/pubs/dwrnews/california_water_facts_card/waterfactscard.pdf

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Conaway Preservation Group	Federal Attainment Status			Peak Month
Transfer Volume	26,639 acre feet/year	PM10	A	*Engines subject to ATCM.*	6,393 AF/month
Location	Yolo County	PM2.5	N		46,669 gallons/minute
		O3	N		53% peak pump rate

Table 17. Conaway Preservation Group Criteria Pollutant Emissions

														Emission Factors (g/bhp-hr)						Daily Emissions (lbs/day)						Annual Emissions (tons per year)					
Description	Well	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operation (hours/day)	Operation (hours/year)	Fuel Consumption (gal/yr)	VOC	NOx	CO	SOx	PM10	PM2.5	VOC	NOx	CO	SOx	PM10	PM2.5	VOC	NOx	CO	SOx	PM10	PM2.5
Conaway PG6W-3	6W-3	Electric	TBD	114	n/a	3,500	4%	255	1,062	13	1,648	n/a																		
Conaway PG5W-3	5W-3	Electric	TBD	114	n/a	3,500	4%	255	1,062	13	1,648	n/a																		
Conaway PG7W-4	7W-4	Electric	TBD	114	n/a	3,500	4%	255	1,062	13	1,648	n/a																		
Conaway PG12W-5	12W-5	Electric	TBD	114	n/a	3,500	4%	255	1,062	13	1,648	n/a																		
Conaway PG1W-3	1W-3	Electric	TBD	114	n/a	3,500	4%	255	1,062	13	1,648	n/a																		
Conaway PG12W-1	12W-1	Electric	TBD	114	n/a	3,500	4%	255	1,062	13	1,648	n/a																		
Conaway PG7W-2	7W-2	Electric	TBD	114	n/a	3,500	4%	255	1,062	13	1,648	n/a																		
Conaway PG13W-3	13W-3	Electric	TBD	114	n/a	3,500	4%	255	1,062	13	1,648	n/a																		
Conaway PG7W-5	7W-5	Electric	TBD	114	n/a	3,500	4%	255	1,062	13	1,648	n/a																		
Conaway PG32NW-2	32NW-2	Electric	TBD	114	n/a	3,500	4%	255	1,062	13	1,648	n/a																		
Conaway PG33NW-4	33NW-4	Electric		100	n/a	3,400	4%	248	1,032	13	1,648	n/a																		
Conaway PGOW-2	OW-2	Electric		100	n/a	3,400	4%	248	1,032	13	1,648	n/a																		
Conaway PGOW-3	OW-3	Electric		125	n/a	3,400	4%	248	1,032	13	1,648	n/a																		
Conaway PG32NW-1	32NW-1	Electric		100	n/a	3,300	4%	240	1,001	13	1,648	n/a																		
Conaway PG6-2	6-2	Electric		100	n/a	2,700	3%	197	819	13	1,648	n/a																		
Conaway PGOW-1	OW-1	Electric		100	n/a	2,600	3%	189	789	13	1,648	n/a																		
Conaway PG20-1	20-1	Electric		100	n/a	2,500	3%	182	759	13	1,648	n/a																		
Conaway PG21W-1	21W-1	Electric		100	n/a	2,500	3%	182	759	13	1,648	n/a																		
Conaway PG31W-1	31W-1	Electric		100	n/a	2,300	3%	167	698	13	1,648	n/a																		
Conaway PG33NW-1	33NW-1	Electric		100	n/a	2,300	3%	167	698	13	1,648	n/a																		
Conaway PG8-1	8-1	Diesel	2007	170	T3	2,300	3%	167	698	13	1,648	15,715	0.1	2.8	3.7	0.93	0.22	0.22	0.71	13.56	17.84	4.45	1.07	1.07	0.05	0.88	1.15	0.29	0.07	0.07
Conaway PG33NW-2	33NW-2	Electric		100	n/a	2,200	3%	160	667	13	1,648	n/a																		
Conaway PG33NW-8	33NW-8	Electric		100	n/a	2,200	3%	160	667	13	1,648	n/a																		
Conaway PG33NW-3	33NW-3	Electric		100	n/a	2,100	2%	153	637	13	1,648	n/a																		
Conaway PG33NW-6	33NW-6	Electric		100	n/a	2,100	2%	153	637	13	1,648	n/a																		
Conaway PGOW-5	OW-5	Electric		125	n/a	2,000	2%	146	607	13	1,648	n/a																		
Conaway PG33NW-5	33NW-5	Electric		100	n/a	1,800	2%	131	546	13	1,648	n/a																		
Conaway PG7W-1	7W-1	Electric		100	n/a	1,800	2%	131	546	13	1,648	n/a																		
Conaway PG17W-3	17W-3	Diesel	2005	170	T2	1,700	2%	124	516	13	1,648	15,715	0.2	4.7	3.7	0.93	0.22	0.22	1.18	22.37	17.84	4.45	1.07	1.07	0.08	1.44	1.15	0.29	0.07	0.07
Conaway PGOW-4	OW-4	Electric		100	n/a	1,700	2%	124	516	13	1,648	n/a																		
Conaway PG16W-2	16W-2	Diesel	2005	170	T2	1,600	2%	117	485	13	1,648	15,715	0.2	4.7	3.7	0.93	0.22	0.22	1.18	22.37	17.84	4.45	1.07	1.07	0.08	1.44	1.15	0.29	0.07	0.07
Conaway PG8-2	8-2	Diesel	2002	170	T1	1,500	2%	109	455	13	1,648	15,715	1.1	6.9	3.0	0.93	1.00	1.00	5.45	32.82	14.49	4.45	4.77	4.77	0.35	2.12	0.94	0.29	0.31	0.31
Conaway PG33NW-7	33NW-7	Electric		100	n/a	1,400	2%	102	425	13	1,648	n/a																		
					Total	**87,800**	**100%**	**6,393**	**26,639**	**421**	**54,376**	**62,859**							**8.52**	**91.12**	**68.00**	**17.78**	**7.98**	**7.98**	**0.55**	**5.89**	**4.39**	**1.15**	**0.52**	**0.52**

Notes:
If a specific HP and emission tier combination has an emission standard of NMHC+NOx, then 95% of emissions assumed to be NOx and 5% of emissions assumed to be VOC (see CARB Carl Moyer Program Guidelines).
AP-42 emission factors used for SOx in all cases.
If an emission standard is not available for a given pollutant, then AP-42 emission factors used.
PM2.5 assumed to be 98% of PM10 emissions based on size fractions for stationary internal combustion diesel engines.

Legend

	Average HP from all pumps
	Emission factor based on NMHC+NOx emission standard
	Emission factor from AP-42

Conversion Factors

1 lb =	453.6	g
1 ton =	2,000	lbs
1 kW =	1.34	hp
1 day =	24	hours
1 month =	31	days
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

http://www.water.ca.gov/pubs/dwrnews/california_water_facts_card/waterfactscard.pdf

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	*(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855	g/mL	*(Based on MSDS for Hess Diesel Fuel All Types)*
7.13	lb/gal	

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency Eastside Mutual Water Company
Transfer Volume 2,000 acre feet/year
Location Colusa County

Federal Attainment Status
PM10 A
PM2.5 A
O3 A
Engines not subject to ATCM if remotely-located.

Peak Month
480 AF/month
3,504 gallons/minute
92% peak pump rate

Table 18. Eastside Mutual Water Company Criteria Pollutant Emissions

											Emission Factors (g/bhp-hr)						Daily Emissions (lbs/day)						Annual Emissions (tons per year)					
Description	Well	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (acre feet/year)	Operation (hours/year)	Fuel Consumption (gal/yr)	VOC	NOx	CO	SOx	PM10	PM2.5	VOC	NOx	CO	SOx	PM10	PM2.5	VOC	NOx	CO	SOx	PM10	PM2.5
Eastside MWC7631T	7631T	Diesel	2006	215	T3	3,800	100%	2,000	2,858	34,476	0.1	2.8	2.6	0.9	0.15	0.15	1.70	32.26	29.71	10.58	1.70	1.70	0.10	1.92	1.77	0.63	0.10	0.10

Notes:
If a specific HP and emission tier combination has an emission standard of NMHC+NOx, then 95% of emissions assumed to be NOx and 5% of emissions assumed to be VOC (see CARB Carl Moyer Program Guidelines).
AP-42 emission factors used for SOx in all cases.
If an emission standard is not available for a given pollutant, then AP-42 emission factors used.
PM2.5 assumed to be 98% of PM10 emissions based on size fractions for stationary internal combustion diesel engines.

Legend
Emission factor based on NMHC+NOx emission standard
Emission factor from AP-42

Conversion Factors
1 lb = 453.6 g
1 ton = 2,000 lbs
1 kW = 1.34 hp
1 day = 24 hours
1 hour = 60 minutes
1 acre-foot = 325,851 gallons
http://www.water.ca.gov/pubs/dwrnews/california_water_facts_card/waterfactscard.pdf

Diesel Engine Fuel Consumption
0.4 lb/hp-hr *(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855 g/mL *(Based on MSDS for Hess Diesel Fuel All Types)*
7.13 lb/gal

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Glenn-Colusa Irrigation District		Federal Attainment Status		
Transfer Volume	7,500	acre feet/year	PM10	A	*Engines not subject to ATCM if*
Location	Glenn	County	PM2.5	A	*remotely-located.*
	Colusa	County	O3	A	

Table 19. Glenn-Colusa Irrigation District Criteria Pollutant Emissions

Description	Well	Fuel Type	Model Year	Power Rating (hp)	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (acre feet/year)	Operation (hours/year)
GCID 1	GCID 1	Electric		100	3,000	19%	1,452	2,628
GCID 2	GCID 2	Electric		100	3,000	19%	1,452	2,628
GCID 3	GCID 3	Electric		100	3,000	19%	1,452	2,628
GCID 4	GCID 4	Electric		100	3,000	19%	1,452	2,628
Jacinto	Jacinto	Electric		100	3,500	23%	1,694	2,628
					Total	**100%**	**7,500**	**13,139**

Note: All wells are electric; therefore, no local criteria pollutant emissions.

Legend

	Horsepower equal to data provided in GCID priority spreadsheet (2010PrirtyWells.xls) for Well
	Horsepower assumed to be equal to engine with known HP

Conversion Factors

1 lb =	453.6	g
1 ton =	2,000	lbs
1 kW =	1.34	hp
1 day =	24	hours
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

http://www.water.ca.gov/pubs/dwrnews/california_water_facts_card/waterfactscard.pdf

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	*(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855	g/mL	*(Based on MSDS for Hess Diesel Fuel All Types)*
7.13	lb/gal	

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency Glenn-Colusa Irrigation District
Transfer Volume 18,668 acre feet/year
Location Glenn County
Colusa County

Federal Attainment Status
PM10 A *Engines not subject to ATCM if remotely-located.*
PM2.5 A
O3 A

Table 20. Glenn-Colusa Irrigation District (Transfer to Westside WD) Criteria Pollutant Emissions

						Pump Rate		Transfer Volume		Operation		Fuel Consumption	Emission Factors (g/bhp-hr)						Daily Emissions (lbs/day)						Annual Emissions (tons per year)					
Description	Well	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	(gpm)	(% of Total)	(AF/month)	(AF/year)	(hours/day)	(hours/year)	(gal/yr)	VOC	NOx	CO	SOx	PM10	PM2.5	VOC	NOx	CO	SOx	PM10	PM2.5	VOC	NOx	CO	SOx	PM10	PM2.5
RW-1	RW-1	E	2014	15	n/a	425	1%	40	280	16	3,579	n/a																		
RW-2	RW-2	E	2014	30	n/a	850	3%	80	560	16	3,579	n/a																		
RW-3	RW-3	E	2014	30	n/a	850	3%	80	560	16	3,579	n/a																		
RW-4	RW-4	E	2014	30	n/a	850	3%	80	560	16	3,579	n/a																		
LW-1	LW-1	E	2014	30	n/a	850	3%	80	560	16	3,579	n/a																		
LW-2	LW-2	E	2014	30	n/a	850	3%	80	560	16	3,579	n/a																		
LW-3	LW-3	E	2014	30	n/a	850	3%	80	560	16	3,579	n/a																		
TPHW-1	TPHW-1	D	2011	200	T4I	2,250	8%	212	1,483	16	3,579	40,152	0.14	0.3	2.6	0.93	0.01	0.01	1.03	2.17	18.99	6.76	0.11	0.11	0.11	0.24	2.06	0.73	0.01	0.01
M&R	M&R	D	2014	350	T4	3,200	11%	424	2,544	23	4,317	84,760	0.14	0.3	2.6	0.93	0.01	0.01	2.54	5.35	46.77	16.65	0.27	0.26	0.24	0.50	4.35	1.55	0.02	0.02
SB&L#2	SB&L#2	D	2001	165	T1	3,000	10%	398	1,194	23	2,161	20,004	1.1	6.9	3.0	0.93	0.22	0.21	9.64	58.03	25.61	7.86	1.86	1.82	0.45	2.70	1.19	0.37	0.09	0.08
SB&L#3	SB&L#3	E	2014	70	n/a	500	2%	43	129	15	1,401	n/a																		
SB&L#4	SB&L#4	E	2014	80	n/a	2,500	9%	332	664	23	1,442	n/a																		
Vann#1	Vann#1	D	2013	260	T4I	3,000	10%	252	1,764	15	3,193	46,574	0.14	0.3	2.6	0.93	0.01	0.01	1.20	2.52	22.03	7.84	0.13	0.12	0.13	0.27	2.39	0.85	0.01	0.01
Vann#2	Vann#2	D	2013	300	T4I	4,000	14%	392	2,744	17	3,725	62,691	0.14	0.3	2.6	0.93	0.01	0.01	1.61	3.39	29.65	10.56	0.17	0.17	0.17	0.37	3.22	1.15	0.02	0.02
Vann#3	Vann#3	D	2013	300	T4I	3,000	10%	392	2,744	23	4,967	83,588	0.14	0.3	2.6	0.93	0.01	0.01	2.15	4.52	39.54	14.08	0.23	0.22	0.23	0.49	4.29	1.53	0.02	0.02
Vann#4	Vann#4	E	2013	300	n/a	2,000	7%	252	1,764	22	4,789	n/a																		
					Total	**28,975**	**100%**	**3,216**	**18,668**	**294**	**54,623**	**337,769**							**18.16**	**75.98**	**182.60**	**63.75**	**2.76**	**2.69**	**1.33**	**4.56**	**17.50**	**6.17**	**0.18**	**0.18**

Notes:
If a specific HP and emission tier combination has an emission standard of NMHC+NOx, then 95% of emissions assumed to be NOx and 5% of emissions assumed to be VOC (see CARB Carl Moyer Program Guidelines).
AP-42 emission factors used for SOx in all cases.
If an emission standard is not available for a given pollutant, then AP-42 emission factors used.
PM2.5 assumed to be 98% of PM10 emissions based on size fractions for stationary internal combustion diesel engines.

Legend
Data modified to meet transfer capacity

Conversion Factors

1 lb =	453.6	g
1 ton =	2,000	lbs
1 kW =	1.34	hp
1 day =	24	hours
1 month =	31	days
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

http://www.water.ca.gov/pubs/dwrnews/california_water_facts_card/waterfactscard.pdf

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	*(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855	g/mL	*(Based on MSDS for Hess Diesel Fuel All Types)*
7.13	lb/gal	

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Maxwell Irrigation District	Federal Attainment Status			Peak Month
Transfer Volume	4,700 acre feet/year	PM10	A	*Engines not subject to ATCM if remotely-located.*	1,128 AF/month
Location	Colusa County	PM2.5	A		8,234 gallons/minute
		O3	A		43% peak pump rate

Table 21. Maxwell Irrigation District Criteria Pollutant Emissions

						Pump Rate		Transfer Volume		Operation		Fuel Consumption	Emission Factors (g/bhp-hr)						Daily Emissions (lbs/day)						Annual Emissions (tons per year)					
Description	Well	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	(gpm)	(% of Total)	(AF/month)	(AF/year)	(hours/day)	(hours/year)	(gal/yr)	VOC	NOx	CO	SOx	PM10	PM2.5	VOC	NOx	CO	SOx	PM10	PM2.5	VOC	NOx	CO	SOx	PM10	PM2.5
MID1	MID1	Diesel	2006	215	T3	3,800	20%	226	940	10	1,343	16,204	0.1	2.8	2.6	0.9	0.15	0.15	0.74	13.98	12.88	4.58	0.74	0.74	0.05	0.90	0.83	0.30	0.05	0.05
MID2	MID2	Diesel	2006	215	T3	3,800	20%	226	940	10	1,343	16,204	0.1	2.8	2.6	0.9	0.15	0.15	0.74	13.98	12.88	4.58	0.74	0.74	0.05	0.90	0.83	0.30	0.05	0.05
MID3	MID3	Diesel	2006	215	T3	3,800	20%	226	940	10	1,343	16,204	0.1	2.8	2.6	0.9	0.15	0.15	0.74	13.98	12.88	4.58	0.74	0.74	0.05	0.90	0.83	0.30	0.05	0.05
MID4	MID4	Diesel	2006	215	T3	3,800	20%	226	940	10	1,343	16,204	0.1	2.8	2.6	0.9	0.15	0.15	0.74	13.98	12.88	4.58	0.74	0.74	0.05	0.90	0.83	0.30	0.05	0.05
MID5	MID5	Diesel	2006	215	T3	3,800	20%	226	940	10	1,343	16,204	0.1	2.8	2.6	0.9	0.15	0.15	0.74	13.98	12.88	4.58	0.74	0.74	0.05	0.90	0.83	0.30	0.05	0.05
					Total	**19,000**	**100%**	**1,128**	**4,700**	**52**	**6,717**	**81,020**							**3.68**	**69.90**	**64.38**	**22.92**	**3.68**	**3.68**	**0.24**	**4.51**	**4.16**	**1.48**	**0.24**	**0.24**

Notes:
If a specific HP and emission tier combination has an emission standard of NMHC+NOx, then 95% of emissions assumed to be NOx and 5% of emissions assumed to be VOC (see CARB Carl Moyer Program Guidelines).
AP-42 emission factors used for SOx in all cases.
If an emission standard is not available for a given pollutant, then AP-42 emission factors used.
PM2.5 assumed to be 98% of PM10 emissions based on size fractions for stationary internal combustion diesel engines.

Legend

	Engine information assumed to be equivalent to Eastside MWC because it is the adjacent water district.
	Emission factor based on NMHC+NOx emission standard
	Emission factor from AP-42

Conversion Factors

1 lb =	453.6	g
1 ton =	2,000	lbs
1 kW =	1.34	hp
1 day =	24	hours
1 month =	31	days
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

http://www.water.ca.gov/pubs/dwrnews/california_water_facts_card/waterfactscard.pdf

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	*(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855	g/mL	*(Based on MSDS for Hess Diesel Fuel All Types)*
7.13	lb/gal	

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Natomas Central Mutual Water Company		Federal Attainment Status		
Transfer Volume	30,000	acre feet/year	PM10	M	*Engines subject to ATCM.*
Location	Sacramento	County	PM2.5	N	
	Sutter	County	O3	N	

Table 22. Natomas Central Mutual Water Company Criteria Pollutant Emissions

Description	Well	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (acre feet/year)	Operation (hours/year)
	1	Electric		110	n/a	4,200	8%	2,308	2,984
	2	Electric		110	n/a	4,200	8%	2,308	2,984
	3	Electric		110	n/a	4,200	8%	2,308	2,984
	4	Electric		110	n/a	4,200	8%	2,308	2,984
	5	Electric		110	n/a	4,200	8%	2,308	2,984
	6	Electric		110	n/a	4,200	8%	2,308	2,984
	7	Electric		110	n/a	4,200	8%	2,308	2,984
	8	Electric		110	n/a	4,200	8%	2,308	2,984
	9	Electric		110	n/a	4,200	8%	2,308	2,984
	10	Electric		110	n/a	4,200	8%	2,308	2,984
	11	Electric		110	n/a	4,200	8%	2,308	2,984
	12	Electric		110	n/a	4,200	8%	2,308	2,984
	13	Electric		110	n/a	4,200	8%	2,308	2,984
						Total	**100%**	**30,000**	**38,792**

Note: All wells are electric; therefore, no local criteria pollutant emissions.

Legend

Horsepower estimated based on average size engine for fuel type in study area

Conversion Factors

1 hour =	60	minutes
1 acre-foot =	325,851	gallons

http://www.water.ca.gov/pubs/dwrnews/california_water_facts_card/waterfactscard.pdf

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Pelger Mutual Water Company	Federal Attainment Status			Peak Month
Transfer Volume	4,000 acre feet/year	PM10	A	*Engines subject to ATCM.*	960 AF/month
Location	Sutter County	PM2.5	N		7,008 gallons/minute
		O3	N		74% peak pump rate

Table 23. Pelger Mutual Water Company Criteria Pollutant Emissions

													Emission Factors (g/bhp-hr)						Daily Emissions (lbs/day)						Annual Emissions (tons per year)					
Description	Well	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operation (hours/day)	Operation (hours/year)	Fuel Consumption (gal/yr)	VOC	NOx	CO	SOx	PM10	PM2.5	VOC	NOx	CO	SOx	PM10	PM2.5	VOC	NOx	CO	SOx	PM10	PM2.5
Pelger MWC Well 3 Klein	Well 3 Klein	Electric		110	n/a	4,300	45%	435	1,811	18	2,287	n/a																		
Pelger MWC Well 1 Tucker	Well 1 Tucker	Electric		110	n/a	3,100	33%	313	1,305	18	2,287	n/a																		
Pelger MWC Well 2 Flopet	Well 2 Flopet	Diesel	2008	173	T3	2,100	22%	212	884	18	2,287	22,193	0.15	2.84	3.7	0.93	0.22	0.22	1.01	19.15	25.19	6.28	1.51	1.51	0.03	0.48	0.63	0.16	0.04	0.04
					Total	**9,500**	**100%**	**960**	**4,000**	**53**	**6,860**								**1.01**	**19.15**	**25.19**	**6.28**	**1.51**	**1.51**	**0.03**	**0.48**	**0.63**	**0.16**	**0.04**	**0.04**

Notes:
If a specific HP and emission tier combination has an emission standard of NMHC+NOx, then 95% of emissions assumed to be NOx and 5% of emissions assumed to be VOC (see CARB Carl Moyer Program Guidelines).
AP-42 emission factors used for SOx in all cases.
If an emission standard is not available for a given pollutant, then AP-42 emission factors used.
PM2.5 assumed to be 98% of PM10 emissions based on size fractions for stationary internal combustion diesel engines.

Legend

	Emission factor from AP-42
	Horsepower estimated based on average size engine for fuel type in study area

Conversion Factors

1 lb =	453.6	g
1 ton =	2,000	lbs
1 kW =	1.34	hp
1 day =	24	hours
1 month =	31	days
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

http://www.water.ca.gov/pubs/dwrnews/california_water_facts_card/waterfactscard.pdf

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	*(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855	g/mL	*(Based on MSDS for Hess Diesel Fuel All Types)*
7.13	lb/gal	

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Pleasant Grove-Verona Mutual Water Company	Maximum Pump Rate	3,600 AF/month	Federal Attainment Status			Peak Month
Transfer Volume	15,000 acre feet/year		26,278 gallons/minute	PM10	A	*Engines subject to ATCM.*	3,600 AF/month
Location	Sutter County			PM2.5	N		26,278 gallons/minute
				O3	N		35% peak pump rate

Table 24. Pleasant Grove-Verona Mutual Water Company Criteria Pollutant Emissions

												Fuel	Emission Factors (g/bhp-hr)						Daily Emissions (lbs/day)						Annual Emissions (tons per year)					
				Power Rating	Emission	Pump Rate		Transfer Volume		Operation		Consumption																		
Description	Well	Fuel Type	Model Year	(hp)	Tier	(gpm)	(% of Total)	(AF/month)	(AF/project)	(hours/day)	(hours/year)	(gal/yr)	VOC	NOx	CO	SOx	PM10	PM2.5	VOC	NOx	CO	SOx	PM10	PM2.5	VOC	NOx	CO	SOx	PM10	PM2.5
PGVMWC Well #1	Well #1	Electric		30	n/a	2,000	3%	95	394	8	1,070	n/a																		
PGVMWC Well #2	Well #2	Electric		250	n/a	5,000	7%	237	986	8	1,070	n/a																		
PGVMWC Monster Pump	Monster Pump	Electric		60	n/a	3,100	4%	147	611	8	1,070	n/a																		
PGVMWC Well #12&17	Well #12&17	Electric		50	n/a	1,500	2%	71	296	8	1,070	n/a																		
PGVMWC Well #11	Well #11	Diesel	2004	250	T2	4,200	6%	199	828	8	1,070	15,014	0.2	4.7	2.6	0.93	0.15	0.15	1.12	21.37	11.93	4.25	0.68	0.68	0.07	1.38	0.77	0.27	0.04	0.04
PGVMWC Well #13&15	Well #13&15	Electric		240	n/a	4,800	6%	227	946	8	1,070	n/a																		
PGVMWC Well #16	Well #16	Electric		240	n/a	1,700	2%	80	335	8	1,070	n/a																		
PGVMWC Willey #1	Willey #1	Diesel	2000	168	T1	3,000	4%	142	591	8	1,070	10,089	1.1	6.9	3.0	0.93	1.00	1.00	3.50	21.07	9.30	2.85	3.06	3.06	0.23	1.36	0.60	0.18	0.20	0.20
PGVMWC Willey #2	Willey #2	Electric		159	n/a	3,000	4%	142	591	8	1,070	n/a																		
PGVMWC Willey #3	Willey #3	Electric		58	n/a	2,000	3%	95	394	8	1,070	n/a																		
PGVMWC Willey #4	Willey #4	Diesel	1974	150	T0	3,000	4%	142	591	8	1,070	9,008	1.1	14.1	3.0	0.93	0.22	0.21	3.13	38.54	8.30	2.55	0.60	0.59	0.20	2.49	0.54	0.16	0.04	0.04
PGVMWC Well #30	Well #30	Diesel	2000	100	T1	1,500	2%	71	296	8	1,070	6,005	1.1	6.9	3.0	0.93	1.00	1.00	2.08	12.54	5.54	1.70	1.82	1.82	0.13	0.81	0.36	0.11	0.12	0.12
PGVMWC Well #31	Well #31	Electric		99	n/a	2,500	3%	118	493	8	1,070	n/a																		
PGVMWC Well #32	Well #32	Electric		99	n/a	2,500	3%	118	493	8	1,070	n/a																		
PGVMWC Well #33	Well #33	Electric		99	n/a	2,500	3%	118	493	8	1,070	n/a																		
PGVMWC Nicholas Sand Field Well	Nicholas Sand Field Well	Diesel	2002	62	T1	2,000	3%	95	394	8	1,070	3,729	1.1	6.9	3.0	0.93	1.00	1.00	1.29	7.79	3.44	1.06	1.13	1.13	0.08	0.50	0.22	0.07	0.07	0.07
PGVMWC Nicholas Filipino Camp #2	Nicholas Filipino Camp #2	Electric		40	n/a	2,000	3%	95	394	8	1,070	n/a																		
PGVMWC Nicholas Filipino Camp South	Nicholas Filipino Camp South	Diesel	2002	62	T1	2,000	3%	95	394	8	1,070	3,729	1.1	6.9	3.0	0.93	1.00	1.00	1.29	7.79	3.44	1.06	1.13	1.13	0.08	0.50	0.22	0.07	0.07	0.07
PGVMWC Nicholas Johnston Field Well #2	Nicholas Johnston Field Well #2	Electric		58	n/a	2,000	3%	95	394	8	1,070	n/a																		
PGVMWC Nicholas Johnston Well	Nicholas Johnston Well	Electric		58	n/a	2,000	3%	95	394	8	1,070	n/a																		
PGVMWC Nicholas 72-Acre Field South	Nicholas 72-Acre Field South	Diesel	2002	62	T1	2,000	3%	95	394	8	1,070	3,729	1.1	6.9	3.0	0.93	1.00	1.00	1.29	7.79	3.44	1.06	1.13	1.13	0.08	0.50	0.22	0.07	0.07	0.07
PGVMWC Nicholas 72-Acre Field North	Nicholas 72-Acre Field North	Electric		58	n/a	2,000	3%	95	394	8	1,070	n/a																		
PGVMWC Nicholas BBC Well	Nicholas BBC Well	Electric		58	n/a	2,000	3%	95	394	8	1,070	n/a																		
PGVMWC Kelly 190 Field Well #2	Kelly 190 Field Well #2	Electric		30	n/a	2,000	3%	95	394	8	1,070	n/a																		
PGVMWC Kelly Windmill Field Well #2	Kelly Windmill Field Well #2	Diesel	2002	62	T1	2,000	3%	95	394	8	1,070	3,729	1.1	6.9	3.0	0.93	1.00	1.00	1.29	7.79	3.44	1.06	1.13	1.13	0.08	0.50	0.22	0.07	0.07	0.07
PGVMWC Kelly Windmill North Field Well	Kelly Windmill North Field Well	Diesel	2002	62	T1	2,000	3%	95	394	8	1,070	3,729	1.1	6.9	3.0	0.93	1.00	1.00	1.29	7.79	3.44	1.06	1.13	1.13	0.08	0.50	0.22	0.07	0.07	0.07
PGVMWC Kelly 306 Well	Kelly 306 Well	Electric		111	n/a	2,600	3%	123	512	8	1,070	n/a																		
PGVMWC Scheidel & Osterli #16	Scheidel & Osterli #16	Diesel	1997	234	T1	3,400	4%	161	670	8	1,070	14,053	1.0	6.9	8.5	0.93	0.40	0.40	4.15	29.35	36.37	3.98	1.72	1.72	0.27	1.90	2.35	0.26	0.11	0.11
PGVMWC Scheidel & Osterli #17	Scheidel & Osterli #17	Diesel	1999	101	T0	1,500	2%	71	296	8	1,070	6,065	1.1	14.1	3.0	0.93	0.22	0.21	2.10	25.95	5.59	1.72	0.41	0.40	0.14	1.68	0.36	0.11	0.03	0.03
PGVMWC Scheidel & Osterli #18A	Scheidel & Osterli #18A	Diesel	1999	101	T0	1,800	2%	85	355	8	1,070	6,065	1.1	14.1	3.0	0.93	0.22	0.21	2.10	25.95	5.59	1.72	0.41	0.40	0.14	1.68	0.36	0.11	0.03	0.03
PGVMWC River Ranch #19	River Ranch #19	Diesel	2008	99	T3	2,500	3%	118	493	8	1,070	5,945	0.2	3.3	3.7	0.93	0.30	0.30	0.32	6.03	6.75	1.68	0.54	0.54	0.02	0.39	0.44	0.11	0.03	0.03
					Total	**76,100**	**100%**	**3,600**	**15,000**	**257**	**33,185**	**90,892**							**24.98**	**219.75**	**106.56**	**25.71**	**14.91**	**14.87**	**1.61**	**14.19**	**6.88**	**1.66**	**0.96**	**0.96**

Notes:
If a specific HP and emission tier combination has an emission standard of NMHC+NOx, then 95% of emissions assumed to be NOx and 5% of emissions assumed to be VOC (see CARB Carl Moyer Program Guidelines).
AP-42 emission factors used for SOx in all cases.
If an emission standard is not available for a given pollutant, then AP-42 emission factors used.
PM2.5 assumed to be 98% of PM10 emissions based on size fractions for stationary internal combustion diesel engines.

Legend

	Average HP estimated from pump rates
	HP interpolated from other pumps
	Emission factor from AP-42
	Emission factor based on NMHC+NOx emission standard

Conversion Factors

1 lb =	453.6	g	
1 ton =	2,000	lbs	
1 kW =	1.34	hp	
1 day =	24	hours	
1 hour =	60	minutes	
1 month =	31	days	(peak occurs in July and August)
1 acre-foot =	325,851	gallons	

http://www.water.ca.gov/pubs/dwrnews/california_water_facts_card/waterfactscard.pdf

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	*(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855	g/mL	*(Based on MSDS for Hess Diesel Fuel All Types)*
7.13	lb/gal	

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Princeton-Codora-Glenn Irrigation District		Federal Attainment Status			Peak Month	
Transfer Volume	5,000	acre feet/year	PM10	A	*Engines not subject to ATCM if remotely-located.*	1,200	AF/month
Location	Glenn	County	PM2.5	A		8,759	gallons/minute
	Colusa	County	O3	A		23%	peak pump rate

Table 25. Princeton-Codora-Glenn Irrigation District Criteria Pollutant Emissions

						Pump Rate		Transfer Volume		Operation		Fuel Consumption	Emission Factors (g/bhp-hr)						Daily Emissions (lbs/day)						Annual Emissions (tons per year)					
Description	Well	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	(gpm)	(% of Total)	(AF/month)	(AF/year)	(hours/day)	(hours/year)	(gal/yr)	VOC	NOx	CO	SOx	PM10	PM2.5	VOC	NOx	CO	SOx	PM10	PM2.5	VOC	NOx	CO	SOx	PM10	PM2.5
C MICHAEL	C MICHAEL	D	0	160	T0	3,000	8%	96	400	6	724	6,500	1.1	14.1	3.0	0.93	0.22	0.21	2.26	27.81	5.99	1.84	0.44	0.42	0.15	1.80	0.39	0.12	0.03	0.03
CHRISMAN 1	CHRISMAN 1	D	0	160	T0	3,000	8%	96	400	6	724	6,500	1.1	14.1	3.0	0.93	0.22	0.21	2.26	27.81	5.99	1.84	0.44	0.42	0.15	1.80	0.39	0.12	0.03	0.03
CHRISMAN 2	CHRISMAN 2	D	0	160	T0	3,000	8%	96	400	6	724	6,500	1.1	14.1	3.0	0.93	0.22	0.21	2.26	27.81	5.99	1.84	0.44	0.42	0.15	1.80	0.39	0.12	0.03	0.03
D PEREZ	D PEREZ	D	0	160	T0	5,000	13%	160	667	6	724	6,500	1.1	14.1	3.0	0.93	0.22	0.21	2.26	27.81	5.99	1.84	0.44	0.42	0.15	1.80	0.39	0.12	0.03	0.03
D PEREZ	D PEREZ	D	0	160	T0	5,000	13%	160	667	6	724	6,500	1.1	14.1	3.0	0.93	0.22	0.21	2.26	27.81	5.99	1.84	0.44	0.42	0.15	1.80	0.39	0.12	0.03	0.03
R PEREZ	R PEREZ	E	0	110	n/a	4,000	11%	128	533	6	724	n/a																		
WELLER	WELLER	D	0	160	T0	3,000	8%	96	400	6	724	6,500	1.1	14.1	3.0	0.93	0.22	0.21	2.26	27.81	5.99	1.84	0.44	0.42	0.15	1.80	0.39	0.12	0.03	0.03
G GIESBREST	G GIESBREST	E	0	110	n/a	3,000	8%	96	400	6	724	n/a																		
L HANSEN	L HANSEN	D	0	160	T0	3,000	8%	96	400	6	724	6,500	1.1	14.1	3.0	0.93	0.22	0.21	2.26	27.81	5.99	1.84	0.44	0.42	0.15	1.80	0.39	0.12	0.03	0.03
J MANN	J MANN	D	0	160	T0	2,500	7%	80	333	6	724	6,500	1.1	14.1	3.0	0.93	0.22	0.21	2.26	27.81	5.99	1.84	0.44	0.42	0.15	1.80	0.39	0.12	0.03	0.03
B GIESBRECHT	B GIESBRECHT	D	0	160	T0	3,000	8%	96	400	6	724	6,500	1.1	14.1	3.0	0.93	0.22	0.21	2.26	27.81	5.99	1.84	0.44	0.42	0.15	1.80	0.39	0.12	0.03	0.03
					Total	**37,500**	**100%**	**1,200**	**5,000**	**62**	**7,965**	**58,498**							**20.30**	**250.25**	**53.93**	**16.55**	**3.92**	**3.82**	**1.31**	**16.16**	**3.48**	**1.07**	**0.25**	**0.25**

Notes:
If a specific HP and emission tier combination has an emission standard of NMHC+NOx, then 95% of emissions assumed to be NOx and 5% of emissions assumed to be VOC (see CARB Carl Moyer Program Guidelines).
AP-42 emission factors used for SOx in all cases.
If an emission standard is not available for a given pollutant, then AP-42 emission factors used.
PM2.5 assumed to be 98% of PM10 emissions based on size fractions for stationary internal combustion diesel engines.

Legend
Horsepower estimated based on average size engine for fuel type in study area

Conversion Factors

1 lb =	453.6	g
1 ton =	2,000	lbs
1 kW =	1.34	hp
1 day =	24	hours
1 month =	31	days
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

http://www.water.ca.gov/pubs/dwrnews/california_water_facts_card/waterfactscard.pdf

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	*(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855	g/mL	*(Based on MSDS for Hess Diesel Fuel All Types)*
7.13	lb/gal	

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Provident Irrigation District	Federal Attainment Status			Peak Month
Transfer Volume	5,000 acre feet/year	PM10	A	*Engines not subject to ATCM if remotely-located.*	1,200 AF/month
Location	Glenn County	PM2.5	A		8,759 gallons/minute
	Colusa County	O3	A		25% peak pump rate

Table 26. Provident Irrigation District Criteria Pollutant Emissions

						Pump Rate		Transfer Volume		Operation		Fuel Consumption	Emission Factors (g/bhp-hr)						Daily Emissions (lbs/day)						Annual Emissions (tons per year)					
Description	Well	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	(gpm)	(% of Total)	(AF/month)	(AF/year)	(hours/day)	(hours/year)	(gal/yr)	VOC	NOx	CO	SOx	PM10	PM2.5	VOC	NOx	CO	SOx	PM10	PM2.5	VOC	NOx	CO	SOx	PM10	PM2.5
WELLER#4	WELLER#4	E	0	110	n/a	3,200	9%	109	456	6	774	n/a																		
WELLER#1	WELLER#1	D	0	160	T0	3,300	9%	113	470	6	774	6,944	1.1	14.1	3.0	0.93	0.22	0.21	2.41	29.71	6.40	1.96	0.46	0.45	0.16	1.92	0.41	0.13	0.03	0.03
B WELLER	B WELLER	D	0	160	T0	3,100	9%	106	442	6	774	6,944	1.1	14.1	3.0	0.93	0.22	0.21	2.41	29.71	6.40	1.96	0.46	0.45	0.16	1.92	0.41	0.13	0.03	0.03
PEREZ&PEREZ	PEREZ&PEREZ	D	0	160	T0	3,200	9%	109	456	6	774	6,944	1.1	14.1	3.0	0.93	0.22	0.21	2.41	29.71	6.40	1.96	0.46	0.45	0.16	1.92	0.41	0.13	0.03	0.03
A PEREZ	A PEREZ	D	0	160	T0	3,000	9%	103	427	6	774	6,944	1.1	14.1	3.0	0.93	0.22	0.21	2.41	29.71	6.40	1.96	0.46	0.45	0.16	1.92	0.41	0.13	0.03	0.03
R HANSEN	R HANSEN	D	0	160	T0	3,000	9%	103	427	6	774	6,944	1.1	14.1	3.0	0.93	0.22	0.21	2.41	29.71	6.40	1.96	0.46	0.45	0.16	1.92	0.41	0.13	0.03	0.03
C MICHAEL	C MICHAEL	D	0	160	T0	2,800	8%	96	399	6	774	6,944	1.1	14.1	3.0	0.93	0.22	0.21	2.41	29.71	6.40	1.96	0.46	0.45	0.16	1.92	0.41	0.13	0.03	0.03
K HANSEN	K HANSEN	E	0	110	n/a	3,000	9%	103	427	6	774	n/a																		
NAVARRO#1	NAVARRO#1	D	0	160	T0	2,500	7%	85	356	6	774	6,944	1.1	14.1	3.0	0.93	0.22	0.21	2.41	29.71	6.40	1.96	0.46	0.45	0.16	1.92	0.41	0.13	0.03	0.03
NAVARRO#2	NAVARRO#2	D	0	160	T0	2,000	6%	68	285	6	774	6,944	1.1	14.1	3.0	0.93	0.22	0.21	2.41	29.71	6.40	1.96	0.46	0.45	0.16	1.92	0.41	0.13	0.03	0.03
D KENNEDY	D KENNEDY	E	0	110	n/a	3,000	9%	103	427	6	774	n/a																		
J MANN	J MANN	D	0	160	T0	3,000	9%	103	427	6	774	6,944	1.1	14.1	3.0	0.93	0.22	0.21	2.41	29.71	6.40	1.96	0.46	0.45	0.16	1.92	0.41	0.13	0.03	0.03
					Total	**35,100**	**100%**	**1,200**	**5,000**	**72**	**9,284**	**62,498**							**21.68**	**267.36**	**57.61**	**17.68**	**4.18**	**4.08**	**1.40**	**17.27**	**3.72**	**1.14**	**0.27**	**0.26**

Notes:
If a specific HP and emission tier combination has an emission standard of NMHC+NOx, then 95% of emissions assumed to be NOx and 5% of emissions assumed to be VOC (see CARB Carl Moyer Program Guidelines).
AP-42 emission factors used for SOx in all cases.
If an emission standard is not available for a given pollutant, then AP-42 emission factors used.
PM2.5 assumed to be 98% of PM10 emissions based on size fractions for stationary internal combustion diesel engines.

Legend
Horsepower estimated based on average size engine for fuel type in study area

Conversion Factors

1 lb =	453.6	g
1 ton =	2,000	lbs
1 kW =	1.34	hp
1 day =	24	hours
1 month =	31	days
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

http://www.water.ca.gov/pubs/dwrnews/california_water_facts_card/waterfactscard.pdf

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	*(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855	g/mL	*(Based on MSDS for Hess Diesel Fuel All Types)*
7.13	lb/gal	

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Reclamation District 108	
Transfer Volume	14,400	acre feet/year
Location	Colusa	County
	Yolo	County

Federal Attainment Status

PM10	A	*Engines not subject to ATCM if remotely-located.*
PM2.5	A	
O3	A	

Table 27. Reclamation District 108 Criteria Pollutant Emissions

Description	Well	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operation (hours/day)	Operation (hours/year)
RD-108 Well 1	Well 1	Electric		100	n/a	3,300	18%	438	2,625	23	4,321
RD-108 Well 5	Well 5	Electric		150	n/a	1,500	8%	199	1,193	23	4,321
RD-108 Well 6	Well 6	Electric		250	n/a	5,700	31%	756	4,535	23	4,321
RD-108 Well 7	Well 7	Electric		250	n/a	3,800	21%	504	3,023	23	4,321
RD-108 Well 8	Well 8	Electric		250	n/a	3,800	21%	504	3,023	23	4,321
					Total	**18,100**	**100%**	**2,400**	**14,400**	**116**	**21,603**

Note: All wells are electric; therefore, no local criteria pollutant emissions.

Conversion Factors

1 lb =	453.6	g
1 ton =	2,000	lbs
1 kW =	1.34	hp
1 day =	24	hours
1 month =	31	days
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

http://www.water.ca.gov/pubs/dwrnews/california_water_facts_card/waterfactscard.pdf

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	*(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855	g/mL	*(Based on MSDS for Hess Diesel Fuel All Types)*
7.13	lb/gal	

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Reclamation District 1004			Federal Attainment Status			Peak Month
Transfer Volume	5,400	acre feet/year		PM10	A	*Engines not subject to ATCM if remotely-located.*	1,296 AF/month
Location	Colusa	County		PM2.5	A		9,460 gallons/minute
	Glenn	County		O3	A		17% peak pump rate
	Sutter	County					

Table 28. Reclamation District 1004 Criteria Pollutant Emissions

Description	Well	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/day)	Transfer Volume (AF/year)	Operation (hours/day)	Operation (hours/year)	Fuel Consumption (gal/yr)	Emission Factors (g/bhp-hr) VOC	NOx	CO	SOx	PM10	PM2.5	Daily Emissions (lbs/day) VOC	NOx	CO	SOx	PM10	PM2.5	Annual Emissions (tons per year) VOC	NOx	CO	SOx	PM10	PM2.5
RD-1004Behring Ranch Club House No. 496461	Behring Ranch Club House No. 496461	Electric		202	n/a	3,400	6%	79	330	4	527	n/a																		
RD-1004Behring Ranch Nursery Well No. 17N1W10H1	Behring Ranch Nursery Well No. 17N1W10H1	Diesel	TBD	40	T0	1,000	2%	23	97	4	527	1,184	1.1	14.1	3.0	0.93	0.22	0.22	0.41	5.06	1.09	0.33	0.08	0.08	0.03	0.33	0.07	0.02	0.01	0.01
RD-1004Gardener No. 498178	Gardener No. 498178	Diesel	2009	215	T3	3,500	6%	82	340	4	527	6,362	0.1	2.8	2.6	0.93	0.15	0.15	0.29	5.49	5.06	1.80	0.29	0.29	0.02	0.35	0.33	0.12	0.02	0.02
RD-1004Drumheller Well #7	Drumheller Well #7	Diesel	TBD	162	T0	4,000	7%	93	388	4	527	4,794	1.1	14.1	3.0	0.93	0.22	0.21	1.66	20.51	4.42	1.36	0.32	0.31	0.11	1.32	0.29	0.09	0.02	0.02
RD-1004Myers Well #2 No. 340884	Myers Well #2 No. 340884	Electric	1982	100	n/a	4,100	7%	96	398	4	527	n/a																		
RD-1004Stonewell #6 No. 11334	Stonewell #6 No. 11334	Electric	2006	40	n/a	1,800	3%	42	175	4	527	n/a																		
RD-1004Myers Well #1 No. 3457	Myers Well #1 No. 3457	Electric	2006	40	n/a	2,200	4%	51	214	4	527	n/a																		
RD-1004Hall Well No. 369428	Hall Well No. 369428	Electric	2011	125	n/a	4,500	8%	105	437	4	527	n/a																		
RD-1004Hall Well No. X	Hall Well No. X	Electric	TBD	148	n/a	4,500	8%	105	437	4	527	n/a																		
RD-1004Gardener No. 374672	Gardener No. 374672	Diesel	2008	215	T3	3,500	6%	82	340	4	527	6,362	0.1	2.8	2.6	0.93	0.15	0.15	0.29	5.49	5.06	1.80	0.29	0.29	0.02	0.35	0.33	0.12	0.02	0.02
RD-1004Behring Ranch West Well No. 97863	Behring Ranch West Well No. 97863	Electric		53	n/a	2,300	4%	54	223	4	527	n/a																		
RD-1004Behring Ranch 10 Field Well No. 496441	Behring Ranch 10 Field Well No. 496441	Diesel	2008	225	T3	5,800	10%	135	563	4	527	6,658	0.1	2.8	2.6	0.93	0.15	0.15	0.30	5.74	5.29	1.88	0.30	0.30	0.02	0.37	0.34	0.12	0.02	0.02
RD-1004Behring Ranch Pearl 20094	Behring Ranch Pearl 20094	Diesel	TBD	80	T0	2,500	4%	58	243	4	527	2,367	1.1	14.1	3.0	0.93	0.30	0.29	0.82	10.13	2.18	0.67	0.22	0.21	0.05	0.65	0.14	0.04	0.01	0.01
RD-1004Sikes & Parachini #2 No. 374682	Sikes & Parachini #2 No. 374682	Diesel	2008	150	T3	4,000	7%	93	388	4	527	4,439	0.1	2.8	3.7	0.93	0.22	0.22	0.20	3.83	5.04	1.26	0.30	0.30	0.01	0.25	0.33	0.08	0.02	0.02
RD-1004Sikes & Parachini #1 No. 93124	Sikes & Parachini #1 No. 93124	Diesel	2006	173	T2	4,000	7%	93	388	4	527	5,119	0.2	4.7	3.7	0.93	0.22	0.22	0.38	7.29	5.81	1.45	0.35	0.35	0.02	0.47	0.38	0.09	0.02	0.02
RD-1004Rancho Valeta No. 726883	Rancho Valeta No. 726883	Diesel	2004	170	T2	4,500	8%	105	437	4	527	5,030	0.2	4.7	3.7	0.93	0.22	0.22	0.38	7.16	5.71	1.42	0.34	0.34	0.02	0.46	0.37	0.09	0.02	0.02
					Total	**55,600**	**100%**	**1,296**	**5,400**	**65**	**8,439**	**42,315**							**4.74**	**70.70**	**39.65**	**11.97**	**2.49**	**2.48**	**0.31**	**4.57**	**2.56**	**0.77**	**0.16**	**0.16**

Notes:
If a specific HP and emission tier combination has an emission standard of NMHC+NOx, then 95% of emissions assumed to be NOx and 5% of emissions assumed to be VOC (see CARB Carl Moyer Program Guidelines).
AP-42 emission factors used for SOx in all cases.
If an emission standard is not available for a given pollutant, then AP-42 emission factors used.
PM2.5 assumed to be 98% of PM10 emissions based on size fractions for stationary internal combustion diesel engines.

Legend

	Average HP estimated from pump rates
	HP interpolated from other pumps
	Power rating equal to pump with closest equivalent pump rate
	Engines assumed to be Tier 0 (noncertified) because model year not known (worst-case emissions).
	Emission factor based on NMHC+NOx emission standard
	Emission factor from AP-42

Conversion Factors

1 lb =	453.6	g	
1 ton =	2,000	lbs	
1 kW =	1.34	hp	
1 day =	24	hours	
1 month =	31	days	(peak occurs in July and August)
1 hour =	60	minutes	
1 acre-foot =	325,851	gallons	

http://www.water.ca.gov/pubs/dwrnews/california_water_facts_card/waterfactscard.pdf

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	*(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855	g/mL	*(Based on MSDS for Hess Diesel Fuel All Types)*
7.13	lb/gal	

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	River Garden Farms		
Transfer Volume	6,000	acre feet/year	
Location	Yolo	County	

Federal Attainment Status

PM10	A	*Engines subject to ATCM.*
PM2.5	N	
O3	N	

Table 29. River Garden Farms Criteria Pollutant Emissions

Description	Well	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/year)	Operation (hours/year)
RG Field 65 PW	Field 65 PW	Electric	2008	110	n/a	2,500	14%	862	1,873
RG Field 71 PW	Field 71 PW	Electric	2001	110	n/a	1,700	10%	586	1,873
RG Field 98 PW	Field 98 PW	Electric	1963	110	T0	2,900	17%	1,000	1,873
RG Field 104 PW	Field 104 PW	Electric	2008	110	n/a	2,500	14%	862	1,873
RG Field 104-09 PW	Field 104-09 PW	Electric	2009	110	n/a	2,990	17%	1,031	1,873
RG Field 91-09 PW	Field 91-09 PW	Electric	2009	110	n/a	2,840	16%	980	1,873
RG Field 117 PW	Field 117 PW	Electric	2009	110	n/a	1,965	11%	678	1,873
					Total	**17,395**	**100%**	**6,000**	**13,113**

Legend

Horsepower estimated based on average size engine for fuel type in study area

Conversion Factors

1 lb =	453.6	g	
1 ton =	2,000	lbs	
1 kW =	1.34	hp	
1 day =	24	hours	
1 month =	31	days	(peak occurs in July and August)
1 hour =	60	minutes	
1 acre-foot =	325,851	gallons	

http://www.water.ca.gov/pubs/dwrnews/california_water_facts_card/waterfactscard.pdf

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	*(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855	g/mL	*(Based on MSDS for Hess Diesel Fuel All Types)*
7.13	lb/gal	

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Roberts Ditch Irrigation Company	
Transfer Volume	3,330	acre feet/year
Location	Colusa	County

Federal Attainment Status

PM10	A	*Engines not subject to ATCM if remotely-located.*
PM2.5	A	
O3	A	

Table 30. Roberts Ditch Irrigation Company Criteria Pollutant Emissions

Description	Well	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (acre feet/year)	Operation (hours/year)
RDIC Well North	RDIC Well North	E	0	110	n/a	4,500	50%	1,665	2,009
RDIC Well South	RDIC Well South	E	0	110	n/a	4,500	50%	1,665	2,009
					Total	**9,000**	**100%**	**3,330**	**4,019**

Note: All wells are electric; therefore, no local criteria pollutant emissions.

Legend

Horsepower estimated based on average size engine for fuel type in study area

Conversion Factors

1 hour =	60	minutes
1 acre-foot =	325,851	gallons

http://www.water.ca.gov/pubs/dwrnews/california_water_facts_card/waterfactscard.pdf

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency Sycamore Mutual Water Company
Transfer Volume 8,000 acre feet/year
Location Colusa County

Table 31. Sycamore Mutual Water Company Criteria Pollutant Emissions

Description	Well	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (acre feet/year)	Operation (hours/year)
Sycamore Family Trust11	11	Electric		100	n/a	2,500	7%	571	1,241
Sycamore Family Trust15	15	Electric		75	n/a	2,500	7%	571	1,241
Sycamore Family Trust14	14	Electric		100	n/a	2,500	7%	571	1,241
Sycamore Family Trust17	17	Electric		125	n/a	3,500	10%	800	1,241
Sycamore Family Trust1	1	Electric		125	n/a	3,000	9%	686	1,241
Sycamore Family Trust2	2	Electric		125	n/a	3,000	9%	686	1,241
Sycamore Family Trust3	3	Electric		125	n/a	3,000	9%	686	1,241
Sycamore Family Trust4	4	Electric		125	n/a	3,000	9%	686	1,241
Sycamore Family Trust5	5	Electric		125	n/a	3,000	9%	686	1,241
Sycamore Family Trust6	6	Electric		125	n/a	3,000	9%	686	1,241
Sycamore Family Trust7	7	Electric		125	n/a	3,000	9%	686	1,241
Sycamore Family Trust8	8	Electric		125	n/a	3,000	9%	686	1,241
						Total	**100%**	**8,000**	**14,896**

Note: All wells are electric; therefore, no local criteria pollutant emissions.

Conversion Factors

1 hour = 60 minutes
1 acre-foot = 325,851 gallons

http://www.water.ca.gov/pubs/dwrnews/california_water_facts_card/waterfactscard.pdf

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	T&P Farms		
Transfer Volume	840	acre feet/year	
Location	Colusa	County	

Federal Attainment Status

PM10	A	*Engines not subject to ATCM if remotely-located.*
PM2.5	A	
O3	A	

Table 32. T&P Farms Criteria Pollutant Emissions

Description	Well	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (acre feet/year)	Operation (hours/year)
NW-3	NW-3	E	0	110	n/a	3,500	50%	420	652
NW-4	NW-4	E	0	110	n/a	3,500	50%	420	652
					Total	**7,000**	**100%**	**840**	**1,303**

Note: All wells are electric; therefore, no local criteria pollutant emissions.

Legend

Horsepower estimated based on average size engine for fuel type in study area

Conversion Factors

1 hour =	60	minutes
1 acre-foot =	325,851	gallons

http://www.water.ca.gov/pubs/dwrnews/california_water_facts_card/waterfactscard.pdf

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency Te Velde Revocable Family Trust
Transfer Volume 2,925 acre feet/year
Location Yolo County

Table 33. Te Velde Revocable Family Trust Criteria Pollutant Emissions

Description	Well	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (acre feet/year)	Operation (hours/year)
Sacramento River Ranch123448	123448	elec		127	n/a	4656	35%	1,016	1,185
Sacramento River Ranch123447	123447	elec		104	n/a	2200	16%	480	1,185
Sacramento River Ranch33839	33839	elec		143	n/a	2833	21%	618	1,185
Sacramento River Ranch33838	33838	elec		125	n/a	3715	28%	811	1,185
						Total	**100%**	**2,925**	**4,740**

Note: All wells are electric; therefore, no local criteria pollutant emissions.

Conversion Factors

1 hour = 60 minutes
1 acre-foot = 325,851 gallons
http://www.water.ca.gov/pubs/dwrnews/california_water_facts_card/waterfactscard.pdf

CARB Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines

Table 34
Summary of the Emission Standards for New Stationary Diesel-Fueled CI Engines > 50 BHP used in Agricultural Operations

Horsepower Range	Diesel PM [1] (g/bhp-hr)	HC (g/bhp-hr)	NOx (g/bhp-hr)	NMHC+NOx (g/bhp-hr)	CO (g/bhp-hr)
50<HP<100	0.3				
100<=HP<175	0.22				
175<=HP	0.15				

Source: See Section 93115.8(a)

Notes:

[1] Less than or equal to the emission standard OR Off-Road CI Engine Certification Standard for an off-road engine of the maximum rated power, whichever is more stringent.

[2] Off-Road CI Engine Certification Standard for an off-road engine of the model year and maximum rated power of the engine installed to meet the applicable PM standard, or Tier 1 standards.

[3] Prior to January 1, 2008, these limits shall not apply to engines sold from one agricultural operation to another and funded under State or federal incentive.

Table 35
Emission Standards for Noncertified Greater than 50 BHP In-Use Stationary Diesel-Fueled Engines Used in Agricultural Operations

Horsepower (HP) Range	Compliance Date [1]	PM (g/bhp-hr)	HC [2,3] (g/bhp-hr)	NOx [2,3] (g/bhp-hr)	NMHC+NOx [2,3] (g/bhp-hr)	CO [2,3] (g/bhp-hr)
50<HP<75	2011	0.3				
75<=HP<100	2011	0.3				
100<=HP<175	2010	0.22				
175<=HP<=750	2010	0.15				
750<HP	2014	0.075				

Source: See Sections 93115.8(b) (2) and (4)

Note:

[1] Compliance date on or after December 31

[2] Engine Certification Standards for off-road engine of the model year and maximum rated power of the engine installed to meet the applicable PM standard.

[3] If no limits have been established for an off-road engine of the same model year and maximum rated power, then the in-use stationary diesel-fueled engine used in an agricultural operation shall not exceed Tier 1 standards in Title 13.

Table 36
Emission Standards Tier 1- and Tier 2-Certified Greater than 50 BHP In-Use Stationary Diesel-Fueled Engines Used in Agricultural Operations

Horsepower Range (hp)	Compliance Date	PM (g/bhp-hr)	HC [2,3] (g/bhp-hr)	NOx [2,3] (g/bhp-hr)	NMHC+NOx [2,3] (g/bhp-hr)	CO [2,3] (g/bhp-hr)
50<HP<75	2015	0.02				
75<=HP<175	2015	0.01				
175<=hp<=750	2014	0.01				
750<HP	2014	0.075				

Source: See Sections 93115.8(b)(3) and (4)

Notes:

[1] Compliance date on or after December 31 or 12 years after the date of initial installation, whichever is later.

[2] Off-Road CI Engine Certification Standards for an off-road engine of the model year and maximum rated power of the engine installed to meet the applicable PM standard.

[3] If no limits have been established for an off-road engine of the same model year and maximum rated power, then the in-use stationary diesel-fueled engine used in agricultural operation shall not exceed Tier 1 standards in Tier 13, CCR, section 2423 for an off-road engine of the same maximum rated power irrespective of model year.

Table 37
Tier 1, Tier 2, and Tier 3 Exhaust Emission Standards

Maximum Rated Power	Tier	Model Year	(g/kW-hr)					(g/hp-hr)				
			NOx	HC	NMHC+NOx	CO	PM	NOx	HC	NMHC+NOx	CO	PM
kW<8	T1	2000-2004	-	-	10.5	8.0	1	-	-	7.8	6.0	0.7
hp <11	T2	2005 -2007	-	-	7.5	8.0	0.8	-	-	5.6	6.0	0.6
8≤kW<19	T1	2000-2004	-	-	9.5	6.6	0.8	-	-	7.1	4.9	0.6
11<=hp<25	T2	2005 -2007	-	-	7.5	6.6	0.8	-	-	5.6	4.9	0.6
19≤kW<37	T1	2000-2003	-	-	9.5	5.5	0.8	-	-	7.1	4.1	0.6
25<=hp<50	T2	2004 -2007	-	-	7.5	5.5	0.6	-	-	5.6	4.1	0.4
37≤kW<56	T1	2000-2003	9.2	-	-	-	-	6.9	-	-	-	-
50<=hp<75	T2	2004-2007	-	-	7.5	5.0	0.4	-	-	5.6	3.7	0.3
	T3	2008 -2011	-	-	4.7	5.0	0.4	-	-	3.5	3.7	0.3
56≤kW<75	T1	2000-2003	9.2	-	-	-	-	6.9	-	-	-	-
75<=hp<100	T2	2004-2007	-	-	7.5	5.0	0.4	-	-	5.6	3.7	0.3
	T3	2008-2011	-	-	4.7	5.0	0.4	-	-	3.5	3.7	0.3
75≤kW<130	T1	2000-2002	9.2	-	-	-	-	6.9	-	-	-	-
100<=hp<175	T2	2003-2006	-	-	6.6	5.0	0.3	-	-	4.9	3.7	0.2
	T3	2007 -2011	-	-	4.0	5.0	0.3	-	-	3.0	3.7	0.2
130≤kW<225	T1	1996-2002	9.2	1.3	-	11.4	0.54	6.9	1.0	-	8.5	0.4
175<=hp<300	T2	2003-2005	-	-	6.6	3.5	0.2	-	-	4.9	2.6	0.1
	T3	2006 -2010	-	-	4.0	3.5	0.2	-	-	3.0	2.6	0.1
225≤kW<450	T1	1996-2000	9.2	1.3	-	11.4	0.54	6.9	1.0	-	8.5	0.4
300<=hp<600	T2	2001-2005	-	-	6.4	3.5	0.2	-	-	4.8	2.6	0.1
	T3	2006 -2010	-	-	4.0	3.5	0.2	-	-	3.0	2.6	0.1
450≤kW≤560	T1	1996-2001	9.2	1.3	-	11.4	0.54	6.9	1.0	-	8.5	0.4
600<=hp<750	T2	2002-2005	-	-	6.4	3.5	0.2	-	-	4.8	2.6	0.1
	T3	2006 -2010	-	-	4.0	3.5	0.2	-	-	3.0	2.6	0.1
kW>560	T1	2000-2005	9.2	1.3	-	11.4	0.54	6.9	1.0	-	8.5	0.4
hp>750	T2	2006 -2010	-	-	6.4	3.5	0.2	-	-	4.8	2.6	0.1

Source: Title 13, California Code of Regulations, Division 3, Chapter 9, Article 4, Section 2423, "Off-Road Compression-Ignition Engines and Equipment."

NOx and NMHC fraction - Table B-26

NOx	95%
NMHC	5%

http://www.arb.ca.gov/msprog/moyer/guidelines/cmp_guidelines_part4.pdf

PM Size Fractions

PM10	0.96
PM2.5	0.937
Ratio	0.98

CARB PMSIZE Profile No. 116 (STAT. I.C. ENGINE-DIESEL)

Table 38
Tier 4 Exhaust Emission Standards

MAXIMUM ENGINE POWER	MODEL YEAR	TYPE	PM	NMHC+ NOx	NMHC	NOx	CO
			grams per horsepower-hour				
hp<11	2008 and later	FINAL	0.30	5.6	-	-	6.0
11<=hp<25							4.9
25<=hp<50	2008-2012	INTERIM	0.22	5.6	-	-	4.1
	2013 and later	FINAL	0.02	3.5			
50<=hp<75	2008-2012	INTERIM	0.22	3.5	-	-	3.7
	2013 and later	FINAL	0.02				
75<=hp<100	2012-2014	PHASE-IN	0.01	-	0.14	0.3	3.7
		PHASE-OUT		3.5	-	-	
		or/ ALT NOx			0.14	2.5	
	2015 and later	FINAL		-		0.3	
100<=hp<175	2012-2014	PHASE-IN	0.01	-	0.14	0.3	3.7
		PHASE-OUT		3.0	-	-	
		or/ ALT NOx		-	0.14	2.5	
	2015 and later	FINAL			0.14	0.3	
175<=hp<=750	2011-2013	PHASE-IN	0.01	-	0.14	0.3	2.6
	2014 and later	PHASE-OUT		3.0	-	-	
		or/ ALT NOx		-	0.14	1.5	
		FINAL				0.3	
750 hp<GEN<=1205 hp	2011-2014	INTERIM	0.07	-	0.30	2.6	2.6
	2015 and later	FINAL	0.02		0.14	0.5	
GEN>1205 hp	2011-2014	INTERIM	0.07	-	0.30		2.6
	2015 and later	FINAL	0.02		0.14	0.5	
ELSE>750 hp	2011-2014	INTERIM	0.07	-	0.30	2.6	2.6
	2015 and later	FINAL	0.03	-	0.14		

Source: Title 13, California Code of Regulations, Article 4, Section 2423, "Off-Road Compression-Ignition Engines and Equipment."

Table 39
Engine Tier Matrix

HP Range	Year																			
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
hp <11	T0	T0	T0	T0	T1	T1	T1	T1	T1	T2	T2	T2	T4	T4	T4	T4	T4	T4	T4	T4
11<=hp<25	T0	T0	T0	T0	T1	T1	T1	T1	T1	T2	T2	T2	T4	T4	T4	T4	T4	T4	T4	T4
25<=hp<50	T0	T0	T0	T0	T1	T1	T1	T1	T2	T2	T2	T2	T4I	T4I	T4I	T4I	T4I	T4	T4	T4
50<=hp<75	T0	T0	T0	T0	T1	T1	T1	T1	T2	T2	T2	T2	T4I	T4I	T4I	T4I	T4I	T4	T4	T4
75<=hp<100	T0	T0	T0	T0	T1	T1	T1	T1	T2	T2	T2	T2	T3	T3	T3	T3	T4I	T4I	T4I	T4
100<=hp<175	T0	T0	T0	T0	T1	T1	T1	T2	T2	T2	T2	T3	T3	T3	T3	T3	T4I	T4I	T4I	T4
175<=hp<300	T1	T1	T1	T1	T1	T1	T1	T2	T2	T2	T3	T3	T3	T3	T3	T4I	T4I	T4I	T4	T4
300<=hp<600	T1	T1	T1	T1	T1	T2	T2	T2	T2	T2	T3	T3	T3	T3	T3	T4I	T4I	T4I	T4	T4
600<=hp<750	T1	T1	T1	T1	T1	T1	T2	T2	T2	T2	T3	T3	T3	T3	T3	T4I	T4I	T4I	T4	T4
hp>750	T0	T0	T0	T0	T1	T1	T1	T1	T1	T1	T2	T2	T2	T2	T2	T4I	T4I	T4I	T4I	T4

Key:

T0 = Tier 0 (Noncertified)
T1 = Tier 1
T2 = Tier 2
T3 = Tier 3
T4 = Tier 4
T4I = Tier 4 Interim

AP-42 Emission Factors

Table 40
Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines [a]

Pollutant	Gasoline Fuel Emission Factor (lb/hp-hr) (power output)	Gasoline Fuel Emission Factor (lb/MMBtu) (fuel input)	Diesel Fuel Emission Factor (lb/hp-hr) (power output)	Diesel Fuel Emission Factor (lb/MMBtu) (fuel input)	Emission Factor Rating
NOx	0.011	1.63	0.031	4.41	D
CO	6.96E-03 [d]	0.99 [d]	6.68E-03	0.95	D
SOx	5.91E-04	0.084	2.05E-03	0.29	D
PM-10 [b]	7.21E-04	0.1	2.20E-03	0.31	D
CO2 [c]	1.08	154	1.15	164	B
Aldehydes	4.85E-04	0.07	4.63E-04	0.07	D
TOC					
Exhaust	0.015	2.1	2.47E-03	0.35	D
Evaporative	6.61E-04	0.09	0.00	0.00	E
Crankcase	4.85E-03	0.69	4.41E-05	0.01	E
Refueling	1.08E-03	0.15	0.00	0.00	E

Source: U.S. Environmental Protection Agency. 1996. Compilation of Air Pollutant Emission Factors (AP-42). Chapter 3.3: Gasoline and Diesel Industrial Engines.

Notes:

[a] References 2,5-6,9-14. When necessary, an average brake-specific fuel consumption (BSFC) of 7,000 Btu/hp-hr was used to convert from lb/MMBtu to lb/hp-hr. To convert from lb/hp-hr to kg/kwhr, multiply by 0.608. To convert from lb/MMBtu to ng/J, multiply by 430. SCC = Source Classification Code. TOC = total organic compounds.

[b] PM-10 = particulate matter less than or equal to 10 :m aerodynamic diameter. All particulate is assumed to be 10 µm in size.

[c] Assumes 99% conversion of carbon in fuel to CO2 with 87 weight % carbon in diesel, 86 weight % carbon in gasoline, average BSFC of 7,000 Btu/hp-hr, diesel heating value of 19,300 Btu/lb, and gasoline heating value of 20,300 Btu/lb.

[d] Instead of 0.439 lb/hp-hr (power output) and 62.7 lb/mmBtu (fuel input), the correct emissions factors values are 6.96 E-03 lb/hp-hr (power output) and 0.99 lb/mmBtu (fuel input), respectively. This is an editorial correction. March 24, 2009

For large stationary diesel engines (greater than 600 horsepower [hp]) see Chapter 3.4: Large Stationary Diesel and All Stationary Dual-Fuel Engines.

Table 41
Uncontrolled Emission Factors for 4-Stroke Lean-Burn Engines [a]

Pollutant	Emission Factor (lb/MMBtu) [b] (fuel input)	Emission Factor Rating
NOx [c] 90 - 105% Load	4.08E+00	B
NOx [c] <90% Load	8.47E-01	B
CO [c] 90 - 105% Load	3.17E-01	C
CO [c] <90% Load	5.57E-01	B
CO2 [d]	1.10E+02	A
SO2 [e]	5.88E-04	A
TOC [f]	1.47E+00	A
Methane[g]	1.25E+00	C
VOC [h]	1.18E-01	C
PM10 (filterable) [i]	7.71E-05	D
PM2.5 (filterable) [i]	7.71E-05	D
PM Condensable [j]	9.91E-03	D

Source: U.S. Environmental Protection Agency. 2000. Compilation of Air Pollutant Emission Factors (AP-42). Chapter 3.2: Natural Gas-Fired Reciprocating Engines. July.
Notes:

[a] Reference 7. Factors represent uncontrolled levels. For NOx, CO, and PM10, “uncontrolled” means no combustion or add-on controls; however, the factor may include turbocharged units. For all other pollutants, the data set may include units with control techniques used for NOx control, such as PCC“uncontrolled” means no oxidation control; and SCR for lean burn engines, and PSC for rich burn engines. Factors are based on large population of engines. Factors are for engines at all loads, except as indicated. SCC = Source Classification Code. TOC = Total Organic Compounds. PM-10 = Particulate Matter ≤ 10 microns (μ) aerodynamic diameter. A “<“ sign in front of a factor means that the corresponding emission factor is based on one-half of the method detection limit.

[b] Emission factors were calculated in units of (lb/MMBtu) based on procedures in EPA Method 19. To convert from (lb/MMBtu) to (lb/10^6 scf), multiply by the heat content of the fuel. If the heat content is not available, use 1020 Btu/scf. To convert from (lb/MMBtu) to (lb/hp-hr) use the following equation:

lb/hp-hr = (lb/MMBtu) (heat input, MMBtu/hr) (1/operating HP, 1/hp)

[c] Emission tests with unreported load conditions were not included in the data set.

[d] Based on 99.5% conversion of the fuel carbon to CO2. CO2 [lb/MMBtu] = (3.67)(%CON)(C)(D)(1/h), where %CON = percent conversion of fuel carbon to CO2, C = carbon content of fuel by weight (0.75), D = density of fuel, 4.1 E+04 lb/10^6 scf, and h = heating value of natural gas (assume 1020 Btu/scf at 60EF).

[e] Based on 100% conversion of fuel sulfur to SO2. Assumes sulfur content in natural gas of 2,000 gr/10^bscf.

[f] Emission factor for TOC is based on measured emission levels from 22 source tests.

[g] Emission factor for methane is determined by subtracting the VOC and ethane emission factors from the TOC emission factor. Measured emission factor for methane compares well with the calculated emission factor, 1.31 lb/MMBtu vs. 1.25 lb/MMBtu, respectively.

[h] VOC emission factor is based on the sum of the emission factors for all speciated organic compounds less ethane and methane.

[i] Considered ≤ 1 μ in aerodynamic diameter. Therefore, for filterable PM emissions, PM10(filterable) = PM2.5(filterable).

[j] PM Condensable = PM Condensable Inorganic + PM-Condensable Organic

Engine Size Summary

Table 42
Engine Power Rating Summary by Fuel Type

Fuel Type	No. Engines	Avg. HP	Max HP	Min HP
Diesel	32	160	350	62.1
Electric	53	110	300	15
Natural Gas	1	190	190	190

Table 43. General Conformity Applicability Evaluation (Mitigated Emissions)

County/ Nonattainment Area	Emissions (tons per year)								
	VOC		NOx		CO	SOx	PM10	PM2.5	
	Sacramento Metro[1]	Butte County	Sacramento Metro[1]	Butte County	Sacramento Area[2]	Sacramento[3,4]	Sacramento Co.	Sacramento[4]	Butte County
Butte[5]	n/a	(0.02)	n/a	(0.45)	n/a	n/a	n/a	n/a	(4)
Colusa	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Glenn	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sacramento	0.0	n/a	0	n/a	0.0	0	0	0.0000	n/a
Shasta	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sutter[6]	0.3	n/a	2	n/a	n/a	2	n/a	0.2	n/a
Yolo	0.6	n/a	6	n/a	4	1	n/a	0.5	n/a
Total	0.8	(0.02)	8	(0.45)	4	3	0	0.7	(4)
Classification	Severe-15				Maintenance	PM2.5 Precursor	Maintenance	Nonattainment	
De Minimis Threshold (tpy)	25				100	100	100	100	
Exceed?	No	No	No	No	No	No	No	No	No

Note:

[1]The Sacramento Metro 8-hour O3 nonattainment area consist of Sacramento and Yolo Counties and parts of El Dorado, Placer, Solano, and Sutter Counties. Emissions occurring within the attainment area of these counties are excluded from the total emissions.

[2]The Sacramento Area CO maintenance area is based on the Census Bureau Urbanized Area and consists of parts of Placer, Sacramento, and Yolo Counties. The general conformity applicability evaluation is based on emissions that would occur within the entire county to be conservative.

[3]All counties are designated as attainment areas for SO2; however, since SO2 is a precursor to PM2.5, its emissions must be evaluated under general conformity.

[4]The 24-hour PM2.5 nonattainment area for Sacramento includes Sacramento County and parts of El Dorado, Placer, Solano, and Yolo Counties. The general conformity applicability analysis assumes that all emissions that could occur within each county would occur within the Sacramento nonattainment area to be conservative.

[5]Only cropland idling proposed for Butte County; therefore, there would be a net reduction in emissions.

[6]VOC and NOx emissions are excluded from Garden Highway Mutual Water Company, Pelger Mutual Water Company, and Reclamation District 1004 because they are located in areas designated as attainment for the federal 8-hour O3 NAAQS.

Table 44. Emissions Outside of 8-Hour Ozone Nonattainment Area (tons per year)

Water Agency	County	VOC	NOx
Biggs-West Gridley Water District	Sutter	n/a	n/a
Pelger Mutual Water Company	Sutter	0.0	0.5
Reclamation District 1004	Sutter	0.1	1.5
Total		0.1	2.0

Summary of Peak Daily Mitigated Groundwater Substitution Emissions by County

Legend

Mitigated emissions

Table 45. Peak Daily VOC Emissions

	Peak Daily VOC Emissions (tons/year)						
Water Agency	**Colusa**	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				Electric			0.00
Canal Farms	Electric						0.00
Conaway Preservation Group						8.52	8.52
Eastside Mutual Water Company	1.70						1.70
Glenn-Colusa Irrigation District	Electric	Electric					0.00
Glenn-Colusa Irrigation District (to Westside WD)	9.08	9.08					18.16
Maxwell Irrigation District	3.68						3.68
Natomas Central Mutual Water Company			Electric		Electric		0.00
Pelger Mutual Water Company					1.01		1.01
Pleasant Grove-Verona Mutual Water Company					3.40		3.40
Princeton-Codora-Glenn Irrigation District	10.15	10.15					20.30
Provident Irrigation District	10.84	10.84					21.68
Reclamation District 108	Electric					Electric	0.00
Reclamation District 1004	1.58	1.58			1.58		4.74
River Garden Farms						Electric	0.00
Roberts Ditch Irrigation District	Electric						0.00
Sycamore Mutual Water Company	Electric						0.00
T&P Farms	Electric						0.00
Te Velde Revocable Family Trust						Electric	0.00
Total	**37.03**	**31.65**	**0.00**	**0.00**	**5.99**	**8.52**	**83.18**

Table 46. Peak Daily NOx Emissions

	Peak Daily NOx Emissions (tons/year)						
Water Agency	**Colusa**	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				Electric			0.00
Canal Farms	Electric						0.00
Conaway Preservation Group						91.12	91.12
Eastside Mutual Water Company	32.26						32.26
Glenn-Colusa Irrigation District	Electric	Electric					0.00
Glenn-Colusa Irrigation District (to Westside WD)	37.99	37.99					75.98
Maxwell Irrigation District	69.90						69.90
Natomas Central Mutual Water Company			Electric		Electric		0.00
Pelger Mutual Water Company					19.15		19.15
Pleasant Grove-Verona Mutual Water Company					23.31		23.31
Princeton-Codora-Glenn Irrigation District	125.13	125.13					250.25
Provident Irrigation District	133.68	133.68					267.36
Reclamation District 108	Electric					Electric	0.00
Reclamation District 1004	23.57	23.57			23.57		70.70
River Garden Farms						Electric	0.00
Roberts Ditch Irrigation District	Electric						0.00
Sycamore Mutual Water Company	Electric						0.00
T&P Farms	Electric						0.00
Te Velde Revocable Family Trust						Electric	0.00
Total	**422.52**	**320.36**	**0.00**	**0.00**	**66.03**	**91.12**	**900.04**

Summary of Peak Daily Mitigated Groundwater Substitution Emissions by County

Legend

Mitigated emissions

Table 47. Peak Daily CO Emissions

	Peak Daily CO Emissions (tons/year)						
Water Agency	**Colusa**	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				Electric			0.00
Canal Farms	Electric						0.00
Conaway Preservation Group						68.00	68.00
Eastside Mutual Water Company	29.71						29.71
Glenn-Colusa Irrigation District	Electric	Electric					0.00
Glenn-Colusa Irrigation District (to Westside WD)	91.30	91.30					182.60
Maxwell Irrigation District	64.38						64.38
Natomas Central Mutual Water Company			Electric		Electric		0.00
Pelger Mutual Water Company					25.19		25.19
Pleasant Grove-Verona Mutual Water Company					65.86		65.86
Princeton-Codora-Glenn Irrigation District	26.96	26.96					53.93
Provident Irrigation District	28.81	28.81					57.61
Reclamation District 108	Electric					Electric	0.00
Reclamation District 1004	13.22	13.22			13.22		39.65
River Garden Farms						Electric	0.00
Roberts Ditch Irrigation District	Electric						0.00
Sycamore Mutual Water Company	Electric						0.00
T&P Farms	Electric						0.00
Te Velde Revocable Family Trust						Electric	0.00
Total	**254.38**	**160.29**	**0.00**	**0.00**	**104.27**	**68.00**	**586.94**

Table 48. Peak Daily SOx Emissions

	Peak Daily SOx Emissions (tons/year)						
Water Agency	**Colusa**	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				Electric			0.00
Canal Farms	Electric						0.00
Conaway Preservation Group						17.78	17.78
Eastside Mutual Water Company	10.58						10.58
Glenn-Colusa Irrigation District	Electric	Electric					0.00
Glenn-Colusa Irrigation District (to Westside WD)	31.87	31.87					63.75
Maxwell Irrigation District	22.92						22.92
Natomas Central Mutual Water Company			Electric		Electric		0.00
Pelger Mutual Water Company					6.28		6.28
Pleasant Grove-Verona Mutual Water Company					21.10		21.10
Princeton-Codora-Glenn Irrigation District	8.27	8.27					16.55
Provident Irrigation District	8.84	8.84					17.68
Reclamation District 108	Electric					Electric	0.00
Reclamation District 1004	3.99	3.99			3.99		11.97
River Garden Farms						Electric	0.00
Roberts Ditch Irrigation District	Electric						0.00
Sycamore Mutual Water Company	Electric						0.00
T&P Farms	Electric						0.00
Te Velde Revocable Family Trust						Electric	0.00
Total	**86.48**	**52.98**	**0.00**	**0.00**	**31.37**	**17.78**	**188.61**

Summary of Peak Daily Mitigated Groundwater Substitution Emissions by County

Legend

Mitigated emissions

Table 49. Peak Daily PM10 Emissions

	Peak Daily PM10 Emissions (tons/year)						
Water Agency	**Colusa**	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				Electric			0.00
Canal Farms	Electric						0.00
Conaway Preservation Group						7.98	7.98
Eastside Mutual Water Company	1.70						1.70
Glenn-Colusa Irrigation District	Electric	Electric					0.00
Glenn-Colusa Irrigation District (to Westside WD)	1.38	1.38					2.76
Maxwell Irrigation District	3.68						3.68
Natomas Central Mutual Water Company			Electric		Electric		0.00
Pelger Mutual Water Company					1.51		1.51
Pleasant Grove-Verona Mutual Water Company					1.48		1.48
Princeton-Codora-Glenn Irrigation District	1.96	1.96					3.92
Provident Irrigation District	2.09	2.09					4.18
Reclamation District 1004	0.83	0.83			0.83		2.49
Reclamation District 108	Electric					Electric	0.00
River Garden Farms						Electric	0.00
Roberts Ditch Irrigation District	Electric						0.00
Sycamore Mutual Water Company	Electric						0.00
T&P Farms	Electric						0.00
Te Velde Revocable Family Trust						Electric	0.00
Total	**11.63**	**6.26**	**0.00**	**0.00**	**3.82**	**7.98**	**29.69**

Table 50. Peak Daily PM2.5 Emissions

	Peak Daily PM2.5 Emissions (tons/year)						
Water Agency	**Colusa**	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				Electric			0.00
Canal Farms	Electric						0.00
Conaway Preservation Group						7.98	7.98
Eastside Mutual Water Company	1.70						1.70
Glenn-Colusa Irrigation District	Electric	Electric					0.00
Glenn-Colusa Irrigation District (to Westside WD)	1.38	1.38					2.76
Maxwell Irrigation District	3.68						3.68
Natomas Central Mutual Water Company			Electric		Electric		0.00
Pelger Mutual Water Company					1.51		1.51
Pleasant Grove-Verona Mutual Water Company					1.44		1.44
Princeton-Codora-Glenn Irrigation District	1.96	1.96					3.92
Provident Irrigation District	2.09	2.09					4.18
Reclamation District 1004	0.83	0.83			0.83		2.49
Reclamation District 108	Electric					Electric	0.00
River Garden Farms						Electric	0.00
Roberts Ditch Irrigation District	Electric						0.00
Sycamore Mutual Water Company	Electric						0.00
T&P Farms	Electric						0.00
Te Velde Revocable Family Trust						Electric	0.00
Total	**11.63**	**6.26**	**0.00**	**0.00**	**3.78**	**7.98**	**29.66**

Summary of Peak Annual Mitigated Groundwater Substitution Emissions by County

Legend
Mitigated emissions

Table 51. Peak Annual VOC Emissions

	Peak Annual VOC Emissions (tons/year)						
Water Agency	**Colusa**	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				Electric			0.00
Canal Farms	Electric						0.00
Conaway Preservation Group						0.55	0.55
Eastside Mutual Water Company	0.10						0.10
Glenn-Colusa Irrigation District	Electric	Electric					0.00
Glenn-Colusa Irrigation District (to Westside WD)	0.67	0.67					1.33
Maxwell Irrigation District	0.24						0.24
Natomas Central Mutual Water Company			Electric		Electric		0.00
Pelger Mutual Water Company					0.03		0.03
Pleasant Grove-Verona Mutual Water Company					0.27		0.27
Princeton-Codora-Glenn Irrigation District	0.66	0.66					1.31
Provident Irrigation District	0.70	0.70					1.40
Reclamation District 108	Electric					Electric	0.00
Reclamation District 1004	0.10	0.10			0.10		0.31
River Garden Farms						Electric	0.00
Roberts Ditch Irrigation District	Electric						0.00
Sycamore Mutual Water Company	Electric						0.00
T&P Farms	Electric						0.00
Te Velde Revocable Family Trust						Electric	0.00
Total	**2.46**	**2.12**	**0.00**	**0.00**	**0.39**	**0.55**	**5.53**

Table 52. Peak Annual NOx Emissions

	Peak Annual NOx Emissions (tons/year)						
Water Agency	**Colusa**	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				Electric			0.00
Canal Farms	Electric						0.00
Conaway Preservation Group						5.89	5.89
Eastside Mutual Water Company	1.92						1.92
Glenn-Colusa Irrigation District	Electric	Electric					0.00
Glenn-Colusa Irrigation District (to Westside WD)	2.28	2.28					4.56
Maxwell Irrigation District	4.51						4.51
Natomas Central Mutual Water Company			Electric		Electric		0.00
Pelger Mutual Water Company					0.48		0.48
Pleasant Grove-Verona Mutual Water Company					1.64		1.64
Princeton-Codora-Glenn Irrigation District	8.08	8.08					16.16
Provident Irrigation District	8.63	8.63					17.27
Reclamation District 108	Electric					Electric	0.00
Reclamation District 1004	1.52	1.52			1.52		4.57
River Garden Farms						Electric	0.00
Roberts Ditch Irrigation District	Electric						0.00
Sycamore Mutual Water Company	Electric						0.00
T&P Farms	Electric						0.00
Te Velde Revocable Family Trust						Electric	0.00
Total	**26.95**	**20.52**	**0.00**	**0.00**	**3.64**	**5.89**	**57.00**

Summary of Peak Annual Mitigated Groundwater Substitution Emissions by County

Legend

Mitigated emissions

Table 53. Peak Annual CO Emissions

	Peak Annual CO Emissions (tons/year)						
Water Agency	**Colusa**	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				Electric			0.00
Canal Farms	Electric						0.00
Conaway Preservation Group						4.39	4.39
Eastside Mutual Water Company	1.77						1.77
Glenn-Colusa Irrigation District	Electric	Electric					0.00
Glenn-Colusa Irrigation District (to Westside WD)	8.75	8.75					17.50
Maxwell Irrigation District	4.16						4.16
Natomas Central Mutual Water Company			Electric		Electric		0.00
Pelger Mutual Water Company					0.63		0.63
Pleasant Grove-Verona Mutual Water Company					5.17		5.17
Princeton-Codora-Glenn Irrigation District	1.74	1.74					3.48
Provident Irrigation District	1.86	1.86					3.72
Reclamation District 108	Electric					Electric	0.00
Reclamation District 1004	0.85	0.85			0.85		2.56
River Garden Farms						Electric	0.00
Roberts Ditch Irrigation District	Electric						0.00
Sycamore Mutual Water Company	Electric						0.00
T&P Farms	Electric						0.00
Te Velde Revocable Family Trust						Electric	0.00
Total	**19.13**	**13.20**	**0.00**	**0.00**	**6.66**	**4.39**	**43.38**

Table 54. Peak Annual SOx Emissions

	Peak Annual SOx Emissions (tons/year)						
Water Agency	**Colusa**	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				Electric			0.00
Canal Farms	Electric						0.00
Conaway Preservation Group						1.15	1.15
Eastside Mutual Water Company	0.63						0.63
Glenn-Colusa Irrigation District	Electric	Electric					0.00
Glenn-Colusa Irrigation District (to Westside WD)	3.09	3.09					6.17
Maxwell Irrigation District	1.48						1.48
Natomas Central Mutual Water Company			Electric		Electric		0.00
Pelger Mutual Water Company					0.16		0.16
Pleasant Grove-Verona Mutual Water Company					1.66		1.66
Princeton-Codora-Glenn Irrigation District	0.53	0.53					1.07
Provident Irrigation District	0.57	0.57					1.14
Reclamation District 108	Electric					Electric	0.00
Reclamation District 1004	0.26	0.26			0.26		0.77
River Garden Farms						Electric	0.00
Roberts Ditch Irrigation District	Electric						0.00
Sycamore Mutual Water Company	Electric						0.00
T&P Farms	Electric						0.00
Te Velde Revocable Family Trust						Electric	0.00
Total	**6.56**	**4.45**	**0.00**	**0.00**	**2.08**	**1.15**	**14.23**

Summary of Peak Annual Mitigated Groundwater Substitution Emissions by County

Legend
Mitigated emissions

Table 55. Peak Annual PM10 Emissions

	Peak Annual PM10 Emissions (tons/year)						
Water Agency	**Colusa**	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				Electric			0.00
Canal Farms	Electric						0.00
Conaway Preservation Group						0.52	0.52
Eastside Mutual Water Company	0.10						0.10
Glenn-Colusa Irrigation District	Electric	Electric					0.00
Glenn-Colusa Irrigation District (to Westside WD)	0.09	0.09					0.18
Maxwell Irrigation District	0.24						0.24
Natomas Central Mutual Water Company			Electric		Electric		0.00
Pelger Mutual Water Company					0.04		0.04
Pleasant Grove-Verona Mutual Water Company					0.10		0.10
Princeton-Codora-Glenn Irrigation District	0.13	0.13					0.25
Provident Irrigation District	0.14	0.14					0.27
Reclamation District 1004	0.05	0.05			0.05		0.16
Reclamation District 108	Electric					Electric	0.00
River Garden Farms						Electric	0.00
Roberts Ditch Irrigation District	Electric						0.00
Sycamore Mutual Water Company	Electric						0.00
T&P Farms	Electric						0.00
Te Velde Revocable Family Trust						Electric	0.00
Total	**0.74**	**0.40**	**0.00**	**0.00**	**0.19**	**0.52**	**1.86**

Table 56. Peak Annual PM2.5 Emissions

	Peak Annual PM2.5 Emissions (tons/year)						
Water Agency	**Colusa**	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				Electric			0.00
Canal Farms	Electric						0.00
Conaway Preservation Group						0.52	0.52
Eastside Mutual Water Company	0.10						0.10
Glenn-Colusa Irrigation District	Electric	Electric					0.00
Glenn-Colusa Irrigation District (to Westside WD)	0.09	0.09					0.18
Maxwell Irrigation District	0.24						0.24
Natomas Central Mutual Water Company			Electric		Electric		0.00
Pelger Mutual Water Company					0.04		0.04
Pleasant Grove-Verona Mutual Water Company					0.10		0.10
Princeton-Codora-Glenn Irrigation District	0.12	0.12					0.25
Provident Irrigation District	0.13	0.13					0.26
Reclamation District 1004	0.05	0.05			0.05		0.16
Reclamation District 108	Electric					Electric	0.00
River Garden Farms						Electric	0.00
Roberts Ditch Irrigation District	Electric						0.00
Sycamore Mutual Water Company	Electric						0.00
T&P Farms	Electric						0.00
Te Velde Revocable Family Trust						Electric	0.00
Total	**0.73**	**0.40**	**0.00**	**0.00**	**0.19**	**0.52**	**1.84**

Groundwater Substitution Air Quality Emissions

Agency	Pleasant Grove-Verona Mutual Water Company	Maximum Pump Rate	3,600 AF/month	Federal Attainment Status			Peak Month
Transfer Volume	15,000 acre feet/year		26,278 gallons/minute	PM10	A	*Engines subject to ATCM.*	3,600 AF/month
Location	Sutter County			PM2.5	N		26,278 gallons/minute
				O3	N		35% peak pump rate

Table 57. Pleasant Grove-Verona Mutual Water Company Criteria Pollutant Emissions

												Fuel	Emission Factors (g/bhp-hr)						Daily Emissions (lbs/day)						Annual Emissions (tons per year)					
				Power Rating	Emission	Pump Rate		Transfer Volume		Operation		Consumption																		
Description	Well	Fuel Type	Model Year	(hp)	Tier	(gpm)	(% of Total)	(AF/month)	(AF/project)	(hours/day)	(hours/year)	(gal/yr)	VOC	NOx	CO	SOx	PM10	PM2.5	VOC	NOx	CO	SOx	PM10	PM2.5	VOC	NOx	CO	SOx	PM10	PM2.5
PGVMWC Well #1	Well #1	Electric		30	n/a	2,000	3%	95	394	6.5	1,070	n/a																		
PGVMWC Well #2	Well #2	Electric		250	n/a	5,000	7%	237	986	6.5	1,070	n/a																		
PGVMWC Monster Pump	Monster Pump	Electric		60	n/a	3,100	4%	147	611	6.5	1,070	n/a																		
PGVMWC Well #12&17	Well #12&17	Electric		50	n/a	1,500	2%	71	296	6.5	1,070	n/a																		
PGVMWC Well #11	Well #11	Diesel	2013	250	T4I	4,200	6%	199	828	6.5	1,070	15,014	0.14	0.3	2.6	0.93	0.01	0.01	0.51	1.07	9.36	3.33	0.05	0.05	0.04	0.09	0.77	0.27	0.00	0.00
PGVMWC Well #13&15	Well #13&15	Electric		240	n/a	4,800	6%	227	946	6.5	1,070	n/a																		
PGVMWC Well #16	Well #16	Electric		240	n/a	1,700	2%	80	335	6.5	1,070	n/a																		
PGVMWC Willey #1	Willey #1	Diesel	2013	168	T4I	3,000	4%	142	591	6.5	1,070	10,089	0.14	0.3	3.0	0.93	0.01	0.01	0.34	0.72	7.29	2.24	0.04	0.04	0.03	0.06	0.60	0.18	0.00	0.00
PGVMWC Willey #2	Willey #2	Electric		159	n/a	3,000	4%	142	591	6.5	1,070	n/a																		
PGVMWC Willey #3	Willey #3	Electric		58	n/a	2,000	3%	95	394	6.5	1,070	n/a																		
PGVMWC Willey #4	Willey #4	Diesel	2013	150	T4I	3,000	4%	142	591	6.5	1,070	9,008	0.14	0.3	3.0	0.93	0.01	0.01	0.30	0.64	6.51	2.00	0.03	0.03	0.03	0.05	0.54	0.16	0.00	0.00
PGVMWC Well #30	Well #30	Diesel	2013	100	T4I	1,500	2%	71	296	6.5	1,070	6,005	0.14	0.3	3.0	0.93	0.01	0.01	0.20	0.43	4.34	1.33	0.02	0.02	0.02	0.04	0.36	0.11	0.00	0.00
PGVMWC Well #31	Well #31	Electric		99	n/a	2,500	3%	118	493	6.5	1,070	n/a																		
PGVMWC Well #32	Well #32	Electric		99	n/a	2,500	3%	118	493	6.5	1,070	n/a																		
PGVMWC Well #33	Well #33	Electric		99	n/a	2,500	3%	118	493	6.5	1,070	n/a																		
PGVMWC Nicholas Sand Field Well	Nicholas Sand Field Well	Diesel	2013	62	T4	2,000	3%	95	394	6.5	1,070	3,729	0.2	3.3	3.0	0.93	0.22	0.22	0.16	2.97	2.70	0.83	0.20	0.19	0.01	0.24	0.22	0.07	0.02	0.02
PGVMWC Nicholas Filipino Camp #2	Nicholas Filipino Camp #2	Electric		40	n/a	2,000	3%	95	394	6.5	1,070	n/a	0.2	3.3	3.0	0.93	0.22	0.22	0.10	1.91	1.74	0.53	0.13	0.13						
PGVMWC Nicholas Filipino Camp South	Nicholas Filipino Camp South	Diesel	2013	62	T4	2,000	3%	95	394	6.5	1,070	3,729	0.2	3.3	3.0	0.93	0.22	0.22	0.16	2.97	2.70	0.83	0.20	0.19	0.01	0.24	0.22	0.07	0.02	0.02
PGVMWC Nicholas Johnston Field Well #2	Nicholas Johnston Field Well #2	Electric		58	n/a	2,000	3%	95	394	6.5	1,070	n/a																		
PGVMWC Nicholas Johnston Well	Nicholas Johnston Well	Electric		58	n/a	2,000	3%	95	394	6.5	1,070	n/a																		
PGVMWC Nicholas 72-Acre Field South	Nicholas 72-Acre Field South	Diesel	2013	62	T4	2,000	3%	95	394	6.5	1,070	3,729	0.2	3.3	3.0	0.93	0.22	0.22	0.16	2.97	2.70	0.83	0.20	0.19	0.01	0.24	0.22	0.07	0.02	0.02
PGVMWC Nicholas 72-Acre Field North	Nicholas 72-Acre Field North	Electric		58	n/a	2,000	3%	95	394	6.5	1,070	n/a																		
PGVMWC Nicholas BBC Well	Nicholas BBC Well	Electric		58	n/a	2,000	3%	95	394	6.5	1,070	n/a																		
PGVMWC Kelly 190 Field Well #2	Kelly 190 Field Well #2	Electric		30	n/a	2,000	3%	95	394	6.5	1,070	n/a	0.2	3.3	3.0	0.93	0.22	0.22	0.08	1.43	1.30	0.40	0.10	0.09						
PGVMWC Kelly Windmill Field Well #2	Kelly Windmill Field Well #2	Diesel	2013	62	T4	2,000	3%	95	394	6.5	1,070	3,729	0.2	3.3	3.0	0.93	0.22	0.22	0.16	2.97	2.70	0.83	0.20	0.19	0.01	0.24	0.22	0.07	0.02	0.02
PGVMWC Kelly Windmill North Field Well	Kelly Windmill North Field Well	Diesel	2013	62	T4	2,000	3%	95	394	6.5	1,070	3,729	0.2	3.3	3.0	0.93	0.22	0.22	0.16	2.97	2.70	0.83	0.20	0.19	0.01	0.24	0.22	0.07	0.02	0.02
PGVMWC Kelly 306 Well	Kelly 306 Well	Electric		111	n/a	2,600	3%	123	512	6.5	1,070	n/a																		
PGVMWC Scheidel & Osterli #16	Scheidel & Osterli #16	Diesel	2013	234	T4I	3,400	4%	161	670	6.5	1,070	14,053	0.14	0.3	2.6	0.93	0.01	0.01	0.48	1.00	8.76	3.12	0.05	0.05	0.04	0.08	0.72	0.26	0.00	0.00
PGVMWC Scheidel & Osterli #17	Scheidel & Osterli #17	Diesel	2013	101	T4I	1,500	2%	71	296	6.5	1,070	6,065	0.14	0.3	3.0	0.93	0.01	0.01	0.21	0.43	4.39	1.35	0.02	0.02	0.02	0.04	0.36	0.11	0.00	0.00
PGVMWC Scheidel & Osterli #18A	Scheidel & Osterli #18A	Diesel	2013	101	T4I	1,800	2%	85	355	6.5	1,070	6,065	0.14	0.3	3.0	0.93	0.01	0.01	0.21	0.43	4.39	1.35	0.02	0.02	0.02	0.04	0.36	0.11	0.00	0.00
PGVMWC River Ranch #19	River Ranch #19	Diesel	2013	99	T4I	2,500	3%	118	493	6.5	1,070	5,945	0.14	0.3	3.0	0.93	0.01	0.01	0.20	0.42	4.30	1.32	0.02	0.02	0.02	0.03	0.35	0.11	0.00	0.00
					Total	**76,100**	**100%**	**3,600**	**15,000**	**202**	**33,185**	**90,892**							**3.40**	**23.31**	**65.86**	**21.10**	**1.48**	**1.44**	**0.27**	**1.64**	**5.17**	**1.66**	**0.10**	**0.10**

Notes:
If a specific HP and emission tier combination has an emission standard of NMHC+NOx, then 95% of emissions assumed to be NOx and 5% of emissions assumed to be VOC (see CARB Carl Moyer Program Guidelines).
AP-42 emission factors used for SOx in all cases.
If an emission standard is not available for a given pollutant, then AP-42 emission factors used.
PM2.5 assumed to be 98% of PM10 emissions based on size fractions for stationary internal combustion diesel engines.

Legend

	Average HP estimated from pump rates
	HP interpolated from other pumps
	Emission factor from AP-42
	Emission factor based on NMHC+NOx emission standard
	Current model year engine used for mitigation

Conversion Factors

1 lb =	453.6	g	
1 ton =	2,000	lbs	
1 kW =	1.34	hp	
1 day =	24	hours	
1 hour =	60	minutes	
1 month =	31	days	(peak occurs in July and August)
1 acre-foot =	325,851	gallons	

http://www.water.ca.gov/pubs/dwrnews/california_water_facts_card/waterfactscard.pdf

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	*(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855	g/mL	*(Based on MSDS for Hess Diesel Fuel All Types)*
7.13	lb/gal	

Summary of Crop Idling Emissions by Air District

Table 58. Reduced Exhaust Emissions from Cropland Idling

	Peak Daily Emissions (lbs/day)						Annual Project Emissions (tpy)					
Air District	**VOC**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**	**VOC**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
Butte County AQMD												
Biggs-West Gridley Water District	(1)	(18)	(24)	(6)	(1)	(1)	(0)	(0)	(1)	(0)	(0)	(0)
Butte County AQMD Subtotal	(1)	(18)	(24)	(6)	(1)	(1)	(0)	(0)	(1)	(0)	(0)	(0)
Colusa County APCD												
Canal Farms	(0)	(1)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Glenn-Colusa Irrigation District	(2)	(43)	(56)	(14)	(3)	(3)	(0)	(1)	(1)	(0)	(0)	(0)
Maxwell Irrigation District	(0)	(8)	(11)	(3)	(1)	(1)	(0)	(0)	(0)	(0)	(0)	(0)
Princeton-Codora-Glenn Irrigation District	(0)	(2)	(2)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Provident Irrigation District	(0)	(2)	(2)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Reclamation District 108	(1)	(11)	(15)	(4)	(1)	(1)	(0)	(0)	(0)	(0)	(0)	(0)
Reclamation District 1004	(0)	(3)	(4)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Roberts Ditch Irrigation Company	(0)	(2)	(3)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Sycamore Mutual Water Company	(1)	(11)	(15)	(4)	(1)	(1)	(0)	(0)	(0)	(0)	(0)	(0)
T&P Farms	(0)	(1)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Colusa County APCD Subtotal	(4)	(84)	(110)	(27)	(7)	(7)	(0)	(2)	(3)	(1)	(0)	(0)
Glenn County APCD												
Glenn-Colusa Irrigation District	(2)	(43)	(56)	(14)	(3)	(3)	(0)	(1)	(1)	(0)	(0)	(0)
Princeton-Codora-Glenn Irrigation District	(0)	(2)	(2)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Provident Irrigation District	(0)	(2)	(2)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Reclamation District 1004	(0)	(3)	(4)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Glenn County APCD Subtotal	(3)	(49)	(64)	(16)	(4)	(4)	(0)	(1)	(2)	(0)	(0)	(0)
Feather River AQMD												
Biggs-West Gridley Water District	(1)	(18)	(24)	(6)	(1)	(1)	(0)	(0)	(1)	(0)	(0)	(0)
Pelger Mutual Water Company	(0)	(2)	(3)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Pleasant Grove-Verona Mutual Water Company	(1)	(10)	(13)	(3)	(1)	(1)	(0)	(0)	(0)	(0)	(0)	(0)
Reclamation District 1004	(0)	(3)	(4)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Feather River AQMD Subtotal	(2)	(33)	(44)	(11)	(3)	(3)	(0)	(1)	(1)	(0)	(0)	(0)
Yolo-Solano AQMD												
Conaway Preservation Group	(1)	(18)	(24)	(6)	(1)	(1)	(0)	(0)	(1)	(0)	(0)	(0)
Reclamation District 108	(1)	(11)	(15)	(4)	(1)	(1)	(0)	(0)	(0)	(0)	(0)	(0)
Te Velde Revocable Family Trust	--	--	--	--	--	--	--	--	--	--	--	--
Yolo-Solano AQMD Subtotal	(2)	(29)	(39)	(10)	(2)	(2)	(0)	(1)	(1)	(0)	(0)	(0)
GRAND TOTAL	(11)	(213)	(281)	(70)	(17)	(17)	(0)	(5)	(7)	(2)	(0)	(0)

Note:
No cropland idling would occur in Merced, Sacramento, and Shasta Counties.

Table 59. Reduced Peak Daily Fugitive Dust Emissions from Cropland Idling

	Peak Daily PM10 Emissions (lbs/day)				Peak Daily PM2.5 Emissions (lbs/day)			
Air District	**Land Prep**	**Harvest**	**Wind Erosion**	**Total**	**Land Prep**	**Harvest**	**Wind Erosion**	**Total**
Butte County AQMD								
Biggs-West Gridley Water District	(267)	(22)	10	(280)	(40)	(3)	2	(41)
Butte County AQMD Subtotal	(267)	(22)	10	(280)	(40)	(3)	2	(41)
Colusa County APCD								
Canal Farms	(11)	(1)	2	(9)	(2)	(0)	0	(1)
Glenn-Colusa Irrigation District	(631)	(53)	152	(532)	(95)	(8)	30	(72)
Maxwell Irrigation District	(125)	(10)	29	(106)	(19)	(2)	6	(14)
Princeton-Codora-Glenn Irrigation District	(25)	(2)	6	(21)	(4)	(0)	1	(3)
Provident Irrigation District	(25)	(2)	6	(21)	(4)	(0)	1	(3)
Reclamation District 108	(166)	(14)	22	(158)	(25)	(2)	4	(23)
Reclamation District 1004	(42)	(3)	7	(38)	(6)	(1)	1	(5)
Roberts Ditch Irrigation Company	(35)	(3)	8	(30)	(5)	(0)	2	(4)
Sycamore Mutual Water Company	(166)	(14)	39	(141)	(25)	(2)	8	(19)
T&P Farms	(11)	(1)	2	(9)	(2)	(0)	0	(1)
Colusa County APCD Subtotal	(1,235)	(104)	275	(1,064)	(185)	(16)	55	(146)
Glenn County APCD								
Glenn-Colusa Irrigation District	(631)	(53)	152	(532)	(95)	(8)	30	(72)
Princeton-Codora-Glenn Irrigation District	(25)	(2)	6	(21)	(4)	(0)	1	(3)
Provident Irrigation District	(25)	(2)	6	(21)	(4)	(0)	1	(3)
Reclamation District 1004	(42)	(3)	7	(38)	(6)	(1)	1	(5)
Glenn County APCD Subtotal	(722)	(61)	171	(612)	(108)	(9)	34	(83)
Feather River AQMD								
Biggs-West Gridley Water District	(267)	(22)	10	(280)	(40)	(3)	2	(41)
Pelger Mutual Water Company	(32)	(3)	1	(34)	(5)	(0)	0	(5)
Pleasant Grove-Verona Mutual Water Company	(149)	(13)	3	(159)	(22)	(2)	1	(24)
Reclamation District 1004	(42)	(3)	7	(38)	(6)	(1)	1	(5)
Feather River AQMD Subtotal	(490)	(41)	20	(510)	(73)	(6)	4	(75)
Yolo-Solano AQMD								
Conaway Preservation Group	(266)	(22)	8	(280)	(40)	(3)	2	(42)
Reclamation District 108	(166)	(14)	22	(158)	(25)	(2)	4	(23)
Te Velde Revocable Family Trust	(26)	(2)	1	(27)	(4)	(0)	0	(4)
Yolo-Solano AQMD Subtotal	(458)	(38)	31	(465)	(69)	(6)	6	(68)
GRAND TOTAL	(3,172)	(266)	508	(2,930)	(475)	(40)	102	(414)

Note:
No cropland idling would occur in Merced, Sacramento, and Shasta Counties.

Table 60. Reduced Annual Fugitive Dust Emissions from Cropland Idling

	Annual PM10 Emissions (tpy)				Annual PM2.5 Emissions (tpy)			
Air District	**Land Prep**	**Harvest**	**Wind Erosion**	**Total**	**Land Prep**	**Harvest**	**Wind Erosion**	**Total**
Butte County AQMD								
Biggs-West Gridley Water District	(24)	(2)	1	(25)	(4)	(0)	0	(4)
Butte County AQMD Subtotal	(19)	4	8	(17)	5	10	0	(4)
Colusa County APCD								
Canal Farms	(1)	(0)	0	(1)	(0)	(0)	0	(0)
Glenn-Colusa Irrigation District	(57)	(5)	14	(48)	(9)	(1)	3	(6)
Maxwell Irrigation District	(11)	(1)	3	(10)	(2)	(0)	1	(1)
Princeton-Codora-Glenn Irrigation District	(2)	(0)	1	(2)	(0)	(0)	0	(0)
Provident Irrigation District	(2)	(0)	1	(2)	(0)	(0)	0	(0)
Reclamation District 108	(15)	(1)	2	(14)	(2)	(0)	0	(2)
Reclamation District 1004	(4)	(0)	1	(3)	(1)	(0)	0	(0)
Roberts Ditch Irrigation Company	(3)	(0)	1	(3)	(0)	(0)	0	(0)
Sycamore Mutual Water Company	(15)	(1)	4	(13)	(2)	(0)	1	(2)
T&P Farms	(1)	(0)	0	(1)	(0)	(0)	0	(0)
Colusa County APCD Subtotal	(111)	(9)	25	(96)	(17)	(1)	5	(13)
Glenn County APCD								
Glenn-Colusa Irrigation District	(57)	(5)	14	(48)	(9)	(1)	3	(6)
Princeton-Codora-Glenn Irrigation District	(2)	(0)	1	(2)	(0)	(0)	0	(0)
Provident Irrigation District	(2)	(0)	1	(2)	(0)	(0)	0	(0)
Reclamation District 1004	(4)	(0)	1	(3)	(1)	(0)	0	(0)
Glenn County APCD Subtotal	(65)	(5)	15	(55)	(10)	(1)	3	(7)
Feather River AQMD								
Biggs-West Gridley Water District	(24)	(2)	1	(25)	(4)	(0)	0	(4)
Pelger Mutual Water Company	(3)	(0)	0	(3)	(0)	(0)	0	(0)
Pleasant Grove-Verona Mutual Water Company	(13)	(1)	0	(14)	(2)	(0)	0	(2)
Reclamation District 1004	(4)	(0)	1	(3)	(1)	(0)	0	(0)
Feather River AQMD Subtotal	(44)	(4)	2	(46)	(7)	(1)	0	(7)
Yolo-Solano AQMD								
Conaway Preservation Group	(24)	(2)	1	(25)	(4)	(0)	0	(4)
Reclamation District 108	(15)	(1)	2	(14)	(2)	(0)	0	(2)
Te Velde Revocable Family Trust	(2)	(0)	0	(2)	(0)	(0)	0	(0)
Yolo-Solano AQMD Subtotal	(41)	(3)	3	(42)	(6)	(1)	1	(6)
GRAND TOTAL	(280)	(18)	53	(256)	(34)	6	9	(37)

Note:
No cropland idling would occur in Merced, Sacramento, and Shasta Counties.

Table 61. Combined Emissions by Air District

	Peak Daily Emissions (lbs/day)						Annual Project Emissions (tpy)					
Air District	**VOC**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**	**VOC**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
Butte County AQMD												
Biggs-West Gridley Water District	(1)	(18)	(24)	(6)	(281)	(43)	(0)	(0)	(1)	(0)	(25)	(4)
Butte County AQMD Subtotal	(1)	(18)	(24)	(6)	(281)	(43)	(0)	(0)	(1)	(0)	(25)	(4)
Colusa County APCD												
Canal Farms	(0)	(1)	(1)	(0)	(9)	(1)	(0)	(0)	(0)	(0)	(1)	(0)
Glenn-Colusa Irrigation District	(2)	(43)	(56)	(14)	(535)	(75)	(0)	(1)	(1)	(0)	(48)	(7)
Maxwell Irrigation District	(0)	(8)	(11)	(3)	(106)	(15)	(0)	(0)	(0)	(0)	(10)	(1)
Princeton-Codora-Glenn Irrigation District	(0)	(2)	(2)	(1)	(21)	(3)	(0)	(0)	(0)	(0)	(2)	(0)
Provident Irrigation District	(0)	(2)	(2)	(1)	(21)	(3)	(0)	(0)	(0)	(0)	(2)	(0)
Reclamation District 108	(1)	(11)	(15)	(4)	(159)	(23)	(0)	(0)	(0)	(0)	(14)	(2)
Reclamation District 1004	(0)	(3)	(4)	(1)	(38)	(6)	(0)	(0)	(0)	(0)	(3)	(0)
Roberts Ditch Irrigation Company	(0)	(2)	(3)	(1)	(30)	(4)	(0)	(0)	(0)	(0)	(3)	(0)
Sycamore Mutual Water Company	(1)	(11)	(15)	(4)	(142)	(20)	(0)	(0)	(0)	(0)	(13)	(2)
T&P Farms	(0)	(1)	(1)	(0)	(9)	(1)	(0)	(0)	(0)	(0)	(1)	(0)
Colusa County APCD Subtotal	(4)	(84)	(110)	(27)	(1,070)	(152)	(0)	(2)	(3)	(1)	(96)	(13)
Glenn County APCD												
Glenn-Colusa Irrigation District	(2)	(43)	(56)	(14)	(535)	(75)	(0)	(1)	(1)	(0)	(48)	(7)
Princeton-Codora-Glenn Irrigation District	(0)	(2)	(2)	(1)	(21)	(3)	(0)	(0)	(0)	(0)	(2)	(0)
Provident Irrigation District	(0)	(2)	(2)	(1)	(21)	(3)	(0)	(0)	(0)	(0)	(2)	(0)
Reclamation District 1004	(0)	(3)	(4)	(1)	(38)	(6)	(0)	(0)	(0)	(0)	(3)	(0)
Glenn County APCD Subtotal	(3)	(49)	(64)	(16)	(616)	(87)	(0)	(1)	(2)	(0)	(55)	(8)
Feather River AQMD												
Biggs-West Gridley Water District	(1)	(18)	(24)	(6)	(281)	(43)	(0)	(0)	(1)	(0)	(25)	(4)
Pelger Mutual Water Company	(0)	(2)	(3)	(1)	(34)	(5)	(0)	(0)	(0)	(0)	(3)	(0)
Pleasant Grove-Verona Mutual Water Company	(1)	(10)	(13)	(3)	(160)	(25)	(0)	(0)	(0)	(0)	(14)	(2)
Reclamation District 1004	(0)	(3)	(4)	(1)	(38)	(6)	(0)	(0)	(0)	(0)	(3)	(0)
Feather River AQMD Subtotal	(2)	(33)	(44)	(11)	(513)	(78)	(0)	(1)	(1)	(0)	(46)	(7)
Yolo-Solano AQMD												
Conaway Preservation Group	(1)	(18)	(24)	(6)	(281)	(43)	(0)	(0)	(1)	(0)	(25)	(4)
Reclamation District 108	(1)	(11)	(15)	(4)	(159)	(23)	(0)	(0)	(0)	(0)	(14)	(2)
Te Velde Revocable Family Trust	--	--	--	--	(27)	(4)	--	--	--	--	(2)	(0)
Yolo-Solano AQMD Subtotal	(2)	(29)	(39)	(10)	(467)	(70)	(0)	(1)	(1)	(0)	(42)	(6)
GRAND TOTAL	(11)	(213)	(281)	(70)	(2,947)	(431)	(0)	(5)	(7)	(2)	(264)	(38)

Table 62. Summary of Cropland Idling Emissions by Water Agency

	Daily Emissions (lbs per day)						Annual Emissions (tons per year)					
Water Agency	**VOC**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**	**VOC**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
Biggs-West Gridley Water District												
Exhaust Emissions	(2)	(36)	(48)	(12)	(3)	(3)	(0)	(1)	(1)	(0)	(0)	(0)
Land Preparation	--	--	--	--	(534)	(80)	--	--	--	--	(48)	(7)
Harvesting	--	--	--	--	(45)	(7)	--	--	--	--	(4)	(1)
Wind Erosion	--	--	--	--	20	4	--	--	--	--	2	0
Biggs-West Gridley Water District Subtotal	(2)	(36)	(48)	(12)	(562)	(86)	(0)	(1)	(1)	(0)	(50)	(8)
Canal Farms												
Exhaust Emissions	(0)	(1)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Land Preparation	--	--	--	--	(11)	(2)	--	--	--	--	(1)	(0)
Harvesting	--	--	--	--	(1)	(0)	--	--	--	--	(0)	(0)
Wind Erosion	--	--	--	--	2	0	--	--	--	--	0	0
Canal Farms Subtotal	(0)	(1)	(1)	(0)	(9)	(1)	(0)	(0)	(0)	(0)	(1)	(0)
Conaway Preservation Group												
Exhaust Emissions	(1)	(18)	(24)	(6)	(1)	(1)	(0)	(0)	(1)	(0)	(0)	(0)
Land Preparation	--	--	--	--	(266)	(40)	--	--	--	--	(24)	(4)
Harvesting	--	--	--	--	(22)	(3)	--	--	--	--	(2)	(0)
Wind Erosion	--	--	--	--	8	2	--	--	--	--	1	0
Conaway Preservation Group Subtotal	(1)	(18)	(24)	(6)	(281)	(43)	(0)	(0)	(1)	(0)	(25)	(4)
Glenn-Colusa Irrigation District												
Exhaust Emissions	(5)	(86)	(113)	(28)	(7)	(7)	(0)	(2)	(3)	(1)	(0)	(0)
Land Preparation	--	--	--	--	(1,262)	(189)	--	--	--	--	(114)	(17)
Harvesting	--	--	--	--	(106)	(16)	--	--	--	--	(10)	(1)
Wind Erosion	--	--	--	--	305	61	--	--	--	--	27	5
Glenn-Colusa Irrigation District Subtotal	(5)	(86)	(113)	(28)	(1,070)	(151)	(0)	(2)	(3)	(1)	(96)	(13)
Maxwell Irrigation District												
Exhaust Emissions	(0)	(8)	(11)	(3)	(1)	(1)	(0)	(0)	(0)	(0)	(0)	(0)
Land Preparation	--	--	--	--	(125)	(19)	--	--	--	--	(11)	(2)
Harvesting	--	--	--	--	(10)	(2)	--	--	--	--	(1)	(0)
Wind Erosion	--	--	--	--	29	6	--	--	--	--	3	1
Maxwell Irrigation District Subtotal	(0)	(8)	(11)	(3)	(106)	(15)	(0)	(0)	(0)	(0)	(10)	(1)
Pelger Mutual Water Company												
Exhaust Emissions	(0)	(2)	(3)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Land Preparation	--	--	--	--	(32)	(5)	--	--	--	--	(3)	(0)
Harvesting	--	--	--	--	(3)	(0)	--	--	--	--	(0)	(0)
Wind Erosion	--	--	--	--	1	0	--	--	--	--	0	0
Pelger Mutual Water Company Subtotal	(0)	(2)	(3)	(1)	(34)	(5)	(0)	(0)	(0)	(0)	(3)	(0)

Table 62. Summary of Cropland Idling Emissions by Water Agency

	Daily Emissions (lbs per day)						Annual Emissions (tons per year)					
Water Agency	**VOC**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**	**VOC**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
Pleasant Grove-Verona Mutual Water Company												
Exhaust Emissions	(1)	(10)	(13)	(3)	(1)	(1)	(0)	(0)	(0)	(0)	(0)	(0)
Land Preparation	--	--	--	--	(149)	(22)	--	--	--	--	(13)	(2)
Harvesting	--	--	--	--	(13)	(2)	--	--	--	--	(1)	(0)
Wind Erosion	--	--	--	--	3	1	--	--	--	--	0	0
Pleasant Grove-Verona Mutual Water Company Subtotal	(1)	(10)	(13)	(3)	(160)	(25)	(0)	(0)	(0)	(0)	(14)	(2)
Princeton-Codora-Glenn Irrigation District												
Exhaust Emissions	(0)	(3)	(4)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Land Preparation	--	--	--	--	(50)	(7)	--	--	--	--	(4)	(1)
Harvesting	--	--	--	--	(4)	(1)	--	--	--	--	(0)	(0)
Wind Erosion	--	--	--	--	12	2	--	--	--	--	1	0
Princeton-Codora-Glenn Irrigation District Subtotal	(0)	(3)	(4)	(1)	(42)	(6)	(0)	(0)	(0)	(0)	(4)	(1)
Provident Irrigation District												
Exhaust Emissions	(0)	(3)	(4)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Land Preparation	--	--	--	--	(50)	(7)	--	--	--	--	(4)	(1)
Harvesting	--	--	--	--	(4)	(1)	--	--	--	--	(0)	(0)
Wind Erosion	--	--	--	--	12	2	--	--	--	--	1	0
Provident Irrigation District Subtotal	(0)	(3)	(4)	(1)	(42)	(6)	(0)	(0)	(0)	(0)	(4)	(1)
Reclamation District 108												
Exhaust Emissions	(1)	(23)	(30)	(7)	(2)	(2)	(0)	(1)	(1)	(0)	(0)	(0)
Land Preparation	--	--	--	--	(332)	(50)	--	--	--	--	(30)	(4)
Harvesting	--	--	--	--	(28)	(4)	--	--	--	--	(3)	(0)
Wind Erosion	--	--	--	--	44	9	--	--	--	--	4	1
Reclamation District 108 Subtotal	(1)	(23)	(30)	(7)	(318)	(47)	(0)	(1)	(1)	(0)	(28)	(4)
Reclamation District 1004												
Exhaust Emissions	(0)	(8)	(11)	(3)	(1)	(1)	(0)	(0)	(0)	(0)	(0)	(0)
Land Preparation	--	--	--	--	(125)	(19)	--	--	--	--	(11)	(2)
Harvesting	--	--	--	--	(10)	(2)	--	--	--	--	(1)	(0)
Wind Erosion	--	--	--	--	21	4	--	--	--	--	2	0
Reclamation District 1004 Subtotal	(0)	(8)	(11)	(3)	(115)	(17)	(0)	(0)	(0)	(0)	(10)	(1)
Roberts Ditch Irrigation Company												
Exhaust Emissions	(0)	(2)	(3)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Land Preparation	--	--	--	--	(35)	(5)	--	--	--	--	(3)	(0)
Harvesting	--	--	--	--	(3)	(0)	--	--	--	--	(0)	(0)
Wind Erosion	--	--	--	--	8	2	--	--	--	--	1	0
Roberts Ditch Irrigation Company Subtotal	(0)	(2)	(3)	(1)	(30)	(4)	(0)	(0)	(0)	(0)	(3)	(0)
Sycamore Mutual Water Company												
Exhaust Emissions	(1)	(11)	(15)	(4)	(1)	(1)	(0)	(0)	(0)	(0)	(0)	(0)
Land Preparation	--	--	--	--	(166)	(25)	--	--	--	--	(15)	(2)
Harvesting	--	--	--	--	(14)	(2)	--	--	--	--	(1)	(0)
Wind Erosion	--	--	--	--	39	8	--	--	--	--	4	1
Sycamore Mutual Water Company Subtotal	(1)	(11)	(15)	(4)	(142)	(20)	(0)	(0)	(0)	(0)	(13)	(2)
T&P Farms												
Exhaust Emissions	(0)	(1)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Land Preparation	--	--	--	--	(11)	(2)	--	--	--	--	(1)	(0)
Harvesting	--	--	--	--	(1)	(0)	--	--	--	--	(0)	(0)
Wind Erosion	--	--	--	--	2	0	--	--	--	--	0	0
T&P Farms Subtotal	(0)	(1)	(1)	(0)	(9)	(1)	(0)	(0)	(0)	(0)	(1)	(0)

Table 62. Summary of Cropland Idling Emissions by Water Agency

	Daily Emissions (lbs per day)						Annual Emissions (tons per year)					
Water Agency	**VOC**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**	**VOC**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
Te Velde Revocable Family Trust												
Exhaust Emissions	(0)	(2)	(2)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Land Preparation	--	--	--	--	(26)	(4)	--	--	--	--	(2)	(0)
Harvesting	--	--	--	--	(2)	(0)	--	--	--	--	(0)	(0)
Wind Erosion	--	--	--	--	1	0	--	--	--	--	0	0
Te Velde Revocable Family Trust Subtotal	(0)	(2)	(2)	(1)	(27)	(4)	(0)	(0)	(0)	(0)	(2)	(0)
Exhaust Emissions Total	(11)	(222)	(292)	(73)	(18)	(18)	(0)	(6)	(7)	(2)	(0)	(0)
Land Preparation Total	0	0	0	0	(3,271)	(490)	0	0	0	0	(294)	(44)
Harvesting Total	0	0	0	0	(275)	(41)	0	0	0	0	(25)	(4)
Wind Erosion Total	0	0	0	0	510	102	0	0	0	0	46	9
GRAND TOTAL	**(11)**	**(215)**	**(283)**	**(71)**	**(2,947)**	**(431)**	**(0)**	**(5)**	**(7)**	**(2)**	**(264)**	**(38)**

Size Fractions

Description	PM10	PM2.5	Ratio
PM Profile ID No. 411, Windblown Dust - Agricultural	0.5	0.1	0.2
PM Profile ID No. 417, Agricultural Tilling Dust	0.4543	0.0681	0.1499

Table 63. Summary of Cropland Idling Emissions by County

	Daily Emissions (lbs/day)						Annual Emissions (tons/yr)					
County	**VOC**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**	**VOC**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
Butte												
Biggs-West Gridley Water District	(1)	(18)	(24)	(6)	(281)	(43)	(0)	(0)	(1)	(0)	(25)	(4)
Butte County Subtotal	(1)	(18)	(24)	(6)	(281)	(43)	(0)	(0)	(1)	(0)	(25)	(4)
Colusa												
Canal Farms	--	--	--	--	--	--	--	--	--	--	--	--
Glenn-Colusa Irrigation District	(2)	(43)	(56)	(14)	(535)	(75)	(0)	(1)	(1)	(0)	(48)	(7)
Maxwell Irrigation District	(0)	(8)	(11)	(3)	(106)	(15)	(0)	(0)	(0)	(0)	(10)	(1)
Princeton-Cordora-Glenn Irrigation District	--	--	--	--	--	--	--	--	--	--	--	--
Provident Irrigation District	(0)	(2)	(2)	(1)	(21)	(3)	(0)	(0)	(0)	(0)	(2)	(0)
Reclamation District 108	(1)	(11)	(15)	(4)	(159)	(23)	(0)	(0)	(0)	(0)	(14)	(2)
Reclamation District 1004	(0)	(3)	(4)	(1)	(38)	(6)	(0)	(0)	(0)	(0)	(3)	(0)
Roberts Ditch Irrigation Company	--	--	--	--	--	--	--	--	--	--	--	--
Sycamore Mutual Water Company	(1)	(11)	(15)	(4)	(142)	(20)	(0)	(0)	(0)	(0)	(13)	(2)
T&P Farms	--	--	--	--	--	--	--	--	--	--	--	--
Colusa Subtotal	(4)	(78)	(103)	(26)	(1,001)	(143)	(0)	(2)	(3)	(1)	(90)	(12)
Glenn												
Glenn-Colusa Irrigation District	(2)	(43)	(56)	(14)	(535)	(75)	(0)	(1)	(1)	(0)	(48)	(7)
Princeton-Codora-Glenn Irrigation District	(0)	(2)	(2)	(1)	(21)	(3)	(0)	(0)	(0)	(0)	(2)	(0)
Provident Irrigation District	(0)	(2)	(2)	(1)	(21)	(3)	(0)	(0)	(0)	(0)	(2)	(0)
Reclamation District 1004	(0)	(3)	(4)	(1)	(38)	(6)	(0)	(0)	(0)	(0)	(3)	(0)
Glenn Subtotal	(3)	(49)	(64)	(16)	(616)	(87)	(0)	(1)	(2)	(0)	(55)	(8)
Sutter												
Biggs-West Gridley Water District	(1)	(18)	(24)	(6)	(281)	(43)	(0)	(0)	(1)	(0)	(25)	(4)
Pelger Mutual Water Company	(0)	(2)	(3)	(1)	(34)	(5)	(0)	(0)	(0)	(0)	(3)	(0)
Pleasant Grove-Verona Mutual Water Company	(1)	(10)	(13)	(3)	(160)	(25)	(0)	(0)	(0)	(0)	(14)	(2)
Reclamation District 1004	(0)	(3)	(4)	(1)	(38)	(6)	(0)	(0)	(0)	(0)	(3)	(0)
Sutter Subtotal	(2)	(33)	(44)	(11)	(513)	(78)	(0)	(1)	(1)	(0)	(46)	(7)
Yolo												
Conaway Preservation Group	(1)	(18)	(24)	(6)	(281)	(43)	(0)	(0)	(1)	(0)	(25)	(4)
Reclamation District 108	(1)	(11)	(15)	(4)	(159)	(23)	(0)	(0)	(0)	(0)	(14)	(2)
Te Velde Revocable Family Trust	(0)	(2)	(2)	(1)	(27)	(4)	(0)	(0)	(0)	(0)	(2)	(0)
Yolo Subtotal	(2)	(31)	(41)	(10)	(467)	(71)	(0)	(1)	(1)	(0)	(42)	(6)
GRAND TOTAL	(11)	(210)	(276)	(69)	(2,878)	(421)	(0)	(5)	(7)	(2)	(258)	(37)

Table 64. Reduced Exhaust Emissions from Cropland Idling

Water Agency	Groundwater Substitution	Cropland Idling/ Crop Shifting	GW Pumping Equivalent	Reduced Daily Emissions (lbs/day)						Reduced Annual Emissions (tons/year)					
	(acre-feet/year)	(acre-feet/year)	(acre-feet/year)	VOC	NOx	CO	SOx	PM10	PM2.5	VOC	NOx	CO	SOx	PM10	PM2.5
Biggs-West Gridley Water District	0	32,190	7,574	1.91	36.26	47.70	11.89	2.86	2.86	0.05	0.91	1.19	0.30	0.07	0.07
Canal Farms	860	635	149	0.04	0.71	0.94	0.23	0.06	0.06	0.00	0.02	0.02	0.01	0.00	0.00
Conaway Preservation Group	26,639	16,014	3,768	0.95	18.04	23.73	5.91	1.42	1.42	0.02	0.45	0.59	0.15	0.04	0.04
Glenn-Colusa Irrigation District	26,168	76,000	17,882	4.51	85.60	112.63	28.07	6.76	6.76	0.11	2.14	2.81	0.70	0.17	0.17
Maxwell Irrigation District	4,700	7,500	1,765	0.44	8.45	11.12	2.77	0.67	0.67	0.01	0.21	0.28	0.07	0.02	0.02
Pelger Mutual Water Company	4,000	1,903	448	0.11	2.14	2.82	0.70	0.17	0.17	0.00	0.05	0.07	0.02	0.00	0.00
Pleasant Grove-Verona Mutual Water Company	15,000	9,000	2,118	0.53	10.14	13.34	3.32	0.80	0.80	0.01	0.25	0.33	0.08	0.02	0.02
Princeton-Codora-Glenn Irrigation District	5,000	3,000	706	0.18	3.38	4.45	1.11	0.27	0.27	0.00	0.08	0.11	0.03	0.01	0.01
Provident Irrigation District	5,000	3,000	706	0.18	3.38	4.45	1.11	0.27	0.27	0.00	0.08	0.11	0.03	0.01	0.01
Reclamation District 108	15,000	20,000	4,706	1.19	22.53	29.64	7.39	1.78	1.78	0.03	0.56	0.74	0.18	0.04	0.04
Reclamation District 1004	5,400	7,500	1,765	0.44	8.45	11.12	2.77	0.67	0.67	0.01	0.21	0.28	0.07	0.02	0.02
Roberts Ditch Irrigation Company	3,330	2,095	493	0.12	2.36	3.11	0.77	0.19	0.19	0.00	0.06	0.08	0.02	0.00	0.00
Sycamore Mutual Water Company	8,000	10,000	2,353	0.59	11.26	14.82	3.69	0.89	0.89	0.01	0.28	0.37	0.09	0.02	0.02
T&P Farms	840	635	149	0.04	0.71	0.94	0.23	0.06	0.06	0.00	0.02	0.02	0.01	0.00	0.00
Te Velde Revocable Family Trust	2,925	1,548	364	0.09	1.74	2.29	0.57	0.14	0.14	0.00	0.04	0.06	0.01	0.00	0.00
Total	**122,862**	**191,020**	**44,946**	**11.32**	**215.15**	**283.09**	**70.55**	**16.99**	**16.99**	**0.28**	**5.37**	**7.07**	**1.76**	**0.42**	**0.42**

Notes:

Pelger Mutual Water District used to estimate emissions for other water agencies.

Engine power rating equal to 250 hp for Pelger Mutual Water District engines.

The Byron Buck memo is based on diesel-fueled engines with sizes ranging from 121 to 225 hp; all engines are noncertified (Tier 0).

Pelger Mutual Water District engines are therefore determined to be a sufficient proxy to estimate the difference in emissions between groundwater substitution and cropland idling.

1 acre-foot of groundwater pumped = 4.25 acre-feet produced by fallowing

Source: Byron Buck & Associates. 2009. "Comparison of Summertime Emission Credits from Land Fallowing Versus Groundwater Pumping."

Fugitive Dust Emissions from Cropland Idling

Table 65
Land Preparation (Reduced Emissions)

District	County	Acres	Daily PM10 Emissions (lbs/day)	Annual PM10 Emissions (tons per year)
		Rice	Rice	Rice
Sacramento River Area of Analysis				
Anderson-Cottonwood Irrigation District	Shasta	0	0	0
Canal Farms	Colusa	192	11	1
Conaway Preservation Group	Yolo	4,853	266	24
Eastside Mutual Water Company	Colusa	0	0	0
Glenn-Colusa Irrigation District	Glenn/Colusa	23,030	1,262	114
Maxwell Irrigation District	Colusa	2,273	125	11
Natomas Central Mutual Water Company	Sacramento/Sutter	0	0	0
Pelger Mutual Water Company	Sutter	577	32	3
Pleasant Grove-Verona Mutual Water Company	Sutter	2,727	149	13
Princeton-Codora-Glenn Irrigation District	Glenn/Colusa	909	50	4
Provident Irrigation District	Glenn/Colusa	909	50	4
Reclamation District 108	Colusa/Yolo	6,061	332	30
Reclamation District 1004	Colusa/Glenn/Sutter	2,273	125	11
River Garden Farms	Yolo	0	0	0
Roberts Ditch Irrigation Company	Colusa	635	35	3
Sycamore Mutual Water Company	Colusa	3,030	166	15
T&P Farms	Colusa	192	11	1
Te Velde Revocable Family Trust	Yolo	469	26	2
Feather River Area of Analysis				
Biggs-West Gridley Water District	Butte/Sutter	9,755	534	48
Browns Valley Irrigation District	Yuba	0	0	0
American River Area of Analysis				
Sacramento Suburban Water District	Sacramento	0	0	0
Total		**57,885**	**3,172**	**285**

Table 66
Harvesting (Reduced Emissions)

District	County	Acres	Daily PM10 Emissions (lbs/day)	Annual PM10 Emissions (tons per year)
		Rice	Rice	Rice
Sacramento River Area of Analysis				
Anderson-Cottonwood Irrigation District	Shasta	0	0	0
Canal Farms	Colusa	192	1	0
Conaway Preservation Group	Yolo	4,853	22	2
Eastside Mutual Water Company	Colusa	0	0	0
Glenn-Colusa Irrigation District	Glenn/Colusa	23,030	106	10
Maxwell Irrigation District	Colusa	2,273	10	1
Natomas Central Mutual Water Company	Sacramento/Sutter	0	0	0
Pelger Mutual Water Company	Sutter	577	3	0
Pleasant Grove-Verona Mutual Water Company	Sutter	2,727	13	1
Princeton-Codora-Glenn Irrigation District	Glenn/Colusa	909	4	0
Provident Irrigation District	Glenn/Colusa	909	4	0
Reclamation District 108	Colusa/Yolo	6,061	28	3
Reclamation District 1004	Colusa/Glenn/Sutter	2,273	10	1
River Garden Farms	Yolo	0	0	0
Roberts Ditch Irrigation Company	Colusa	635	3	0
Sycamore Mutual Water Company	Colusa	3,030	14	1
T&P Farms	Colusa	192	1	0
Te Velde Revocable Family Trust	Yolo	469	2	0
Feather River Area of Analysis				
Biggs-West Gridley Water District	Butte/Sutter	9,755	45	4
Browns Valley Irrigation District	Yuba	0	0	0
American River Area of Analysis				
Sacramento Suburban Water District	Sacramento	0	0	0
Total		**57,885**	**266**	**24**

Table 67
Windblown Dust (Increased Emissions)

District	County	Acres Rice	Daily PM10 Emissions (lbs/day) Rice	Annual PM10 Emissions (tons per year) Rice
Sacramento River Area of Analysis				
Anderson-Cottonwood Irrigation District	Shasta	0	--	--
Canal Farms	Colusa	192	2	0
Conaway Preservation Group	Yolo	4,853	8	1
Eastside Mutual Water Company	Colusa	0	--	--
Glenn-Colusa Irrigation District	Glenn/Colusa	23,030	305	27
Maxwell Irrigation District	Colusa	2,273	29	3
Natomas Central Mutual Water Company	Sacramento/Sutter	0	--	--
Pelger Mutual Water Company	Sutter	577	1	0
Pleasant Grove-Verona Mutual Water Company	Sutter	2,727	3	0
Princeton-Codora-Glenn Irrigation District	Glenn/Colusa	909	12	1
Provident Irrigation District	Glenn/Colusa	909	12	1
Reclamation District 108	Colusa/Yolo	6,061	44	4
Reclamation District 1004	Colusa/Glenn/Sutter	2,273	21	2
River Garden Farms	Yolo	0	--	--
Roberts Ditch Irrigation Company	Colusa	635	8	1
Sycamore Mutual Water Company	Colusa	3,030	39	4
T&P Farms	Colusa	192	2	0
Te Velde Revocable Family Trust	Yolo	469	1	0
Feather River Area of Analysis			--	--
Biggs-West Gridley Water District	Butte/Sutter	9,755	20	2
Browns Valley Irrigation District	Yuba	0	--	--
American River Area of Analysis				
Sacramento Suburban Water District	Sacramento	0	--	--
Total		**57,885**	**508**	**46**

Note:
Fraction of PM10 (FRPM10) from wind erosion: 0.50
(PM10 Emissions = PM x FRPM10)

Conversions

1 ton =	2,000	pounds	
1 year =	365	days	
Project duration =	180	days	(assumes 6-month crop idling season)

Legend

	Windblown dust emission factor for pasture land used because emission factor for agricultural lands not available.
	Windblown dust emission factor for pasture land used because emission factor for agricultural lands not available (for Yolo County only).
	Windblown dust emission factor for pasture land used because emission factor for agricultural lands not available (for Sutter County only).

Agricultural Land Preparation

Table 68
Summary of Crop Profile, Acre-Pass, and Emission Factor

Crop profile	Land Preparation Operations	Category	Acre-Pass	Emission Factor	
				Operation (lbs/Acre-pass)	Crop (lbs/Acre/year)
Alfalfa	Unspecified	Discing	1.25	1.2	4
	Land Maintenance	Land Planing	0.2	12.5	
Almonds	Float	Land Planing	0.25	12.5	3.13
Citrus	Unspecified	Discing	0.06	1.2	0.07
Corn	List & Fertilize	Weeding	1	0.8	6.9
	Mulch Beds	Discing	1	1.2	
	Finish Disc	Discing	1	1.2	
	Land Maintenance	Land Planing	0.2	12.5	
	Stubble Disc	Discing	1	1.2	
Cotton	Land Preparation	Discing	4	1.2	8.9
	Land Maintenance	Land Planing	0.2	12.5	
	Seed Bed Preparation	Weeding	2	0.8	
DryBeans	Land Maintenance	Land Planing	0.2	12.5	7.7
	Chisel	Discing	1	1.2	
	Shaping	Weeding	1	0.8	
	Disc	Discing	2	1.2	
	Listing	Weeding	1	0.8	
Garbanzo	Chisel	Discing	1	1.2	7.7
	Listing	Weeding	1	0.8	
	Shaping	Weeding	1	0.8	
	Disc	Discing	2	1.2	
	Land Maintenance	Land Planing	0.2	12.5	
Garlic	Land Maintenance	Land Planing	0.2	12.5	6.5
	Disc & Roll	Discing	1	1.2	
	Chisel	Discing	1	1.2	
	List	Weeding	1	0.8	
	Shape Beds	Weeding	1	0.8	
Grapes-Raisin	Terrace	Weeding	1	0.8	2.6
	Spring Tooth	Weeding	0.2	0.8	
	Subsoil	Ripping	0.05	4.6	
	Disc & Furrow-out	Discing	1	1.2	
	Level (new vineyard)	Land Planing	0.02	12.5	
Grapes-Table	Subsoil	Ripping	0.05	4.6	0.83
	Disc & Furrow-out	Discing	0.5	1.2	
Grapes-Wine	Level (new vineyard)	Land Planing	0.02	12.5	1.5
	Spring Tooth	Weeding	0.2	0.8	
	Subsoil	Ripping	0.05	4.6	
	Disc & Furrow-out	Discing	0.75	1.2	
Lettuce*	Land Maintenance	Land Planing	0.2	12.5	12.75
	Disc & Roll	Discing	2/2	1.2	
	Chisel	Discing	2/2	1.2	
	List	Weeding	2/2	0.8	
	Plane	Land Planing	½	12.5	
	Shape Beds & Roll	Weeding	2/2	0.8	
Melon	Plow	Discing	1	1.2	5.7
	Shape Beds	Weeding	1	0.8	
	Land Maintenance	Land Planing	0.2	12.5	
	Disc	Discing	1	1.2	
No Land Prep.	Unspecified	Discing	0	1.2	0
Onions	List	Weeding	1	0.8	6.5
	Shape Beds	Weeding	1	0.8	
	Land Maintenance	Land Planing	0.2	12.5	
	Chisel	Discing	1	1.2	
	Disc & Roll	Discing	1	1.2	

Agricultural Land Preparation

Table 68
Summary of Crop Profile, Acre-Pass, and Emission Factor

Crop profile	Land Preparation Operations	Category	Acre-Pass	Emission Factor	
				Operation (lbs/Acre-pass)	Crop (lbs/Acre/year)
Rice	Chisel	Discing	1	1.2	20
	Land Maintenance	Land Planing	0.2	12.5	
	Post Burn/Harvest Disc	Discing	0.5	1.2	
	Roll	Weeding	1	0.8	
	3 Wheel Plane	Land Planing	1	12.5	
	Harrow Disc	Discing	1	1.2	
	Stubble Disc	Discing	1	1.2	
Safflower	List	Weeding	1	0.8	4.5
	Land Maintenance	Land Planing	0.2	12.5	
	Stubble Disc	Discing	1	1.2	
Sugar Beets	Disc	Discing	1	1.2	22.8
	Land Plane	Land Planing	1	12.5	
	Subsoil-deep chisel	Ripping	1	4.6	
	Stubble Disc	Discing	1	1.2	
	List	Weeding	1	0.8	
	Land Maintenance	Land Planing	0.2	12.5	
Tomatoes	Bed Preparation	Weeding	2	0.8	10.1
	Land Preparation	Discing	5	1.2	
	Land Maintenance	Land Planing	0.2	12.5	
Vegetables	Land Maintenance	Land Planing	0.2	12.5	8.5
	Unspecified	Discing	5	1.2	
Wheat	Stubble Disc	Discing	1	1.2	3.7
	Land Maintenance	Land Planing	0.2	12.5	

Source:
CARB. 2003. Emission Inventory Documentation, Section 7.4: Agricultural Land Preparation. January.
Accessed on: May 5, 2012. Available at: http://www.arb.ca.gov/ei/areasrc/arbmiscprocfugwbdst.htm.

Agricultural Harvest Operations

Table 69
Summary of Crop Emission Factor Assumptions

CDFA Crop Code	CDFA Crop Description	Crop Profile	Assumption	Emission Factor (lbs PM10/acre/yr)
101999	WHEAT ALL	Wheat	Wheat/1	5.8
104999	RYE FOR GRAIN	Wheat	Wheat/1	5.8
106199	RICE, FOR MILLING	Rice	Cotton/2	1.68
106269	FIELD CROP BY PRODUCTS	Cotton	Cotton/20	0.17
108999	FOOD GRAINS, MISC	Corn	Cotton/2	1.68
111559	CORN, WHITE	Corn	Cotton/40	0.08
111991	CORN FOR GRAIN	Corn	Cotton/2	1.68
111992	CORN FOR SILAGE	Corn	Cotton/20	0.17
112999	OATS FOR GRAIN	Wheat	Wheat/1	5.8
113994	BARLEY, MALTING	Wheat	Wheat/1	5.8
113995	BARLEY, FEED	Wheat	Wheat/1	5.8
113999	BARLEY, UNSPECIFIED	Wheat	Wheat/1	5.8
114991	SORGHUM, GRAIN	Wheat	Wheat/1	5.8
121219	COTTON LINT, UPLAND	Cotton	Cotton/1	3.37
121229	COTTON LINT, PIMA	Cotton	Cotton/1	3.37
121299	COTTON LINT, UNSPEC	Cotton	Cotton/1	3.37
132999	SUGAR BEETS	Sugar Beets	Cotton/2	1.68
151999	COTTONSEED	Cotton	Cotton/1	3.37
153999	PEANUTS, ALL	Safflower	Cotton/2	1.68
158269	SAFFLOWER	Safflower	Wheat/1	5.8
158316	SUNFLOWER SEED, PLANTING	Corn	Wheat/1	5.8
158319	SUNFLOWER SEED	Corn	Wheat/1	5.8
158499	JOJOBA	Melon	Cotton/40	0.08
161131	BEANS, LIMAS, LG. DRY	DryBeans	Cotton/2	1.68
161132	BEANS, LIMAS, BABY DRY	DryBeans	Cotton/2	1.68
161199	LIMA BEANS, UNSPECIFIED	DryBeans	Cotton/2	1.68
161717	BEANS, RED KIDNEY	DryBeans	Cotton/2	1.68
161721	BEANS, PINK	DryBeans	Cotton/2	1.68
161741	BEANS, BLACKEYE (PEAS)	DryBeans	Cotton/2	1.68
161742	BEANS, GARBANZO	Garbanzo	Cotton/2	1.68
162399	BEANS, FAVA	DryBeans	Cotton/2	1.68
163999	PEAS, DRY EDIBLE	DryBeans	Cotton/20	0.17
169999	BEANS,UNSPEC. DRY EDIBLE	DryBeans	Cotton/2	1.68
171019	SEED WHEAT	Wheat	Wheat/1	5.8
171049	SEED RYE	Wheat	Wheat/1	5.8
171069	SEED RICE	Rice	Cotton/2	1.68
171129	SEED OATS	Wheat	Wheat/1	5.8
171139	SEED BARLEY	Wheat	Wheat/1	5.8
171519	SEED, COTTON FOR PLANTING	Cotton	Cotton/1	3.37
171582	SEED, SAFFLOWER, PLANTING	Safflower	Wheat/1	5.8
171619	SEED BEANS	DryBeans	Cotton/2	1.68
171639	SEED PEAS	DryBeans	Cotton/20	0.17
171949	SEED, MISC FIELD CROP	Corn	Cotton/20	0.17
171959	SEED, VEG & VINECROP	Vegetables	Cotton/20	0.17
172119	SEED, ALFALFA	Alfalfa	Zero/1	0
172289	CLOVER, UNSPECIFIED SEED	Alfalfa	Zero/1	0
173079	SEED, BERMUDA GRASS	Alfalfa	Zero/1	0
173669	SEED, SUDAN GRASS	Alfalfa	Zero/1	0
173999	SEED, GRASS, UNSPECIFIED	Alfalfa	Zero/1	0
178999	SEED, OTHER (NO FLOWERS)	Alfalfa	Cotton/20	0.17
181999	HAY, ALFALFA	Alfalfa	Zero/1	0

Agricultural Harvest Operations

Table 69
Summary of Crop Emission Factor Assumptions

CDFA Crop Code	CDFA Crop Description	Crop Profile	Assumption	Emission Factor (lbs PM10/acre/yr)
188499	HAY, GRAIN	Alfalfa	Cotton/2	1.68
188799	HAY, WILD	Alfalfa	Cotton/2	1.68
188899	HAY, SUDAN	Alfalfa	Zero/1	0
188999	HAY, OTHER UNSPECIFIED	Alfalfa	Cotton/2	1.68
194599	PASTURE, IRRIGATED	No Land	Zero/1	0
194699	PASTURE, RANGE	No Land	Zero/1	0
194799	PASTURE, MISC. FORAGE	No Land	Zero/1	0
195199	SILAGE	Wheat	Cotton/20	0.17
195299	HAY, GREEN CHOP	Alfalfa	Zero/1	0
195399	STRAW	Alfalfa	Wheat/1	5.8
198199	RICE, WILD	Rice	Cotton/2	1.68
198999	FIELD CROPS, UNSPEC.	Corn	Cotton/20	0.17
201119	ORANGES, NAVEL	Citrus	Cotton/40	0.08
201519	ORANGES, VALENCIAS	Citrus	Cotton/40	0.08
201999	ORANGES, UNSPECIFIED	Citrus	Cotton/40	0.08
202999	GRAPEFRUIT, ALL	Citrus	Cotton/40	0.08
203999	TANGERINES & MANDARINS	Citrus	Cotton/40	0.08
204999	LEMONS, ALL	Citrus	Cotton/40	0.08
205999	LIMES, ALL	Citrus	Cotton/40	0.08
206999	TANGELOS	Citrus	Cotton/40	0.08
207999	KUMQUATS	Citrus	Cotton/40	0.08
208059	CITRUS, MISC BY-PROD	Citrus	Cotton/40	0.08
209999	CITRUS, UNSPECIFIED	Citrus	Cotton/40	0.08
211999	APPLES, ALL	Citrus	Cotton/40	0.08
212199	PEACHES, FREESTONE	Citrus	Cotton/40	0.08
212399	PEACHES, CLINGSTONE	Citrus	Cotton/40	0.08
212999	PEACHES, UNSPECIFIED	Citrus	Cotton/40	0.08
213199	CHERRIES, SWEET	Citrus	Cotton/40	0.08
214199	PEARS, BARLETT	Citrus	Cotton/40	0.08
214899	PEARS, ASIAN	Citrus	Cotton/40	0.08
214999	PEARS, UNSPECIFIED	Citrus	Cotton/40	0.08
215199	PLUMS	Citrus	Cotton/40	0.08
215399	PLUMCOTS	Citrus	Cotton/40	0.08
215999	PRUNES, DRIED	Citrus	Cotton/40	0.08
216199	GRAPES, TABLE	Grapes-Table	Cotton/20	0.17
216299	GRAPES, WINE	Grapes-Wine	Cotton/20	0.17
216399	GRAPES, RAISIN	Grapes-Raisin	Cotton/20	0.17
216999	GRAPES, UNSPECIFIED	Grapes-Wine	Cotton/20	0.17
217999	APRICOTS, ALL	Citrus	Cotton/40	0.08
218199	NECTARINES	Citrus	Cotton/40	0.08
218299	PERSIMMONS	Citrus	Cotton/40	0.08
218399	POMEGRANATES	Citrus	Cotton/40	0.08
218499	QUINCE	Citrus	Cotton/40	0.08
218839	CHERIMOYAS	Citrus	Cotton/40	0.08
218889	ORCHARD BIOMASS	Almonds	Cotton/40	0.08
218899	FRUITS & NUTS, UNSPEC.	Citrus	Cotton/40	0.08
221999	AVOCADOS, ALL	Citrus	Cotton/40	0.08
224999	DATES	Citrus	Almonds/20	2.04
225999	FIGS, DRIED	Citrus	Almonds/20	2.04
226999	OLIVES	Citrus	Cotton/40	0.08
228019	GUAVAS	Citrus	Cotton/40	0.08

Agricultural Harvest Operations

Table 69
Summary of Crop Emission Factor Assumptions

CDFA Crop Code	CDFA Crop Description	Crop Profile	Assumption	Emission Factor (lbs PM10/acre/yr)
229999	KIWIFRUIT	Citrus	Cotton/40	0.08
230639	BERRIES, BLACKBERRIES	Grapes-Table	Cotton/40	0.08
230869	BERRIES, BOYSENBERRIES	Grapes-Table	Cotton/40	0.08
234799	BERRIES, LOGANBERRIES	Grapes-Table	Cotton/40	0.08
236199	BERRIES, RASPBERRIES	Grapes-Table	Cotton/40	0.08
237199	STRAWBERRIES, FRESH MKT	Melon	Cotton/40	0.08
237299	STRAWBERRIES, PROC	Melon	Cotton/40	0.08
237999	STRAWBERRIES, UNSPECIFIED	Melon	Cotton/40	0.08
239999	BERRIES, BUSH, UNSPECIFIED	Grapes-Table	Cotton/40	0.08
261999	ALMONDS, ALL	Almonds	Almonds/1	40.77
263999	WALNUTS, ENGLISH	Almonds	Almonds/1	40.77
264999	PECANS	Almonds	Almonds/10	4.08
265999	WALNUTS, BLACK	Almonds	Almonds/1	40.77
266999	CHESTNUTS	Almonds	Almonds/10	4.08
267999	MACADAMIA NUT	Almonds	Almonds/10	4.08
268079	PISTACHIOS	Almonds	Almonds/10	4.08
268099	ALMOND HULLS	Almonds	Almonds/1	40.77
301999	ARTICHOKES	Melon	Cotton/40	0.08
302199	ASPARAGUS, FRESH MKT	Melon	Cotton/2	1.68
302299	ASPARAGUS, PROC	Melon	Cotton/2	1.68
302999	ASPARAGUS, UNSPECIFIED	Melon	Cotton/2	1.68
303999	BEANS, GREEN LIMAS	DryBeans	Cotton/2	1.68
304199	BEANS, SNAP FR MKT	DryBeans	Cotton/20	0.17
304299	BEANS, SNAP PROC	DryBeans	Cotton/20	0.17
304399	BEANS FRESH UNSPECIFIED	DryBeans	Cotton/20	0.17
304999	BEANS, UNSPECIFIED SNAP	DryBeans	Cotton/20	0.17
305999	BEETS, GARDEN	Sugar Beets	Cotton/2	1.68
306999	RAPINI	Sugar Beets	Cotton/40	0.08
307189	BROCCOLI,FOOD SERV	Vegetables	Cotton/40	0.08
307199	BROCCOLI, FR MKT	Vegetables	Cotton/40	0.08
307299	BROCCOLI, PROC	Vegetables	Cotton/40	0.08
307919	BROCCOLI, UNSPECIFIED	Vegetables	Cotton/40	0.08
308999	BRUSSELS SPROUTS	Melon	Cotton/40	0.08
309999	CABBAGE, CH. & SPECIALTY	Lettuce	Cotton/40	0.08
310999	CABBAGE, HEAD	Lettuce	Cotton/40	0.08
313189	CARROTS, FOOD SERV	Sugar Beets	Cotton/20	0.17
313199	CARROTS, FR MKT	Sugar Beets	Cotton/20	0.17
313299	CARROTS, PROC	Sugar Beets	Cotton/20	0.17
313999	CARROTS, UNSPECIFIED	Sugar Beets	Cotton/20	0.17
314189	CAULIFLOWER, FOOD SERV	Vegetables	Cotton/40	0.08
314199	CAULIFLOWER, FR MKT	Vegetables	Cotton/40	0.08
314299	CAULIFLOWER, PROC	Vegetables	Cotton/40	0.08
314999	CAULIFLOWER, UNSPECIFIED	Vegetables	Cotton/40	0.08
316189	CELERY, FOOD SERV	Lettuce	Cotton/40	0.08
316199	CELERY, FR MKT	Lettuce	Cotton/40	0.08
316299	CELERY, PROC	Lettuce	Cotton/40	0.08
316999	CELERY, UNSPECIFIED	Lettuce	Cotton/40	0.08
318999	RADICCHIO	Lettuce	Cotton/40	0.08
320999	CHIVES	Lettuce	Cotton/40	0.08
322999	COLLARD GREENS	Lettuce	Cotton/40	0.08
323999	CORN, SWEET ALL	Corn	Cotton/40	0.08

Agricultural Harvest Operations

Table 69
Summary of Crop Emission Factor Assumptions

CDFA Crop Code	CDFA Crop Description	Crop Profile	Assumption	Emission Factor (lbs PM10/acre/yr)
325999	CUCUMBERS	Vegetables	Cotton/40	0.08
330999	EGGPLANT, ALL	Vegetables	Cotton/40	0.08
331999	ENDIVE, ALL	Lettuce	Cotton/40	0.08
332999	ESCAROLE, ALL	Lettuce	Cotton/40	0.08
333999	ANISE (FENNEL)	Lettuce	Cotton/2	1.68
335999	GARLIC, ALL	Garlic	Cotton/2	1.68
337999	KALE	Lettuce	Cotton/40	0.08
338999	KOHLRABI	Lettuce	Cotton/40	0.08
339196	LETTUCE, BULK SALAD PRODS.	Lettuce	Cotton/40	0.08
339999	LETTUCE, UNSPECIFIED	Lettuce	Cotton/40	0.08
340999	LETTUCE, HEAD	Lettuce	Cotton/40	0.08
341999	LETTUCE, ROMAINE	Lettuce	Cotton/40	0.08
342999	LETTUCE, LEAF	Lettuce	Cotton/40	0.08
343999	MELON, CANTALOUPE	Melon	Cotton/40	0.08
348999	MELON, HONEYDEW	Melon	Cotton/40	0.08
354299	MELON, UNSPECIFIED	Melon	Cotton/40	0.08
354999	MELON, WATER MELONS	Melon	Cotton/40	0.08
355999	MUSHROOMS	No Land Prep.	Zero/1	0
356999	MUSTARD	Lettuce	Cotton/40	0.08
357999	OKRA	Lettuce	Cotton/40	0.08
358999	ONIONS	Onions	Cotton/2	1.68
359999	PARSLEY	Lettuce	Cotton/40	0.08
361299	PEAS, GREEN, PROCESSING	DryBeans	Cotton/20	0.17
361999	PEAS, GREEN, UNSPECIFIED	DryBeans	Cotton/20	0.17
363999	PEPPERS, BELL	Tomatoes	Cotton/40	0.08
364999	PEPPERS, CHILI, HOT	Tomatoes	Cotton/40	0.08
366999	PUMPKINS	Melon	Cotton/20	0.17
367999	RADISHES	Sugar Beets	Cotton/40	0.08
368999	RHUBARB	Lettuce	Cotton/40	0.08
370999	RUTABAGAS	Sugar Beets	Cotton/2	1.68
372999	ONIONS, GREEN & SHALLOTS	Onions	Cotton/40	0.08
374189	SPINACH, FOOD SERV	Lettuce	Cotton/40	0.08
374199	SPINACH, FR MKT	Lettuce	Cotton/40	0.08
374299	SPINACH, PROC	Lettuce	Cotton/40	0.08
374999	SPINACH UNSPECIFIED	Lettuce	Cotton/40	0.08
375999	SQUASH	Melon	Cotton/20	0.17
376999	SWISSCHARD	Lettuce	Cotton/40	0.08
378199	TOMATOES, FRESH MARKET	Tomatoes	Cotton/40	0.08
378299	TOMATOES, PROCESSING	Tomatoes	Cotton/20	0.17
378999	TOMATOES, UNSPECIFIED	Tomatoes	Cotton/20	0.17
380999	TURNIPS, ALL	Sugar Beets	Cotton/2	1.68
381999	GREENS, TURNIP & MUSTARD	Lettuce	Cotton/40	0.08
387999	LEEKS	Onions	Cotton/40	0.08
391999	POTATOES, IRISH ALL	Sugar Beets	Cotton/2	1.68
392999	SWEET POTATOES	Sugar Beets	Cotton/2	1.68
393999	HORSERADISH	Onions	Cotton/40	0.08
394199	SALAD GREENS NEC	Lettuce	Cotton/40	0.08
394999	PEAS, EDIBLE POD (SNOW)	DryBeans	Cotton/20	0.17
395999	VEGETABLES, ORIENTAL, ALL	Vegetables	Cotton/40	0.08
396999	SPROUTS, ALFALFA & BEAN	Lettuce	Cotton/40	0.08
398199	CUCUMBERS, GREENHOUSE	No Land Prep.	Zero/1	0

Agricultural Harvest Operations

Table 69
Summary of Crop Emission Factor Assumptions

CDFA Crop Code	CDFA Crop Description	Crop Profile	Assumption	Emission Factor (lbs PM10/acre/yr)
398299	TOMATOES, GREENHOUSE	No Land Prep.	Zero/1	0
398399	TOMATOES, CHERRY	Tomatoes	Cotton/40	0.08
398499	TOMATILLO	Tomatoes	Cotton/40	0.08
398559	CILANTRO	Lettuce	Cotton/40	0.08
398599	SPICES AND HERBS	Lettuce	Cotton/40	0.08
398899	VEGETABLES, BABY	Vegetables	Cotton/40	0.08
398999	VEGETABLES, UNSPECIFIED	Vegetables	Cotton/20	0.17
832919	POTATOES SEED	Sugar Beets	Cotton/2	1.68
892999	NURSERY TURF	No Land Prep.	Zero 1	0

Source:

CARB. 2003. Emission Inventory Documentation, Section 7.5: Agricultural Harvest Operations. January. Accessed on: May 5, 2012. Available at: http://www.arb.ca.gov/ei/areasrc/arbmiscprocresfarmop.htm.

Windblown Dust - Agricultural Lands

Table 70
Windblown Dust - Agricultural Lands

Air Basin Code	County Name	Emission Factor (tons/acre/yr)	Process Rate (acres)	PM Emissions (tons/year)
NCC	Monterey	0.020478	279,178.00	5,717.07
	San Benito	0.015936	50,009.00	796.96
	Santa Cruz	0.002485	14,873.00	36.97
SCC	San Luis Obispo	0.006876	109,694.00	754.2
	Santa Barbara	0.00319	80,732.00	257.56
	Ventura	0.018418	54,568.00	1,005.02
SED	Imperial	0.141666	490,409.00	69,474.43
SJV	Fresno	0.013761	864,164.00	11,891.35
	Kern	0.008662	408,313.48	3,536.73
	Kings	0.012856	473,817.00	6,091.62
	Madera	0.008032	141,617.00	1,137.47
	Merced	0.013659	364,804.00	4,982.86
	San Joaquin	0.003527	387,278.00	1,365.96
	Stanislaus	0.009052	229,805.00	2,080.26
	Tulare	0.004693	471,664.00	2,213.29
SV	Butte	0.001154	116,869.00	134.87
	Colusa	0.004702	229,747.00	1,080.31
	Glenn	0.004957	186,067.00	922.39
	Placer	0.002172	6,962.90	15.12
	Sacramento	0.002479	117,770.00	291.92

Note:
Fraction of PM10 (FRPM10): 0.50
(PM10 Emissions = PM x FRPM10)

Table 71
Windblown Dust - Pasture Lands

Air Basin Code	County Name	Emission Factor (tons/acre/yr)	Process Rate (acres)	PM Emissions (tons/year)
NCC	Monterey	0.00110562	1,108,000	1,225.03
	San Benito	0.00109336	512,000	559.8
	Santa Cruz	0.0001605	8,000	1.28
SCC	Santa Barbara	0.00021801	602,913	131.44
	San Luis Obispo	0.00046964	1,102,500	517.78
	Ventura	0.00050356	210,918	106.21
SED	Imperial	0.00867346	158,449	1,374.30
SJV	Fresno	0.00149089	907,300	1,352.69
	Kern	0.00082834	1,527,603	1,265.37
	Kings	0.00146875	142,777	209.7
	Madera	0.00116178	421,000	489.11
	Merced	0.00155578	642,700	999.9
	San Joaquin	0.0005228	167,700	87.67
	Stanislaus	0.00107875	434,300	468.5
	Tulare	0.00063424	713,400	452.47
SV	Butte	0.00014292	288,500	41.23
	Colusa	0.00046444	181,900	84.48
	Glenn	0.00048846	256,575	125.33
	Placer	0.00026499	65,656	17.4
	Sacramento	0.00019538	118,000	23.05
	Shasta	0.00034146	459,000	156.73
	Solano	0.00039453	131,360	51.83
	Sutter	0.00037084	71,500	26.51
	Tehama	0.00035146	955,350	335.76
	Yolo	0.00061919	136,870	84.75
	Yuba	0.00023892	207,600	49.6

Note:
Fraction of PM10 (FRPM10): 0.50
(PM10 Emissions = PM x FRPM10)

Table 72
County Size

County	Area (acres)	
	Non-Pasture	Pasture
Butte	n/a	n/a
Colusa	n/a	n/a
Fresno	n/a	n/a
Glenn	n/a	n/a
Imperial	n/a	n/a
Kern	n/a	n/a
Kings	n/a	n/a
Madera	n/a	n/a
Merced	n/a	n/a
Monterey	n/a	n/a
Placer	n/a	n/a
Sacramento	n/a	n/a
San Benito	n/a	n/a
San Joaquin	n/a	n/a
San Luis Obispo	n/a	n/a
Santa Barbara	n/a	n/a
Santa Cruz	n/a	n/a
Shasta	n/a	n/a
Solano	n/a	n/a
Stanislaus	n/a	n/a
Sutter	n/a	n/a
Tehama	n/a	n/a
Tulare	n/a	n/a
Ventura	n/a	n/a
Yolo	n/a	n/a
Yuba	n/a	n/a
Total	**0**	**0**

Source:
CARB. 1997. Emission Inventory Documentation, Section 7.12: Windblown Dust - Agricultural Lands. July.
Accessed on: May 5, 2012. Available at: http://www.arb.ca.gov/ei/areasrc/arbmiscprocfugwbdst.htm.