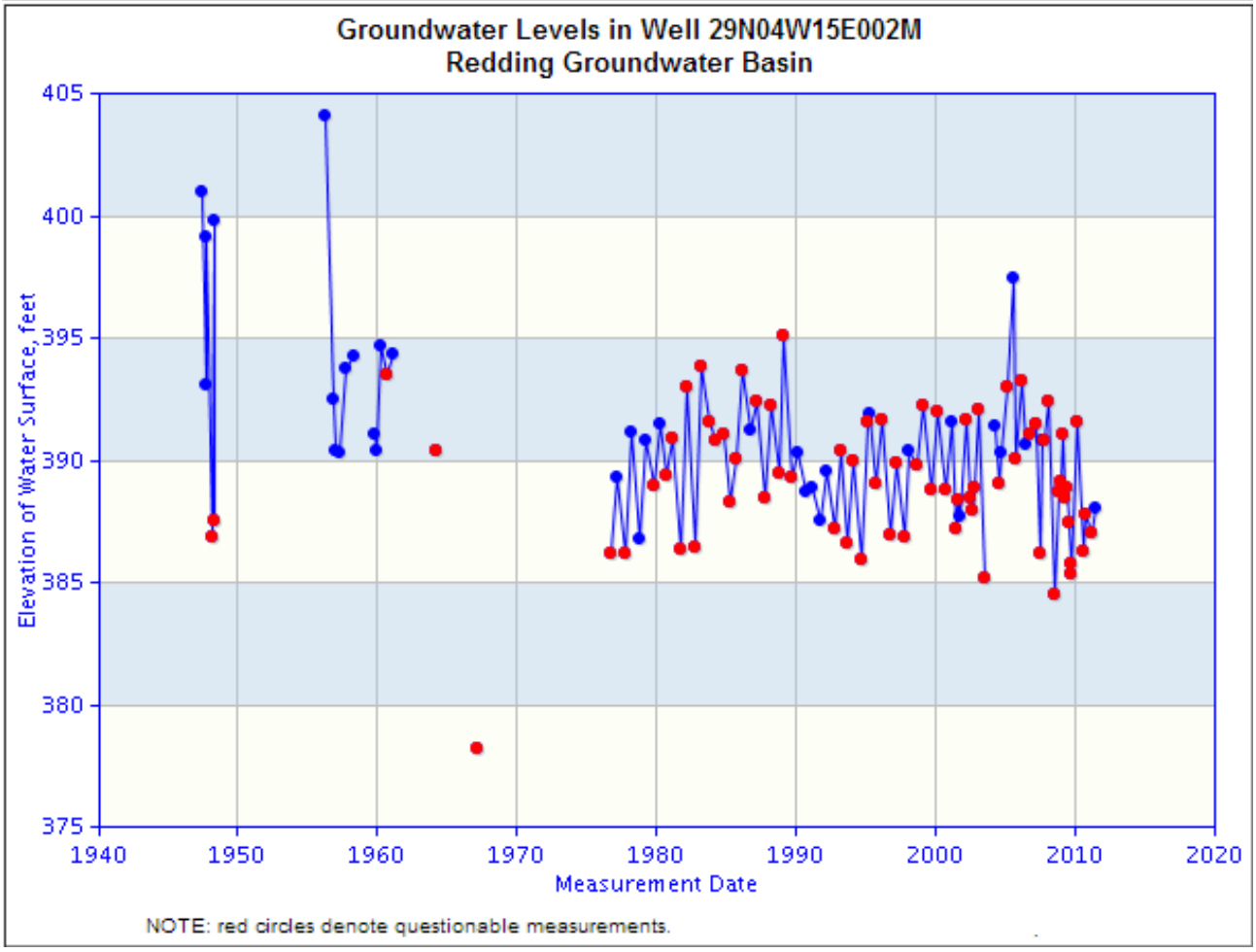
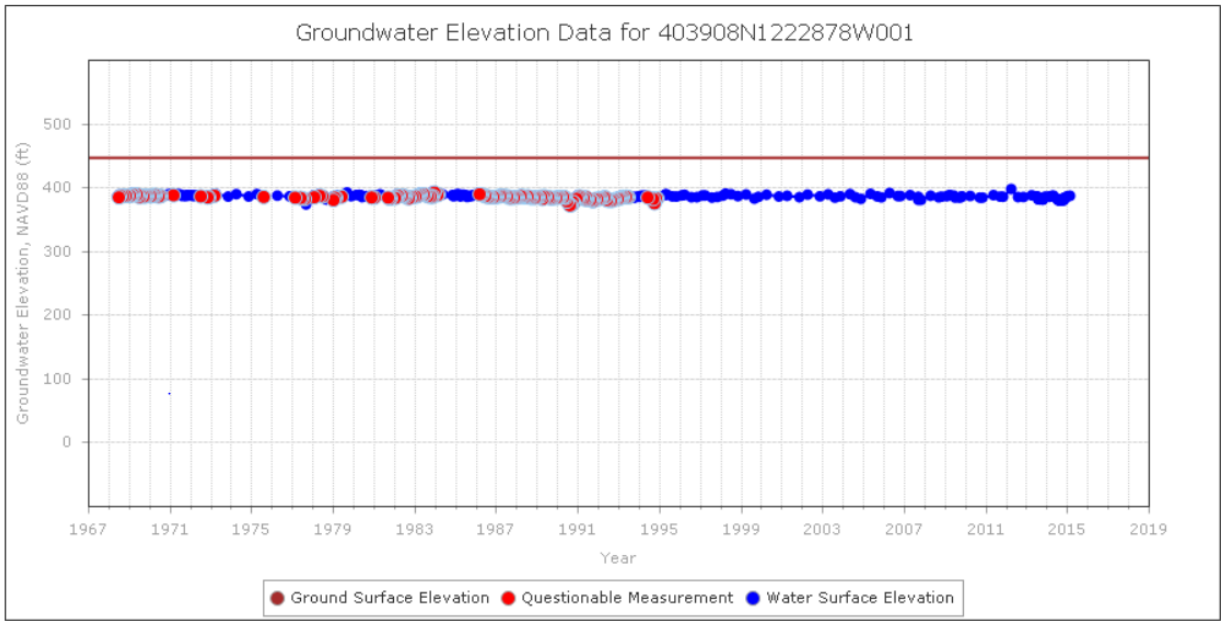
Anderson-Cottonwood Irrigation District

State Well ID 29N04W15E002M



Source: DWR's Water Data Library

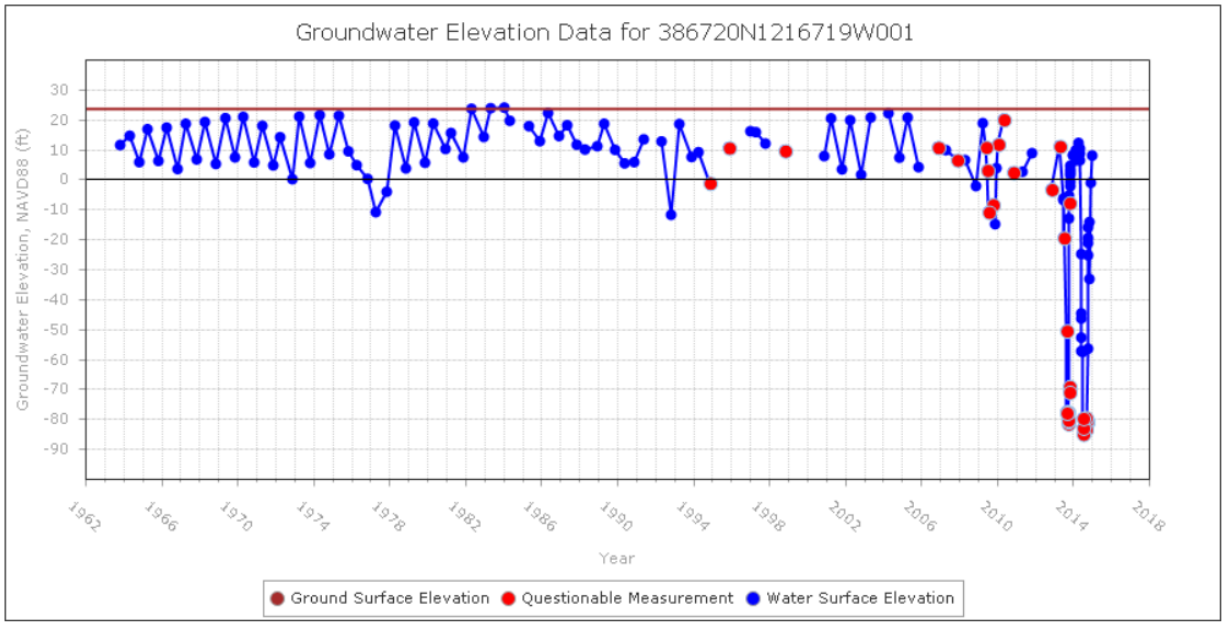
State Well ID 29N04W02P001M



Source: DWR's CASGEM website.
Note: Well number in the title of the figure is the CASGEM Well Number.

Conaway Preservation Group

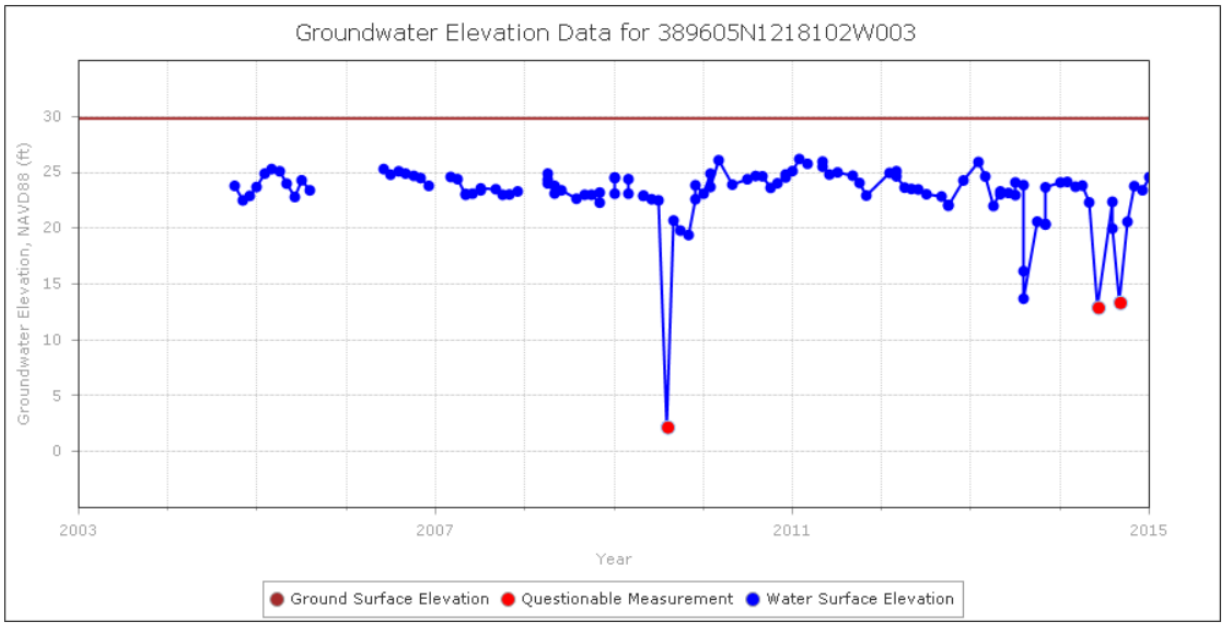
State Well ID 10N03E32E001M



Source: DWR's CASGEM website.
Note: Well number in the title of the figure is the CASGEM Well Number.

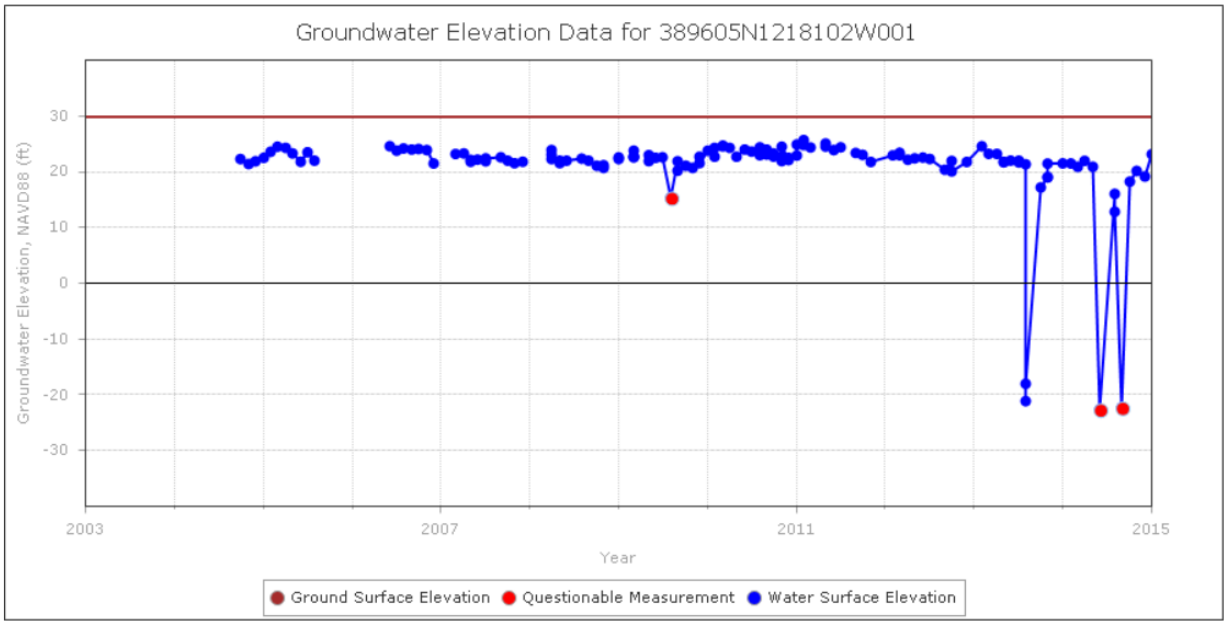
Cranmore Farms

State Well ID 13N01E24G004M (Shallow well; Depth=100 feet)



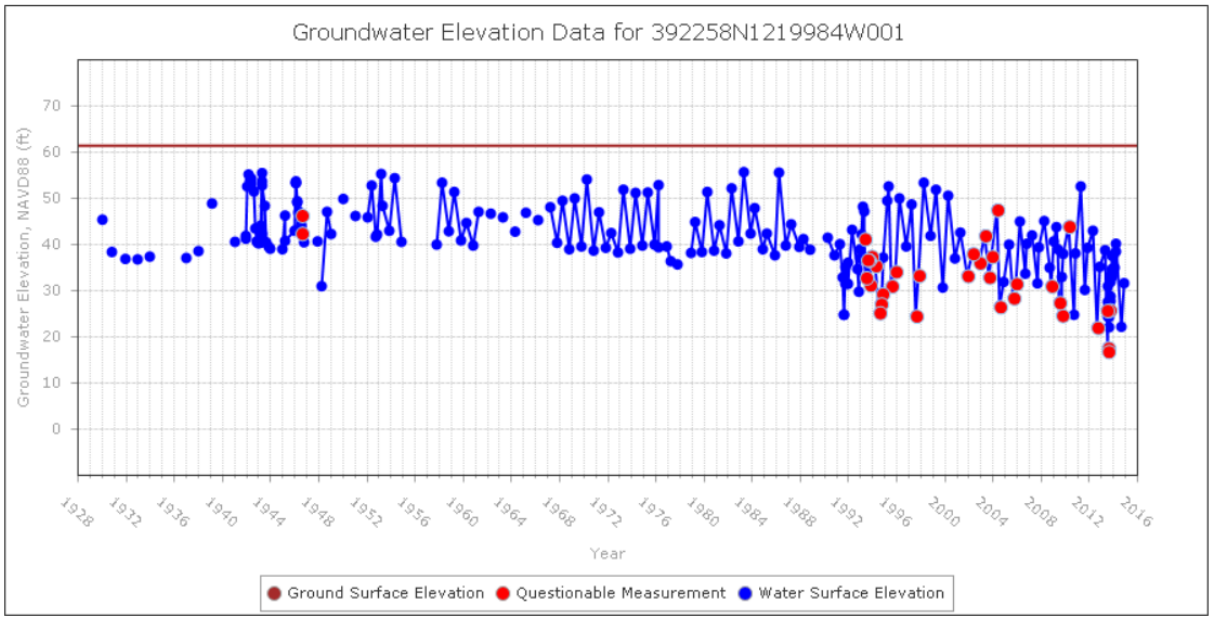
Source: DWR's CASGEM website.
Note: Well number in the title of the figure is the CASGEM Well Number.

State Well ID 13N01E24G002M (Deep well; Depth=310 feet)



Source: DWR's CASGEM website.
Note: Well number in the title of the figure is the CASGEM Well Number.

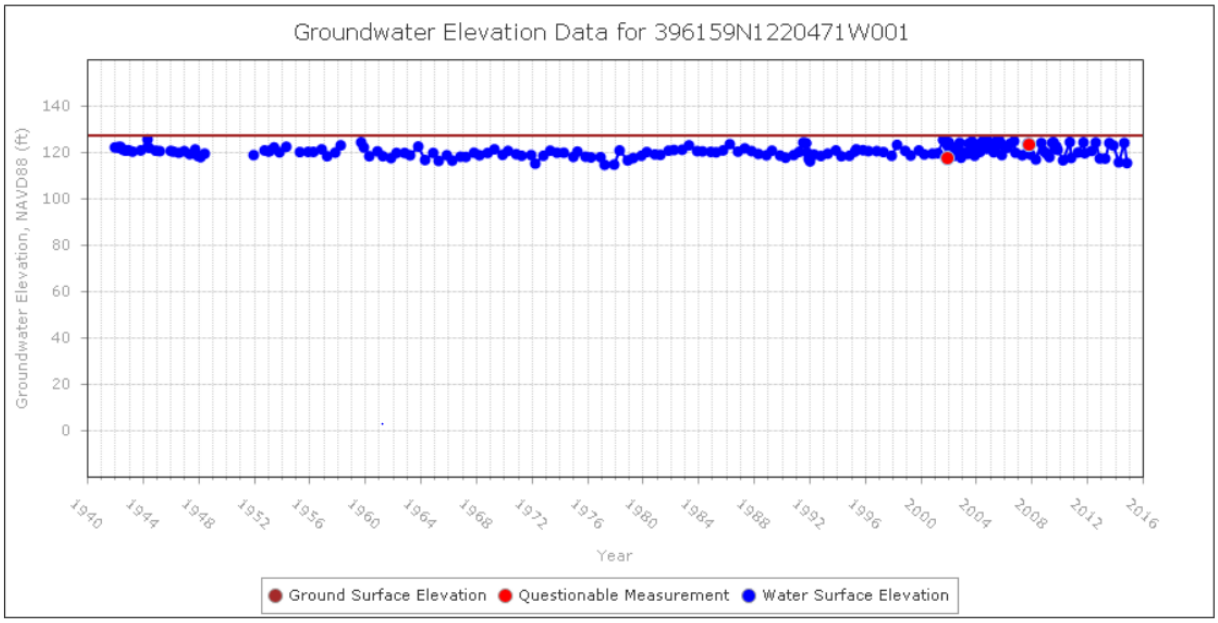
Eastside Mutual Water Company
State Well ID 16N01W20F001M



Source: DWR's CASGEM website.
Note: Well number in the title of the figure is the CASGEM Well Number.

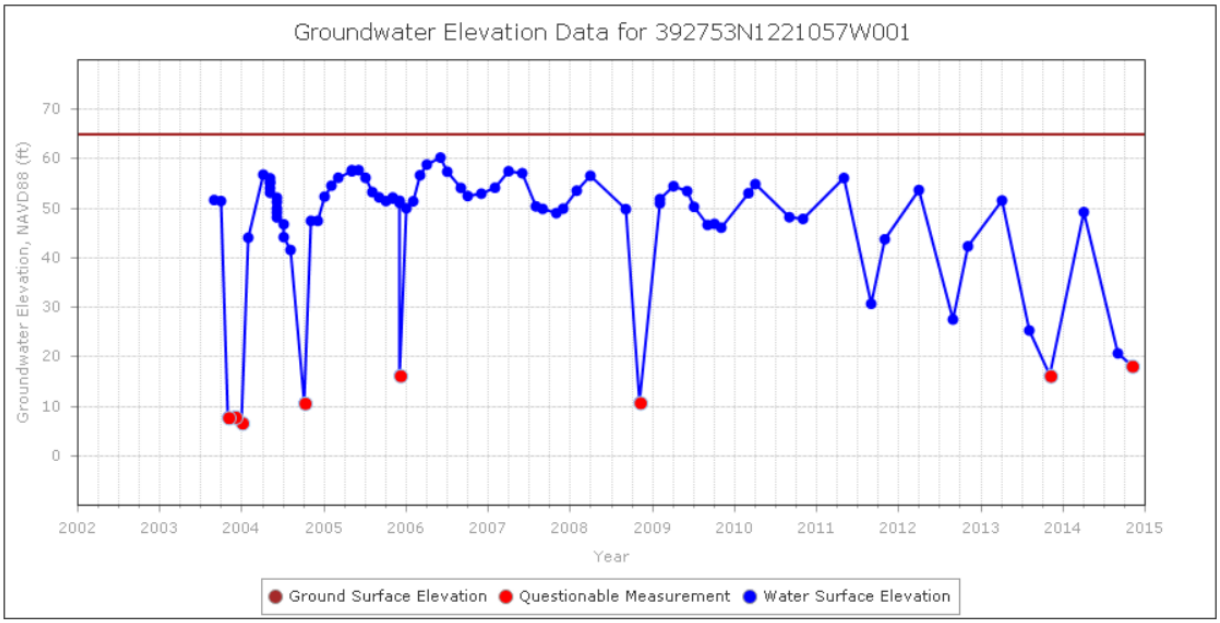
Glenn-Colusa Irrigation District

State Well ID 20N02W02J001M



Source: DWR's CASGEM website.
Note: Well number in the title of the figure is the CASGEM Well Number.

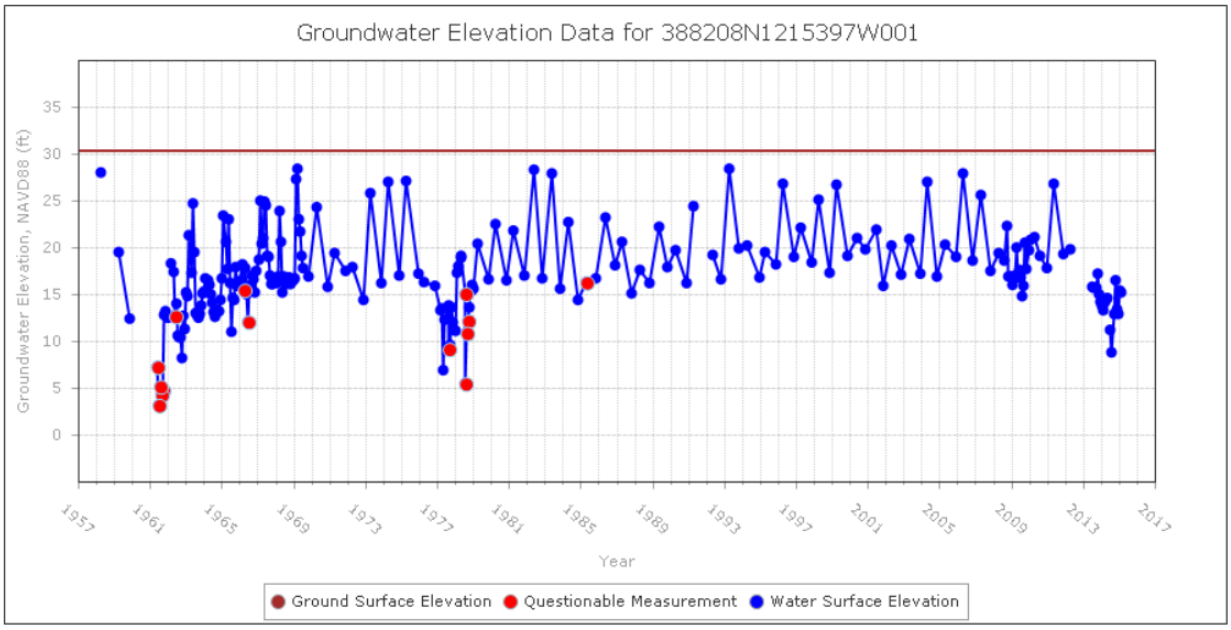
Maxwell Irrigation District
State Well ID 16N02W05B001M



Source: DWR's CASGEM website.
Note: Well number in the title of the figure is the CASGEM Well Number.

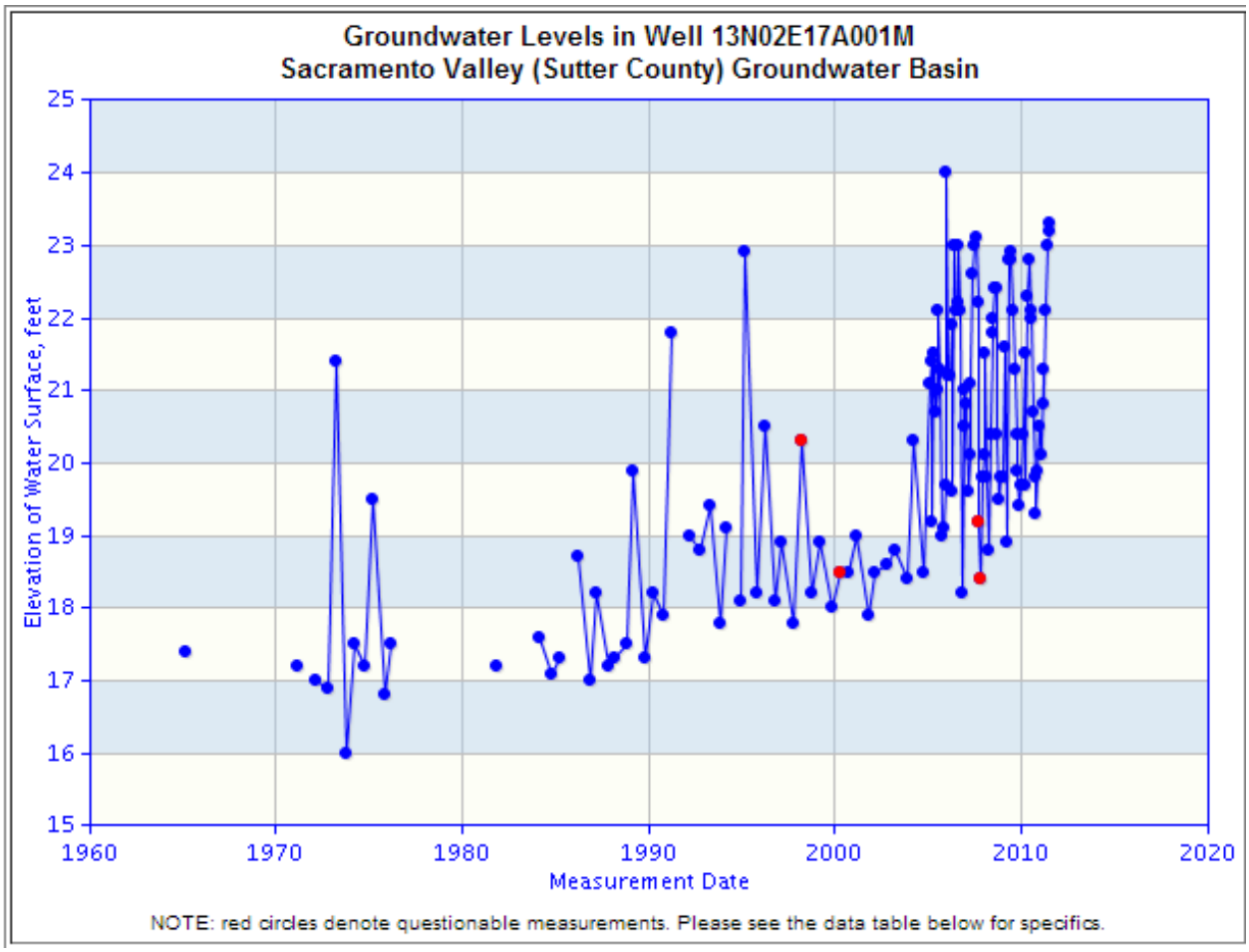
Natomas Central Mutual Water Company

State Well ID 11N04E09D002M



Source: DWR's CASGEM website.
Note: Well number in the title of the figure is the CASGEM Well Number.

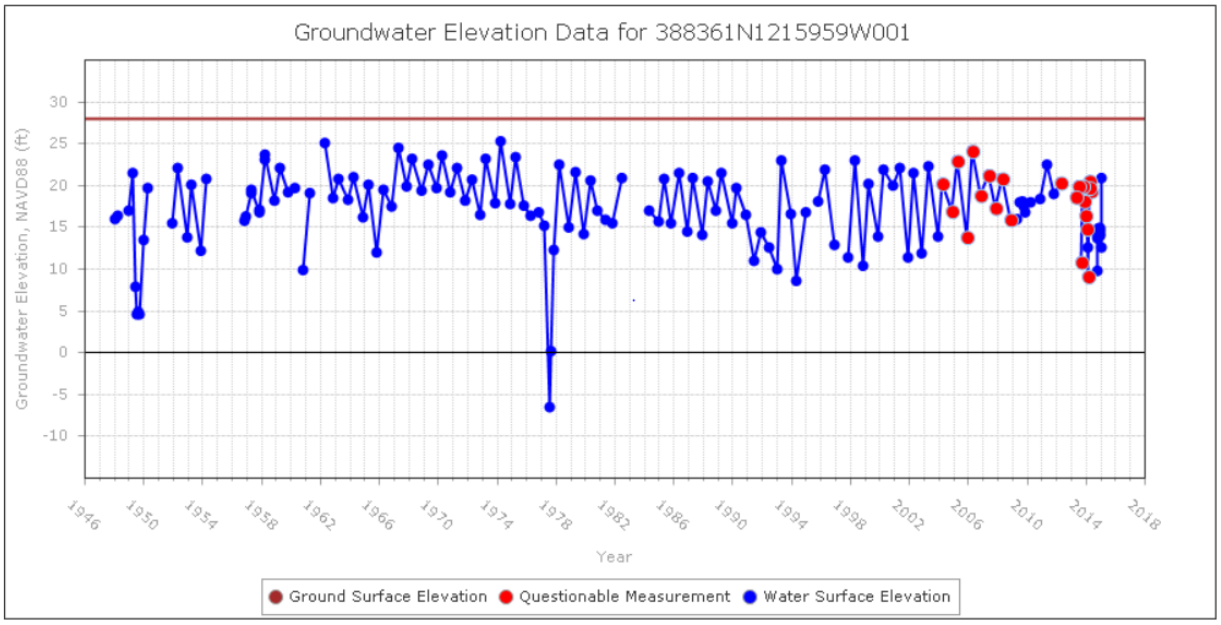
Pelger Mutual Water Company
State Well ID 13N02E17A001M



Source: DWR's Water Data Library

Pleasant Grove-Verona Mutual Water Company

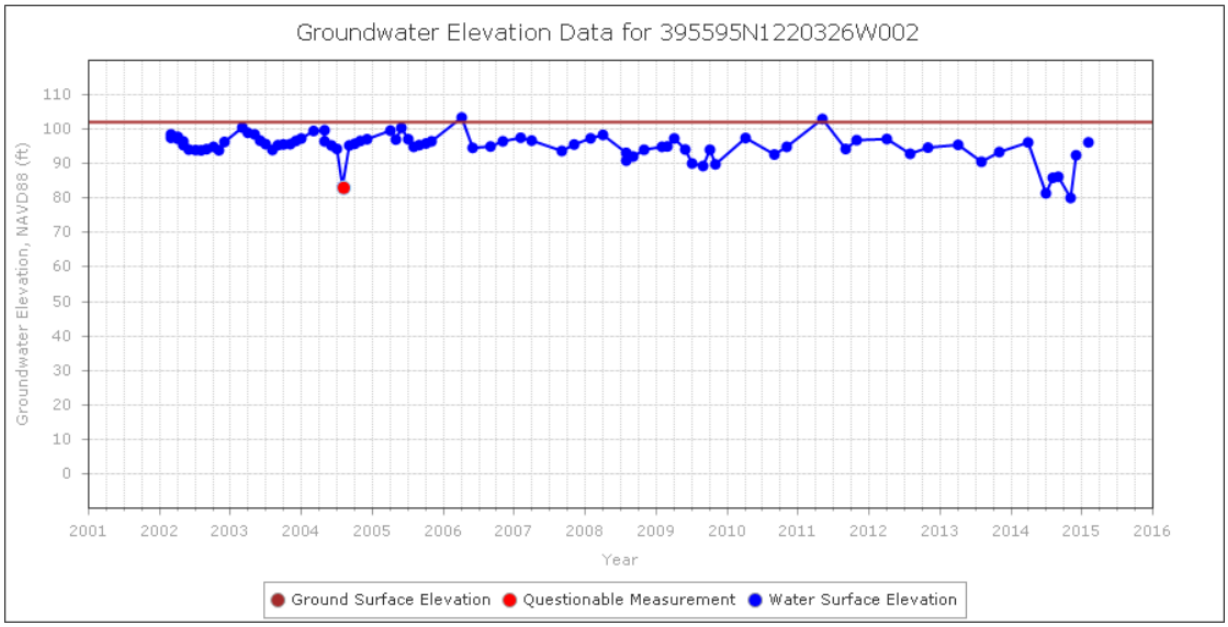
State Well ID 11N03E01D001M



Source: DWR's CASGEM website.
Note: Well number in the title of the figure is the CASGEM Well Number.

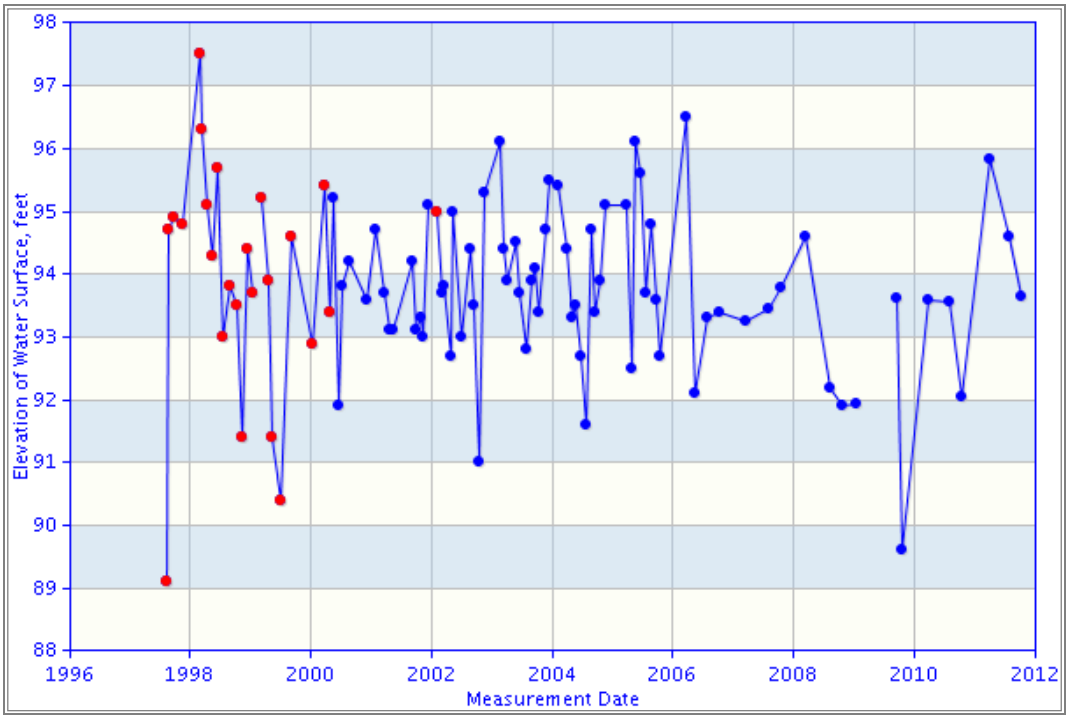
Princeton-Codora-Glenn Irrigation District and Provident Irrigation District

State Well ID 20N02W25F002M



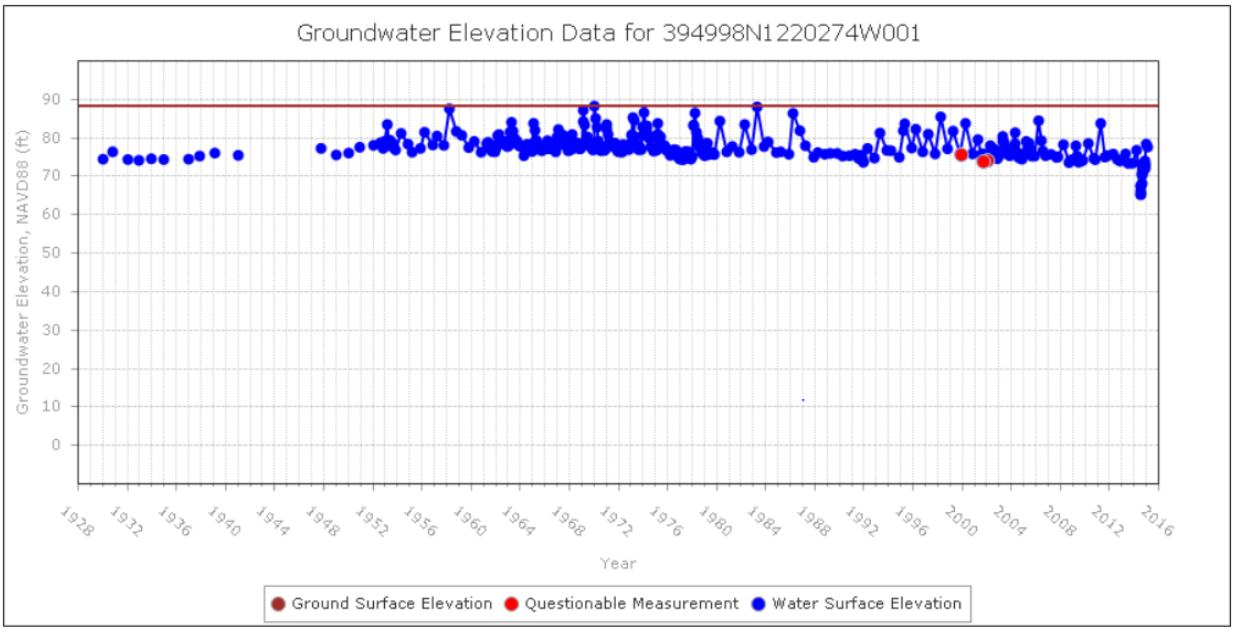
Source: DWR's CASGEM website.
Note: Well number in the title of the figure is the CASGEM Well Number.

State Well ID 20N02W34J001M



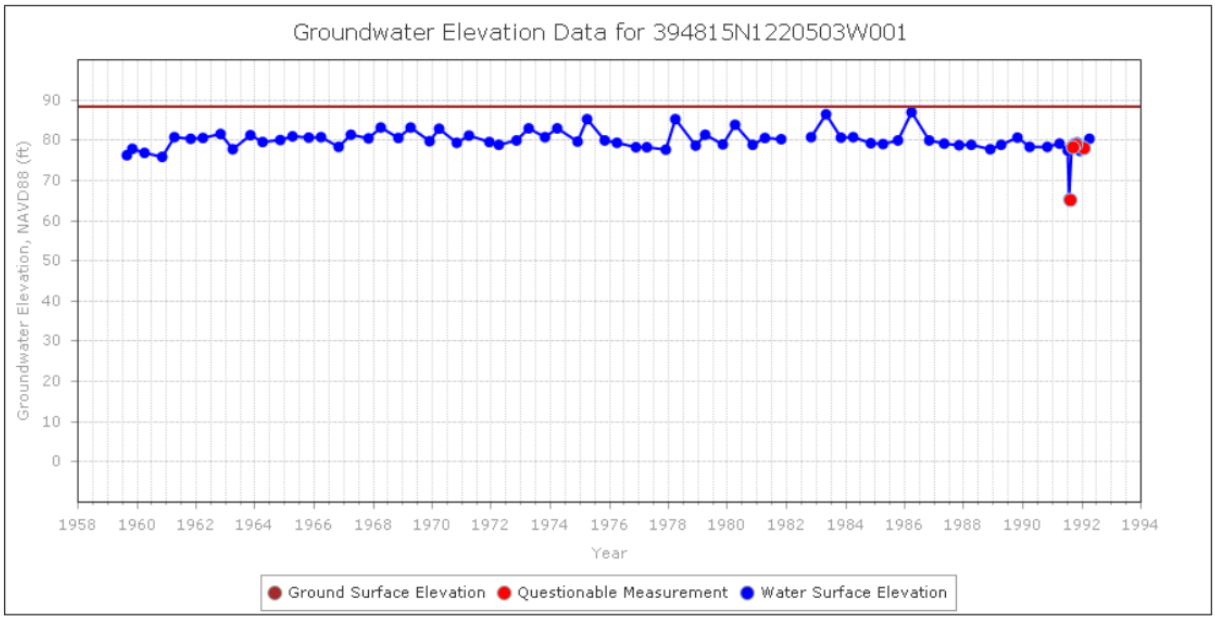
Source: DWR's Water Data Library

State Well ID 19N02W13J001M



Source: DWR's CASGEM website.
Note: Well number in the title of the figure is the CASGEM Well Number.

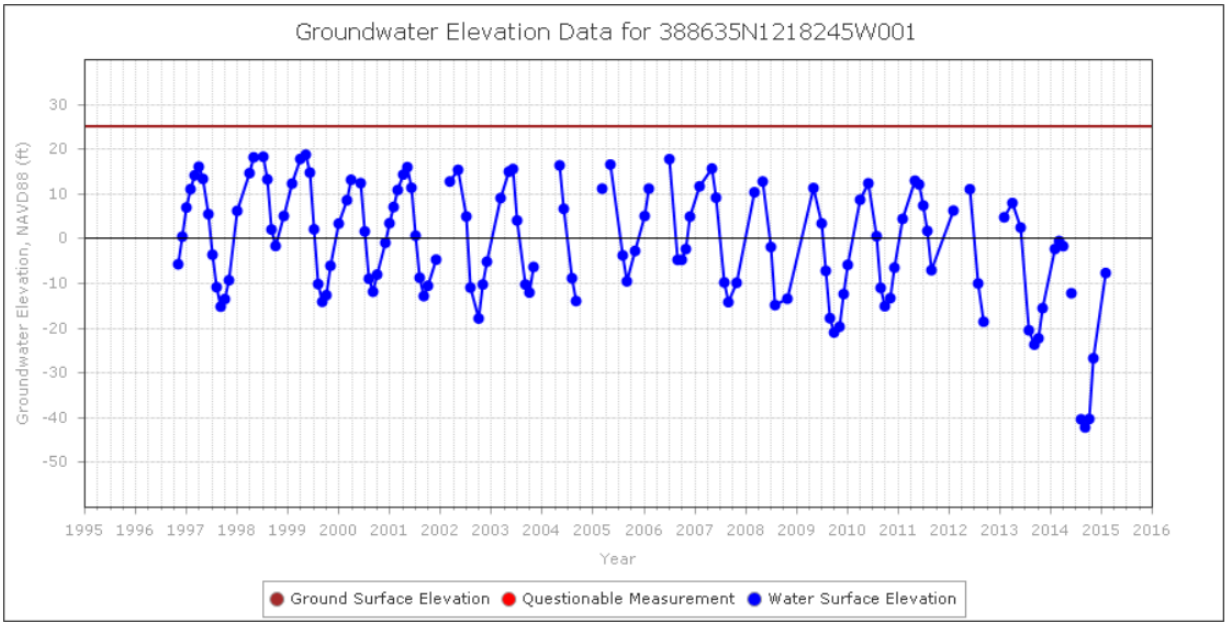
Provident Irrigation District
State Well ID 19N02W23Q002M



Source: DWR's CASGEM website.
Note: Well number in the title of the figure is the CASGEM Well Number.

Reclamation District 108

State Well ID 12N01E26A001M

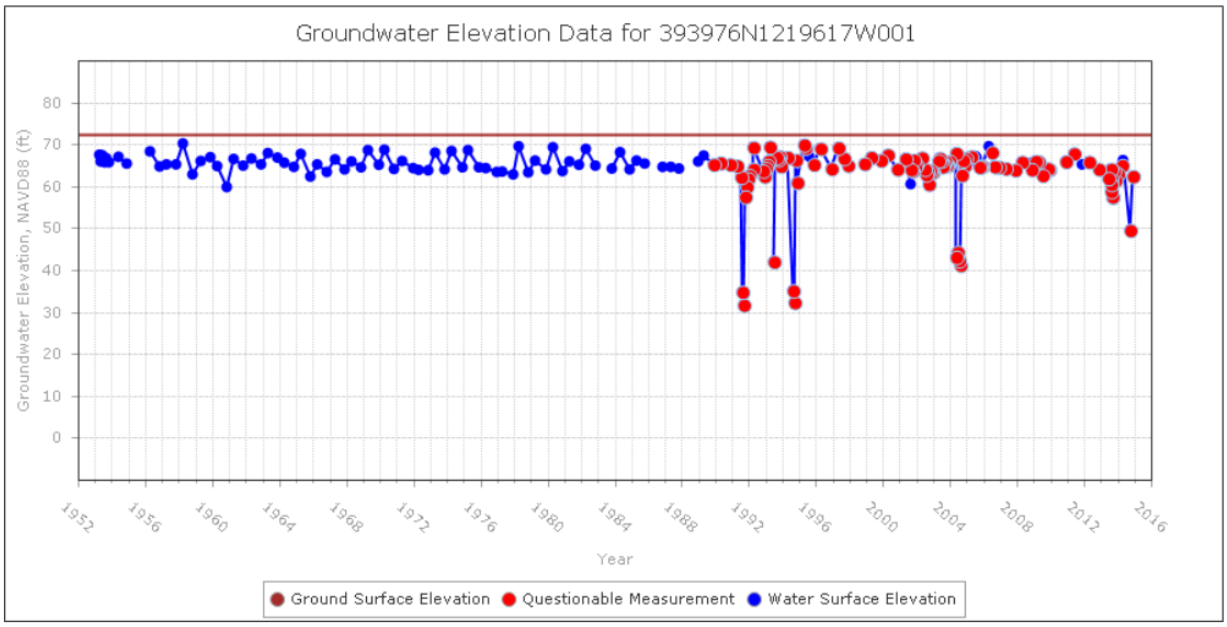


Source: DWR's CASGEM website.

Note: Well number in the title of the figure is the CASGEM Well Number.

Reclamation District 1004

State Well ID 18N01W22L001M

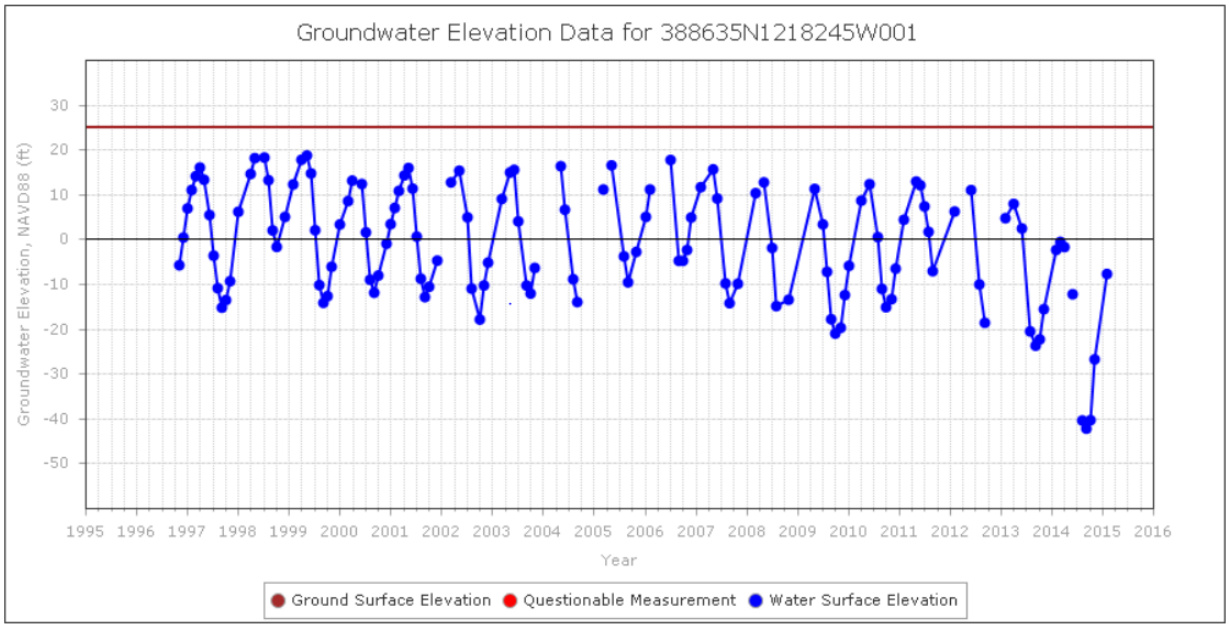


Source: DWR's CASGEM website.

Note: Well number in the title of the figure is the CASGEM Well Number.

River Garden Farms

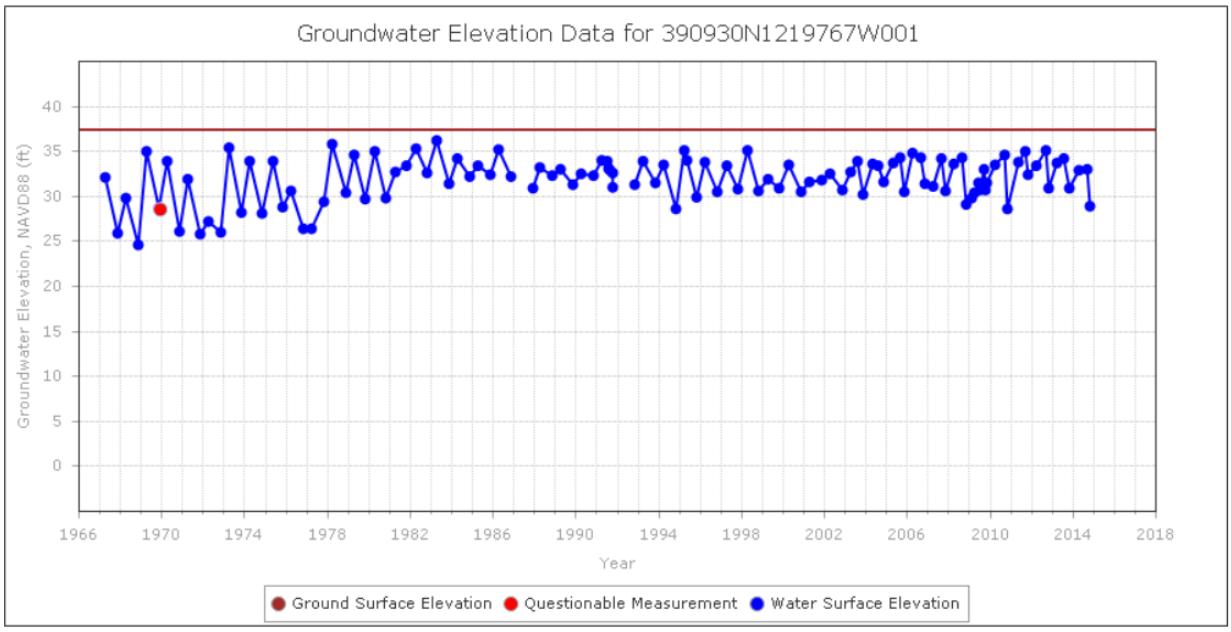
State Well ID 12N01E26A001M



Source: DWR's CASGEM website.

Note: Well number in the title of the figure is the CASGEM Well Number.

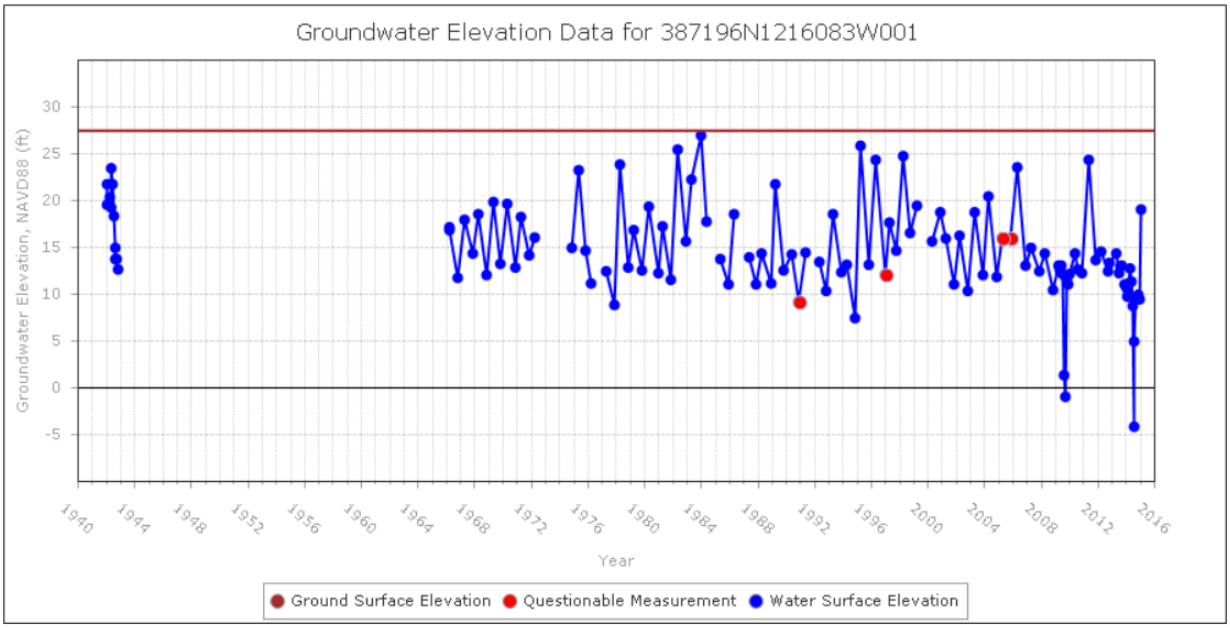
Sycamore Mutual Water Company
State Well ID 14N01W04K003M



Source: DWR's CASGEM website.
Note: Well number in the title of the figure is the CASGEM Well Number.

Te Velde Revocable Family Trust

State Well ID 10N03E14C001M



Source: DWR's CASGEM website.
Note: Well number in the title of the figure is the CASGEM Well Number.

Appendix B

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]	Sacramento Metro[1]	Sacramento Area[2]	Sacramento[3,4]	Sacramento Co.	Sacramento[4]
Colusa	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
Sacramento	0.1	0.3	2.8	1.0	0.0	0.0
Shasta	n/a	n/a	n/a	n/a	n/a	n/a
Sutter[5]	1.5	13.3	n/a	2.0	n/a	0.4
Tehama	n/a	n/a	n/a	n/a	n/a	n/a
Yolo	0.1	1.7	1.0	0.3	n/a	0.1
Total	1.7	15.4	3.7	3.3	0.0	0.5
Classification	Severe-15	Severe-15	Maintenance	PM2.5 Precursor	Maintenance	Nonattainment
De Minimis Threshold (tpy)	25	25	100	100	100	100
Exceed?	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]VOC and NOx emissions are excluded from Cranmore Farms, 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
Cranmore Farms	Sutter	All Electric	All Electric
Pelger Mutual Water Company	Sutter	0.0	0.7
Reclamation District 1004	Sutter	No Engines	No Engines
Total		**0.0**	**0.7**

Summary of Daily Groundwater Substitution Emissions by County (Unmitigated)

Table 3. Daily VOC Emissions (Unmitigated)

Water Agency	Daily VOC Emissions (pounds per day)							
	Colusa	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Tehama**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				All Electric		No Engines		0.00
Burroughs Farms					All Electric			0.00
Canal Farms	2.75							2.75
Conaway Preservation Group							4.24	4.24
Cranmore Farms					All Electric			0.00
Eastside Mutual Water Company	1.67							1.67
Glenn-Colusa Irrigation District	64.51	86.02						150.53
Maxwell Irrigation District	All Electric							0.00
Natomas Central Mutual Water Company			1.61		All Electric			1.61
Pelger Mutual Water Company					0.99			0.99
Pleasant Grove-Verona Mutual Water Company					30.41			30.41
Princeton-Codora-Glenn Irrigation District	No Engines	30.77						30.77
Provident Irrigation District	No Engines	11.64						11.64
Reclamation District 108	All Electric						All Electric	0.00
Reclamation District 1004	34.81	2.95			No Engines			37.76
River Garden Farms							All Electric	0.00
Sutter Mutual Water Company	No Groundwater Substitution							0.00
Sycamore Mutual Water Company	All Electric							0.00
T&P Farms	All Electric							0.00
Te Velde Revocable Family Trust							All Electric	0.00
Total	**103.74**	**131.38**	**1.61**	**0.00**	**31.40**	**0.00**	**4.24**	**272.36**

Key:
VOC = volatile organic compounds

Table 4. Daily NOx Emissions (Unmitigated)

Water Agency	Daily NOx Emissions (pounds per day)							
	Colusa	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Tehama**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				All Electric		No Engines		0.00
Burroughs Farms					All Electric			0.00
Canal Farms	5.50							5.50
Conaway Preservation Group							80.49	80.49
Cranmore Farms					All Electric			0.00
Eastside Mutual Water Company	31.65							31.65
Glenn-Colusa Irrigation District	795.46	1,060.61						1,856.07
Maxwell Irrigation District	All Electric							0.00
Natomas Central Mutual Water Company			3.39		All Electric			3.39
Pelger Mutual Water Company					18.76			18.76
Pleasant Grove-Verona Mutual Water Company					272.37			272.37
Princeton-Codora-Glenn Irrigation District	No Engines	314.71						314.71
Provident Irrigation District	No Engines	135.66						135.66
Reclamation District 108	All Electric						All Electric	0.00
Reclamation District 1004	444.92	36.38			No Engines			481.31
River Garden Farms							All Electric	0.00
Sutter Mutual Water Company	No Groundwater Substitution							0.00
Sycamore Mutual Water Company	All Electric							0.00
T&P Farms	All Electric							0.00
Te Velde Revocable Family Trust							All Electric	0.00
Total	**1,277.54**	**1,547.36**	**3.39**	**0.00**	**291.12**	**0.00**	**80.49**	**3,199.90**

Key:
NOx = nitrogen oxides

Summary of Daily Groundwater Substitution Emissions by County (Unmitigated)

Table 5. Daily CO Emissions (Unmitigated)

Water Agency	Daily CO Emissions (pounds per day)							
	Colusa	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Tehama**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				All Electric		No Engines		0.00
Burroughs Farms					All Electric			0.00
Canal Farms	11.00							11.00
Conaway Preservation Group							44.93	44.93
Cranmore Farms					All Electric			0.00
Eastside Mutual Water Company	29.15							29.15
Glenn-Colusa Irrigation District	171.41	228.54						399.95
Maxwell Irrigation District	All Electric							0.00
Natomas Central Mutual Water Company			29.67		All Electric			29.67
Pelger Mutual Water Company					24.68			24.68
Pleasant Grove-Verona Mutual Water Company					137.77			137.77
Princeton-Codora-Glenn Irrigation District	No Engines	171.88						171.88
Provident Irrigation District	No Engines	45.62						45.62
Reclamation District 108	All Electric						All Electric	0.00
Reclamation District 1004	127.07	7.84			No Engines			134.91
River Garden Farms							All Electric	0.00
Sutter Mutual Water Company	No Groundwater Substitution							0.00
Sycamore Mutual Water Company	All Electric							0.00
T&P Farms	All Electric							0.00
Te Velde Revocable Family Trust							All Electric	0.00
Total	**338.63**	**453.89**	**29.67**	**0.00**	**162.44**	**0.00**	**44.93**	**1,029.56**

Key:
CO = carbon monoxide

Table 6. Daily SOx Emissions (Unmitigated)

Water Agency	Daily SOx Emissions (pounds per day)							
	Colusa	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Tehama**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				All Electric		No Engines		0.00
Burroughs Farms					All Electric			0.00
Canal Farms	0.00							0.00
Conaway Preservation Group							16.00	16.00
Cranmore Farms					All Electric			0.00
Eastside Mutual Water Company	10.38							10.38
Glenn-Colusa Irrigation District	52.60	70.14						122.74
Maxwell Irrigation District	All Electric							0.00
Natomas Central Mutual Water Company			10.56		All Electric			10.56
Pelger Mutual Water Company					6.15			6.15
Pleasant Grove-Verona Mutual Water Company					35.49			35.49
Princeton-Codora-Glenn Irrigation District	No Engines	33.73						33.73
Provident Irrigation District	No Engines	13.91						13.91
Reclamation District 108	All Electric						All Electric	0.00
Reclamation District 1004	38.74	2.41			No Engines			41.15
River Garden Farms							All Electric	0.00
Sutter Mutual Water Company	No Groundwater Substitution							0.00
Sycamore Mutual Water Company	All Electric							0.00
T&P Farms	All Electric							0.00
Te Velde Revocable Family Trust							All Electric	0.00
Total	**101.73**	**120.18**	**10.56**	**0.00**	**41.64**	**0.00**	**16.00**	**290.11**

Key:
SOx = sulfur oxides

Summary of Daily Groundwater Substitution Emissions by County (Unmitigated)

Table 7. Daily PM10 Emissions (Unmitigated)

Water Agency	Daily PM10 Emissions (pounds per day)							
	Colusa	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Tehama**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				All Electric		No Engines		0.00
Burroughs Farms					All Electric			0.00
Canal Farms	0.03							0.03
Conaway Preservation Group							2.57	2.57
Cranmore Farms					All Electric			0.00
Eastside Mutual Water Company	1.67							1.67
Glenn-Colusa Irrigation District	12.45	16.59						29.04
Maxwell Irrigation District	All Electric							0.00
Natomas Central Mutual Water Company			0.17		All Electric			0.17
Pelger Mutual Water Company					1.48			1.48
Pleasant Grove-Verona Mutual Water Company					7.88			7.88
Princeton-Codora-Glenn Irrigation District	No Engines	7.37						7.37
Provident Irrigation District	No Engines	1.51						1.51
Reclamation District 108	All Electric						All Electric	0.00
Reclamation District 1004	6.66	0.39			No Engines			7.05
River Garden Farms							All Electric	0.00
Sutter Mutual Water Company	No Groundwater Substitution							0.00
Sycamore Mutual Water Company	All Electric							0.00
T&P Farms	All Electric							0.00
Te Velde Revocable Family Trust							All Electric	0.00
Total	**20.81**	**25.86**	**0.17**	**0.00**	**9.36**	**0.00**	**2.57**	**58.76**

Key:
PM10 = inhalable particulate matter

Table 8. Daily PM2.5 Emissions (Unmitigated)

Water Agency	Daily PM2.5 Emissions (pounds per day)							
	Colusa	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Tehama**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				All Electric		No Engines		0.00
Burroughs Farms					All Electric			0.00
Canal Farms	0.03							0.03
Conaway Preservation Group							2.57	2.57
Cranmore Farms					All Electric			0.00
Eastside Mutual Water Company	1.67							1.67
Glenn-Colusa Irrigation District	12.15	16.20						28.34
Maxwell Irrigation District	All Electric							0.00
Natomas Central Mutual Water Company			0.17		All Electric			0.17
Pelger Mutual Water Company					1.48			1.48
Pleasant Grove-Verona Mutual Water Company					7.72			7.72
Princeton-Codora-Glenn Irrigation District	No Engines	7.29						7.29
Provident Irrigation District	No Engines	1.47						1.47
Reclamation District 108	All Electric						All Electric	0.00
Reclamation District 1004	6.56	0.38			No Engines			6.94
River Garden Farms							All Electric	0.00
Sutter Mutual Water Company	No Groundwater Substitution							0.00
Sycamore Mutual Water Company	All Electric							0.00
T&P Farms	All Electric							0.00
Te Velde Revocable Family Trust							All Electric	0.00
Total	**20.41**	**25.34**	**0.17**	**0.00**	**9.21**	**0.00**	**2.57**	**57.68**

Key:
PM2.5 = fine particulate matter

Summary of Annual Groundwater Substitution Emissions by County (Unmitigated)

Table 9. Annual VOC Emissions (Unmitigated)

Water Agency	Annual VOC Emissions (tons per year)							
	Colusa	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Tehama**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				All Electric		No Engines		0.00
Burroughs Farms					All Electric			0.00
Canal Farms	0.12							0.12
Conaway Preservation Group							0.09	0.09
Cranmore Farms					All Electric			0.00
Eastside Mutual Water Company	0.09							0.09
Glenn-Colusa Irrigation District	6.00	8.00						14.00
Maxwell Irrigation District	All Electric							0.00
Natomas Central Mutual Water Company			0.15		All Electric			0.15
Pelger Mutual Water Company					0.03			0.03
Pleasant Grove-Verona Mutual Water Company					1.49			1.49
Princeton-Codora-Glenn Irrigation District	No Engines	2.01						2.01
Provident Irrigation District	No Engines	1.08						1.08
Reclamation District 108	All Electric						All Electric	0.00
Reclamation District 1004	1.42	0.12			No Engines			1.54
River Garden Farms							All Electric	0.00
Sutter Mutual Water Company	No Groundwater Substitution							0.00
Sycamore Mutual Water Company	All Electric							0.00
T&P Farms	All Electric							0.00
Te Velde Revocable Family Trust							All Electric	0.00
Total	**7.63**	**11.21**	**0.15**	**0.00**	**1.52**	**0.00**	**0.09**	**20.60**

Key:
VOC = volatile organic compounds

Table 10. Annual NOx Emissions (Unmitigated)

Water Agency	Annual NOx Emissions (tons per year)							
	Colusa	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Tehama**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				All Electric		No Engines		0.00
Burroughs Farms					All Electric			0.00
Canal Farms	0.25							0.25
Conaway Preservation Group							1.74	1.74
Cranmore Farms					All Electric			0.00
Eastside Mutual Water Company	1.72							1.72
Glenn-Colusa Irrigation District	73.98	98.64						172.61
Maxwell Irrigation District	All Electric							0.00
Natomas Central Mutual Water Company			0.32		All Electric			0.32
Pelger Mutual Water Company					0.66			0.66
Pleasant Grove-Verona Mutual Water Company					13.31			13.31
Princeton-Codora-Glenn Irrigation District	No Engines	20.51						20.51
Provident Irrigation District	No Engines	12.62						12.62
Reclamation District 108	All Electric						All Electric	0.00
Reclamation District 1004	18.10	1.48			No Engines			19.58
River Garden Farms							All Electric	0.00
Sutter Mutual Water Company	No Groundwater Substitution							0.00
Sycamore Mutual Water Company	All Electric							0.00
T&P Farms	All Electric							0.00
Te Velde Revocable Family Trust							All Electric	0.00
Total	**94.05**	**133.24**	**0.32**	**0.00**	**13.97**	**0.00**	**1.74**	**243.33**

Key:
NOx = nitrogen oxides

Summary of Annual Groundwater Substitution Emissions by County (Unmitigated)

Table 11. Annual CO Emissions (Unmitigated)

Water Agency	Annual CO Emissions (tons per year)							
	Colusa	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Tehama**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				All Electric		No Engines		0.00
Burroughs Farms					All Electric			0.00
Canal Farms	0.50							0.50
Conaway Preservation Group							0.97	0.97
Cranmore Farms					All Electric			0.00
Eastside Mutual Water Company	1.59							1.59
Glenn-Colusa Irrigation District	15.94	21.25						37.20
Maxwell Irrigation District	All Electric							0.00
Natomas Central Mutual Water Company			2.76		All Electric			2.76
Pelger Mutual Water Company					0.87			0.87
Pleasant Grove-Verona Mutual Water Company					6.73			6.73
Princeton-Codora-Glenn Irrigation District	No Engines	11.20						11.20
Provident Irrigation District	No Engines	4.24						4.24
Reclamation District 108	All Electric						All Electric	0.00
Reclamation District 1004	5.17	0.32			No Engines			5.49
River Garden Farms							All Electric	0.00
Sutter Mutual Water Company	No Groundwater Substitution							0.00
Sycamore Mutual Water Company	All Electric							0.00
T&P Farms	All Electric							0.00
Te Velde Revocable Family Trust							All Electric	0.00
Total	**23.20**	**37.02**	**2.76**	**0.00**	**7.60**	**0.00**	**0.97**	**71.55**

Key:
CO = carbon monoxide

Table 12. Annual SOx Emissions (Unmitigated)

Water Agency	Annual SOx Emissions (tons per year)							
	Colusa	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Tehama**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				All Electric		No Engines		0.00
Burroughs Farms					All Electric			0.00
Canal Farms	0.00							0.00
Conaway Preservation Group							0.35	0.35
Cranmore Farms					All Electric			0.00
Eastside Mutual Water Company	0.57							0.57
Glenn-Colusa Irrigation District	4.89	6.52						11.41
Maxwell Irrigation District	All Electric							0.00
Natomas Central Mutual Water Company			0.98		All Electric			0.98
Pelger Mutual Water Company					0.22			0.22
Pleasant Grove-Verona Mutual Water Company					1.73			1.73
Princeton-Codora-Glenn Irrigation District	No Engines	2.20						2.20
Provident Irrigation District	No Engines	1.29						1.29
Reclamation District 108	All Electric						All Electric	0.00
Reclamation District 1004	1.58	0.10			No Engines			1.67
River Garden Farms							All Electric	0.00
Sutter Mutual Water Company	No Groundwater Substitution							0.00
Sycamore Mutual Water Company	All Electric							0.00
T&P Farms	All Electric							0.00
Te Velde Revocable Family Trust							All Electric	0.00
Total	**7.03**	**10.11**	**0.98**	**0.00**	**1.95**	**0.00**	**0.35**	**20.43**

Key:
SOx = sulfur oxides

Summary of Annual Groundwater Substitution Emissions by County (Unmitigated)

Table 13. Annual PM10 Emissions (Unmitigated)

Water Agency	Annual PM10 Emissions (tons per year)							
	Colusa	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Tehama**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				All Electric		No Engines		0.00
Burroughs Farms					All Electric			0.00
Canal Farms	0.00							0.00
Conaway Preservation Group							0.06	0.06
Cranmore Farms					All Electric			0.00
Eastside Mutual Water Company	0.09							0.09
Glenn-Colusa Irrigation District	1.16	1.54						2.70
Maxwell Irrigation District	All Electric							0.00
Natomas Central Mutual Water Company			0.02		All Electric			0.02
Pelger Mutual Water Company					0.05			0.05
Pleasant Grove-Verona Mutual Water Company					0.38			0.38
Princeton-Codora-Glenn Irrigation District	No Engines	0.48						0.48
Provident Irrigation District	No Engines	0.14						0.14
Reclamation District 108	All Electric						All Electric	0.00
Reclamation District 1004	0.27	0.02			No Engines			0.29
River Garden Farms							All Electric	0.00
Sutter Mutual Water Company	No Groundwater Substitution							0.00
Sycamore Mutual Water Company	All Electric							0.00
T&P Farms	All Electric							0.00
Te Velde Revocable Family Trust							All Electric	0.00
Total	**1.52**	**2.18**	**0.02**	**0.00**	**0.44**	**0.00**	**0.06**	**4.21**

Key:
PM10 = inhalable particulate matter

Table 14. Annual PM2.5 Emissions (Unmitigated)

Water Agency	Annual PM2.5 Emissions (tons per year)							
	Colusa	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Tehama**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				All Electric		No Engines		0.00
Burroughs Farms					All Electric			0.00
Canal Farms	0.00							0.00
Conaway Preservation Group							0.06	0.06
Cranmore Farms					All Electric			0.00
Eastside Mutual Water Company	0.09							0.09
Glenn-Colusa Irrigation District	1.13	1.51						2.64
Maxwell Irrigation District	All Electric							0.00
Natomas Central Mutual Water Company			0.02		All Electric			0.02
Pelger Mutual Water Company					0.05			0.05
Pleasant Grove-Verona Mutual Water Company					0.38			0.38
Princeton-Codora-Glenn Irrigation District	No Engines	0.47						0.47
Provident Irrigation District	No Engines	0.14						0.14
Reclamation District 108	All Electric						All Electric	0.00
Reclamation District 1004	0.27	0.02			No Engines			0.28
River Garden Farms							All Electric	0.00
Sutter Mutual Water Company	No Groundwater Substitution							0.00
Sycamore Mutual Water Company	All Electric							0.00
T&P Farms	All Electric							0.00
Te Velde Revocable Family Trust							All Electric	0.00
Total	**1.49**	**2.13**	**0.02**	**0.00**	**0.43**	**0.00**	**0.06**	**4.12**

Key:
PM2.5 = fine particulate matter

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Anderson-Cottonwood Irrigation District		Peak Pumping by Transfer Period	
Transfer Volume	2,400	acre-feet (Apr-Jun)	800	AF/month
	2,400	acre-feet (Jul-Sep)	800	AF/month
	4,800	acre-feet/year		

Table 15. Anderson-Cottonwood Irrigation District Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Shasta	0	2	0	0	2
Tehama	0	0	0	0	0
Total	0	2	0	0	2

Table 16. Anderson-Cottonwood Irrigation District Criteria Pollutant Emissions

Well	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)
Barney Street	Shasta	Electric	2012	200	n/a	5,500	85%	677	4,062	22	4,010
Crowley Gulch	Shasta	Electric	2012	50	n/a	1,000	15%	123	738	22	4,010
					Total	**6,500**	**100%**	**800**	**4,800**	**43**	**8,021**
					Total (Shasta County)	**6,500**	**100%**	**800**	**4,800**	**43**	**8,021**

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

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Federal Attainment Status

	Shasta	Tehama
PM10	A	A
PM2.5	A	A
O3	A	A

Engines not subject to ATCM if remotely-located.

Peak Month

800	AF/month
5,840	gallons/minute
90%	peak pump rate

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

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Burroughs Farms			Peak Pumping by Transfer Period
Transfer Volume	1,000	acre-feet	(Apr-Jun)	333 AF/month
	1,000	acre-feet	(Jul-Sep)	333 AF/month
	2,000	acre-feet/year		

Table 17. Burroughs Farms Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Sutter	0	1	0	0	1
Total	0	1	0	0	1

Table 18. Burroughs Farms Criteria Pollutant Emissions

Well	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)
Well #1	Sutter	Electric	2013	200	n/a	4,000	100%	333	2,000	15	2,715
					Total	**4,000**	**100%**	**333**	**2,000**	**15**	**2,715**
					Total (Sutter County)	**4,000**	**100%**	**333**	**2,000**	**15**	**2,715**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Federal Attainment Status

	Sutter
PM10	A
PM2.5	N
O3	N

Engines subject to ATCM.

Peak Month
333 AF/month
2,433 gallons/minute
61% peak pump rate

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

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Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Canal Farms			Peak Pumping by Transfer Period
Transfer Volume	575	acre-feet	(Apr-Jun)	342 AF/month
	425	acre-feet	(Jul-Sep)	162 AF/month
	1,000	acre-feet/year		

Table 19. Canal Farms Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Colusa	0	2	0	1	3
Total	0	2	0	1	3

Table 20. Canal Farms Criteria Pollutant Emissions

Well	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)	Fuel Consumption (MMBtu/yr)	Emission Factors (g/hp-hr) VOC	NOx	CO	Emission Factors (lb/MMBtu) SOx	PM10	PM2.5	Daily Emissions (pounds per day) VOC	NOx	CO	SOx	PM10	PM2.5	Annual Emissions (tons per year) VOC	NOx	CO	SOx	PM10	PM2.5
Dennis Well North	Colusa	E	unknown	125	n/a	3,500	29%	100	292	5	453	n/a																		
Dennis Well South	Colusa	E	unknown	125	n/a	3,500	29%	100	292	5	453	n/a																		
East Well	Colusa	Propane	unknown	250	n/a	5,000	42%	142	417	5	453	288	1.0	2.0	4.0	0.00059	0.00999	0.00999	2.75	5.50	11.00	0.00	0.03	0.03	0.12	0.25	0.50	0.000085	0.0014	0.0014
					Total	**12,000**	**100%**	**342**	**1,000**	**15**	**1,358**	**288**							**2.75**	**5.50**	**11.00**	**0.00**	**0.03**	**0.03**	**0.12**	**0.25**	**0.50**	**0.000085**	**0.0014**	**0.0014**
					Total (Colusa County)	**12,000**	**100%**	**342**	**1,000**	**15**	**1,358**	**288**							**2.75**	**5.50**	**11.00**	**0.00**	**0.03**	**0.03**	**0.12**	**0.25**	**0.50**	**0.000085**	**0.0014**	**0.0014**

Note: Natural gas emission factors used for propane.

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Federal Attainment Status

	Colusa
PM10	A
PM2.5	A
O3	A

Engines not subject to ATCM if remotely-located.

Peak Month

342	AF/month
2,496	gallons/minute
21%	peak pump rate

Legend

	Emission factors from 40 CFR 60, Subpart JJJJ, Table 1 for Non-Emergency SI Lean Burn LPG engines, 100<=HP<500, manufactured after 7/1/2008
	Engine power rating not provided; assumed to be equal to average horsepower for all engines operating in the study area for fuel type

Conversion Factors

1 bhp-hr =	2,542.5	Btu
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

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Conaway Preservation Group			Peak Pumping by Transfer Period
Transfer Volume	5,368	acre-feet	(Apr-Jun)	0 AF/month
	0	acre-feet	(Jul-Sep)	2,822 AF/month
	5,368	acre-feet/year		

Table 21. Conaway Preservation Group Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Yolo	2	12	0	0	14
Total	2	12	0	0	14

Table 22. Conaway Preservation Group Criteria Pollutant Emissions

Well	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)	Fuel Consumption (gal/yr)	Emission Factors (g/bhp-hr) VOC	NOx	CO	SOx	PM10	PM2.5	Daily Emissions (pounds per day) VOC	NOx	CO	SOx	PM10	PM2.5	Annual Emissions (tons per year) VOC	NOx	CO	SOx	PM10	PM2.5
1W3	Yolo	Electric	unknown	250	n/a	4,700	11%	419	690	16	797	n/a																		
5W2	Yolo	Electric	unknown	250	n/a	4,500	11%	0	380	0	459	n/a																		
7W1	Yolo	Electric	unknown	75	n/a	1,800	4%	179	414	18	1,248	n/a																		
7W2	Yolo	Electric	unknown	250	n/a	2,700	6%	269	605	18	1,217	n/a																		
7W4S	Yolo	Electric	unknown	200	n/a	3,500	8%	35	212	2	329	n/a																		
12W1	Yolo	Electric	unknown	250	n/a	4,500	11%	425	633	17	763	n/a																		
13W3	Yolo	Electric	unknown	200	n/a	2,900	7%	335	488	21	914	n/a																		
16W2	Yolo	Diesel	2005	227	T2	1,600	4%	167	231	19	785	9,993	0.2	4.7	2.6	0.93	0.15	0.15	2.33	44.23	24.69	8.79	1.41	1.41	0.05	0.92	0.51	0.18	0.03	0.03
17W3	Yolo	Diesel	2005	227	T2	1,700	4%	145	220	15	702	8,944	0.2	4.7	2.6	0.93	0.15	0.15	1.91	36.26	20.24	7.21	1.16	1.16	0.04	0.82	0.46	0.16	0.03	0.03
20W1	Yolo	Electric	unknown	100	n/a	2,500	6%	154	203	11	441	n/a																		
21W3	Yolo	Electric	unknown	100	n/a	2,500	6%	269	332	19	721	n/a																		
31W1	Yolo	Electric	unknown	100	n/a	2,300	5%	0	28	0	66	n/a																		
32NW1	Yolo	Electric	unknown	100	n/a	3,300	8%	0	107	0	177	n/a																		
32NW2	Yolo	Electric	unknown	250	n/a	4,200	10%	424	824	18	1,066	n/a																		
					Total	**42,700**	**100%**	**2,822**	**5,368**	**175**	**9,686**	**18,937**							**4.24**	**80.49**	**44.93**	**16.00**	**2.57**	**2.57**	**0.09**	**1.74**	**0.97**	**0.35**	**0.06**	**0.06**
					Total (Yolo County)	**42,700**	**100%**	**2,822**	**5,368**	**175**	**9,686**	**18,937**							**4.24**	**80.49**	**44.93**	**16.00**	**2.57**	**2.57**	**0.09**	**1.74**	**0.97**	**0.35**	**0.06**	**0.06**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Federal Attainment Status

	Yolo
PM10	A
PM2.5	N
O3	N

Engines subject to ATCM.

Peak Month

425	AF/month
3,204	gallons/minute
8%	peak pump rate

Legend

	Transfer volume data based on transfer plan developed by Conaway PG for May and June 2015
	Engine power rating not provided; assumed to be equal to maximum horsepower for all engines operating at the water agency with the same fuel type
	Emission factors based on NMHC+NOx standard

Conversion Factors

1 lb =	453.6	g	
1 ton =	2,000	lbs	
1 kW =	1.34	hp	
1 day =	24	hours	
1 month =	30	days	*<--peak pumping in June*
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	Cranmore Farms			Peak Pumping by Transfer Period
Transfer Volume	1,700	acre-feet	(Apr-Jun)	567 AF/month
	1,700	acre-feet	(Jul-Sep)	567 AF/month
	3,400	acre-feet/year		

Table 23. Cranmore Farms Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Sutter	0	2	0	0	2
Total	0	2	0	0	2

Table 24. Cranmore Farms Criteria Pollutant Emissions

Well	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)
North Well	Sutter	Electric	unknown	125	n/a	3,500	54%	305	1,831	15	2,841
South Well	Sutter	Electric	unknown	125	n/a	3,000	46%	262	1,569	15	2,841
					Total	**6,500**	**100%**	**567**	**3,400**	**31**	**5,682**
					Total (Sutter County)	**6,500**	**100%**	**567**	**3,400**	**31**	**5,682**

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

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Federal Attainment Status

	Sutter
PM10	A
PM2.5	N
O3	N

Engines subject to ATCM.

Peak Month
567 AF/month
4,136 gallons/minute
64% peak pump rate

Legend
Engine power rating not provided; assumed to be equal to average horsepower for all engines operating in the study area for fuel type

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	

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Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Eastside Mutual Water Company		Peak Pumping by Transfer Period	
Transfer Volume	1,067	acre-feet (Apr-Jun)	634	AF/month
	1,163	acre-feet (Jul-Sep)	443	AF/month
	2,230	acre-feet/year		

Table 25. Eastside Mutual Water Company Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Colusa	1	0	0	0	1
Total	1	0	0	0	1

Table 26. Eastside Mutual Water Company Criteria Pollutant Emissions

Well	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)	Fuel Consumption (gal/yr)	Emission Factors (g/bhp-hr) VOC	NOx	CO	SOx	PM10	PM2.5	Daily Emissions (pounds per day) VOC	NOx	CO	SOx	PM10	PM2.5	Annual Emissions (tons per year) VOC	NOx	CO	SOx	PM10	PM2.5
7631T	Colusa	Diesel	2006	215	T3	4,720	100%	634	2,230	24	2,566	30,948	0.1	2.8	2.6	0.93	0.14925	0.15	1.67	31.65	29.15	10.38	1.67	1.67	0.09	1.72	1.59	0.57	0.09	0.09
					Total	**4,720**	**100%**	**634**	**2,230**	**24**	**2,566**	**30,948**							**1.67**	**31.65**	**29.15**	**10.38**	**1.67**	**1.67**	**0.09**	**1.72**	**1.59**	**0.57**	**0.09**	**0.09**
					Total (Colusa County)	**4,720**	**100%**	**634**	**2,230**	**24**	**2,566**	**30,948**							**1.67**	**31.65**	**29.15**	**10.38**	**1.67**	**1.67**	**0.09**	**1.72**	**1.59**	**0.57**	**0.09**	**0.09**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Federal Attainment Status

	Colusa
PM10	A
PM2.5	A
O3	A

Engines not subject to ATCM if remotely-located.

Peak Month
634 AF/month
4,631 gallons/minute
98% peak pump rate

Legend
Emission factors based on NMHC+NOx standard

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	Glenn-Colusa Irrigation District		Peak Pumping by Transfer Period	
Transfer Volume	5,000	acre-feet (Apr-Jun)	1,667	AF/month
	5,000	acre-feet (Jul-Sep)	1,667	AF/month
	10,000	acre-feet/year		

Table 27. Glenn-Colusa Irrigation District Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Glenn	12	0	0	0	12
Colusa	9	0	0	0	9
Total	21	0	0	0	21

Table 28. Glenn-Colusa Irrigation District Criteria Pollutant Emissions

Well	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)	Fuel Consumption (gal/yr)	Emission Factors (g/bhp-hr) VOC	NOx	CO	SOx	PM10	PM2.5	Daily Emissions (pounds per day) VOC	NOx	CO	SOx	PM10	PM2.5	Annual Emissions (tons per year) VOC	NOx	CO	SOx	PM10	PM2.5
Well1	Glenn	Diesel	unknown	121	T0	590	5%	79	476	24	4,383	29,751	1.1	14.1	3.0	0.93	0.22	0.21	7.17	88.38	19.05	5.84	1.38	1.35	0.67	8.22	1.77	0.54	0.13	0.13
Well2	Glenn	Diesel	unknown	121	T0	590	5%	79	476	24	4,383	29,751	1.1	14.1	3.0	0.93	0.22	0.21	7.17	88.38	19.05	5.84	1.38	1.35	0.67	8.22	1.77	0.54	0.13	0.13
Well3	Glenn	Diesel	unknown	121	T0	590	5%	79	476	24	4,383	29,751	1.1	14.1	3.0	0.93	0.22	0.21	7.17	88.38	19.05	5.84	1.38	1.35	0.67	8.22	1.77	0.54	0.13	0.13
Well4	Glenn	Diesel	unknown	121	T0	590	5%	79	476	24	4,383	29,751	1.1	14.1	3.0	0.93	0.22	0.21	7.17	88.38	19.05	5.84	1.38	1.35	0.67	8.22	1.77	0.54	0.13	0.13
Well5	Glenn	Diesel	unknown	121	T0	590	5%	79	476	24	4,383	29,751	1.1	14.1	3.0	0.93	0.22	0.21	7.17	88.38	19.05	5.84	1.38	1.35	0.67	8.22	1.77	0.54	0.13	0.13
Well6	Glenn	Diesel	unknown	121	T0	590	5%	79	476	24	4,383	29,751	1.1	14.1	3.0	0.93	0.22	0.21	7.17	88.38	19.05	5.84	1.38	1.35	0.67	8.22	1.77	0.54	0.13	0.13
Well7	Glenn	Diesel	unknown	121	T0	590	5%	79	476	24	4,383	29,751	1.1	14.1	3.0	0.93	0.22	0.21	7.17	88.38	19.05	5.84	1.38	1.35	0.67	8.22	1.77	0.54	0.13	0.13
Well8	Glenn	Diesel	unknown	121	T0	590	5%	79	476	24	4,383	29,751	1.1	14.1	3.0	0.93	0.22	0.21	7.17	88.38	19.05	5.84	1.38	1.35	0.67	8.22	1.77	0.54	0.13	0.13
Well9	Glenn	Diesel	unknown	121	T0	590	5%	79	476	24	4,383	29,751	1.1	14.1	3.0	0.93	0.22	0.21	7.17	88.38	19.05	5.84	1.38	1.35	0.67	8.22	1.77	0.54	0.13	0.13
Well10	Glenn	Diesel	unknown	121	T0	590	5%	79	476	24	4,383	29,751	1.1	14.1	3.0	0.93	0.22	0.21	7.17	88.38	19.05	5.84	1.38	1.35	0.67	8.22	1.77	0.54	0.13	0.13
Well11	Glenn	Diesel	unknown	121	T0	590	5%	79	476	24	4,383	29,751	1.1	14.1	3.0	0.93	0.22	0.21	7.17	88.38	19.05	5.84	1.38	1.35	0.67	8.22	1.77	0.54	0.13	0.13
Well12	Glenn	Diesel	unknown	121	T0	590	5%	79	476	24	4,383	29,751	1.1	14.1	3.0	0.93	0.22	0.21	7.17	88.38	19.05	5.84	1.38	1.35	0.67	8.22	1.77	0.54	0.13	0.13
Well13	Colusa	Diesel	unknown	121	T0	590	5%	79	476	24	4,383	29,751	1.1	14.1	3.0	0.93	0.22	0.21	7.17	88.38	19.05	5.84	1.38	1.35	0.67	8.22	1.77	0.54	0.13	0.13
Well14	Colusa	Diesel	unknown	121	T0	590	5%	79	476	24	4,383	29,751	1.1	14.1	3.0	0.93	0.22	0.21	7.17	88.38	19.05	5.84	1.38	1.35	0.67	8.22	1.77	0.54	0.13	0.13
Well15	Colusa	Diesel	unknown	121	T0	590	5%	79	476	24	4,383	29,751	1.1	14.1	3.0	0.93	0.22	0.21	7.17	88.38	19.05	5.84	1.38	1.35	0.67	8.22	1.77	0.54	0.13	0.13
Well16	Colusa	Diesel	unknown	121	T0	590	5%	79	476	24	4,383	29,751	1.1	14.1	3.0	0.93	0.22	0.21	7.17	88.38	19.05	5.84	1.38	1.35	0.67	8.22	1.77	0.54	0.13	0.13
Well17	Colusa	Diesel	unknown	121	T0	590	5%	79	476	24	4,383	29,751	1.1	14.1	3.0	0.93	0.22	0.21	7.17	88.38	19.05	5.84	1.38	1.35	0.67	8.22	1.77	0.54	0.13	0.13
Well18	Colusa	Diesel	unknown	121	T0	590	5%	79	476	24	4,383	29,751	1.1	14.1	3.0	0.93	0.22	0.21	7.17	88.38	19.05	5.84	1.38	1.35	0.67	8.22	1.77	0.54	0.13	0.13
Well19	Colusa	Diesel	unknown	121	T0	590	5%	79	476	24	4,383	29,751	1.1	14.1	3.0	0.93	0.22	0.21	7.17	88.38	19.05	5.84	1.38	1.35	0.67	8.22	1.77	0.54	0.13	0.13
Well20	Colusa	Diesel	unknown	121	T0	590	5%	79	476	24	4,383	29,751	1.1	14.1	3.0	0.93	0.22	0.21	7.17	88.38	19.05	5.84	1.38	1.35	0.67	8.22	1.77	0.54	0.13	0.13
Well21	Colusa	Diesel	unknown	121	T0	590	5%	79	476	24	4,383	29,751	1.1	14.1	3.0	0.93	0.22	0.21	7.17	88.38	19.05	5.84	1.38	1.35	0.67	8.22	1.77	0.54	0.13	0.13
					Total	**12,392**	**100%**	**1,667**	**10,000**	**495**	**92,037**	**624,765**							**150.53**	**1,856.07**	**399.95**	**122.74**	**29.04**	**28.34**	**14.00**	**172.61**	**37.20**	**11.41**	**2.70**	**2.64**
					Total (Glenn County)	**7,081**	**57%**	**952**	**5,714**	**283**	**52,592**	**357,008**							**86.02**	**1,060.61**	**228.54**	**70.14**	**16.59**	**16.20**	**8.00**	**98.64**	**21.25**	**6.52**	**1.54**	**1.51**
					Total (Colusa County)	**5,311**	**43%**	**714**	**4,286**	**212**	**39,444**	**267,756**							**64.51**	**795.46**	**171.41**	**52.60**	**12.45**	**12.15**	**6.00**	**73.98**	**15.94**	**4.89**	**1.16**	**1.13**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Federal Attainment Status

	Glenn	Colusa
PM10	A	A
PM2.5	A	A
O3	A	A

Engines not subject to ATCM if remotely-located.

Peak Month

1,667	AF/month
12,166	gallons/minute
98%	peak pump rate

Legend

Engine power rating equal to average horsepower of all wells in GCID's well database

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		Peak Pumping by Transfer Period	
Transfer Volume	1,330	acre-feet (Apr-Jun)	791	AF/month
	2,270	acre-feet (Jul-Sep)	865	AF/month
	3,600	acre-feet/year		

Table 29. Maxwell Irrigation District Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Colusa	0	2	0	0	2
Total	0	2	0	0	2

Table 30. Maxwell Irrigation District Criteria Pollutant Emissions

Well	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)
MainWell	Colusa	Electric	unknown	125	n/a	3,800	50%	432	1,800	20	2,573
TuttleWell	Colusa	Electric	unknown	125	n/a	3,800	50%	432	1,800	20	2,573
					Total	**7,600**	**100%**	**865**	**3,600**	**40**	**5,145**
					Total (Colusa County)	**7,600**	**100%**	**865**	**3,600**	**40**	**5,145**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Federal Attainment Status

	Colusa
PM10	A
PM2.5	A
O3	A

Engines not subject to ATCM if remotely-located.

Peak Month

865	AF/month
6,312	gallons/minute
83%	peak pump rate

Legend

Engine power rating not provided; assumed to be equal to average horsepower for all engines operating in the study area for fuel type

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

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Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Natomas Central Mutual Water Company			Peak Pumping by Transfer Period
Transfer Volume	10,000	acre-feet	(Apr-Jun)	3,333 AF/month
	10,000	acre-feet	(Jul-Sep)	3,333 AF/month
	20,000	acre-feet/year		

Table 31. Natomas Central Mutual Water Company Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Sacramento	1	6	0	0	7
Sutter	0	7	0	0	7
Total	1	13	0	0	14

Table 32. Natomas Central Mutual Water Company Criteria Pollutant Emissions

Well	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)	Fuel Consumption (gal/yr)	Emission Factors (g/bhp-hr) VOC	NOx	CO	SOx	PM10	PM2.5	Daily Emissions (pounds per day) VOC	NOx	CO	SOx	PM10	PM2.5	Annual Emissions (tons per year) VOC	NOx	CO	SOx	PM10	PM2.5
Frazer	Sutter	Electric	unknown	50	n/a	2,000	8%	261	1,569	23	4,259	n/a																		
Lucich North	Sutter	Electric	unknown	75	n/a	2,500	10%	327	1,961	23	4,259	n/a																		
Bennett North	Sutter	Electric	unknown	150	n/a	2,000	8%	261	1,569	23	4,259	n/a																		
Atkinson	Sutter	Electric	unknown	60	n/a	1,800	7%	235	1,412	23	4,259	n/a																		
L-2	Sutter	Electric	unknown	100	n/a	1,900	7%	248	1,490	23	4,259	n/a																		
L-12	Sutter	Electric	unknown	50	n/a	1,500	6%	196	1,176	23	4,259	n/a																		
Spangler	Sutter	Electric	unknown	60	n/a	2,400	9%	314	1,882	23	4,259	n/a																		
Natomas Farms	Sacramento	Electric	unknown	60	n/a	1,500	6%	196	1,176	23	4,259	n/a																		
Silva	Sacramento	Electric	unknown	150	n/a	1,000	4%	131	784	23	4,259	n/a																		
Betts	Sacramento	Electric	unknown	150	n/a	1,500	6%	196	1,176	23	4,259	n/a																		
MAP	Sacramento	Electric	unknown	150	n/a	2,000	8%	261	1,569	23	4,259	n/a																		
Ose-1	Sacramento	Diesel	2013	225	T4I	1,800	7%	235	1,412	23	4,259	53,766	0.14	0.3	2.6	0.93	0.01	0.01	1.61	3.39	29.67	10.56	0.17	0.17	0.15	0.32	2.76	0.98	0.02	0.02
Ose-2	Sacramento	Electric	unknown	150	n/a	1,600	6%	209	1,255	23	4,259	n/a																		
Perry	Sacramento	Electric	unknown	135	n/a	2,000	8%	261	1,569	23	4,259	n/a																		
					Total	**25,500**	**100%**	**3,333**	**20,000**	**321**	**59,633**	**53,766**							**1.61**	**3.39**	**29.67**	**10.56**	**0.17**	**0.17**	**0.15**	**0.32**	**2.76**	**0.98**	**0.02**	**0.02**
					Total (Sacramento County)	**11,400**	**45%**	**1,490**	**8,941**	**160**	**29,816**	**53,766**							**1.61**	**3.39**	**29.67**	**10.56**	**0.17**	**0.17**	**0.15**	**0.32**	**2.76**	**0.98**	**0.02**	**0.02**
					Total (Sutter County)	**14,100**	**55%**	**1,843**	**11,059**	**160**	**29,816**	**0**							**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Federal Attainment Status

	Sacramento	Sutter
PM10	M	A
PM2.5	N	N
O3	N	N

Engines subject to ATCM.

Peak Month

3,333	AF/month
24,332	gallons/minute
95%	peak pump rate

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: Pelger Mutual Water Company
Transfer Volume: 2,000 acre-feet (Apr-Jun); 2,670 acre-feet (Jul-Sep); 4,670 acre-feet/year

Peak Pumping by Transfer Period
1,189 AF/month
1,017 AF/month

Table 33. Pelger Mutual Water Company Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Sutter	1	2	0	0	3
Total	1	2	0	0	3

Table 34. Pelger Mutual Water Company Criteria Pollutant Emissions

Well	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)	Fuel Consumption (gal/yr)	Emission Factors (g/bhp-hr) VOC	NOx	CO	SOx	PM10	PM2.5	Daily Emissions (pounds per day) VOC	NOx	CO	SOx	PM10	PM2.5	Annual Emissions (tons per year) VOC	NOx	CO	SOx	PM10	PM2.5
PMWC#1	Sutter	Electric	unknown	150	n/a	5,000	25%	293	1,149	24	1,248	n/a																		
Well 1 Tucker	Sutter	Electric	unknown	75	n/a	2,800	25%	293	1,149	24	2,229	n/a																		
Well 2 Flopet	Sutter	Diesel	2008	125	T3	2,500	17%	198	778	24	1,690	11,852	0.1	2.8	3.7	0.93	0.22	0.22	0.99	18.76	24.68	6.15	1.48	1.48	0.03	0.66	0.87	0.22	0.05	0.05
Well 3 Klein	Sutter	Electric	unknown	150	n/a	4,300	34%	406	1,594	24	2,013	n/a																		
					Total	**14,600**	**100%**	**1,190**	**4,670**	**96**	**7,180**	**11,852**							**0.99**	**18.76**	**24.68**	**6.15**	**1.48**	**1.48**	**0.03**	**0.66**	**0.87**	**0.22**	**0.05**	**0.05**
					Total (Sutter County)	**14,600**	**100%**	**1,190**	**4,670**	**96**	**7,180**	**11,852**							**0.99**	**18.76**	**24.68**	**6.15**	**1.48**	**1.48**	**0.03**	**0.66**	**0.87**	**0.22**	**0.05**	**0.05**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Federal Attainment Status

	Sutter
PM10	A
PM2.5	N
O3	N

Engines subject to ATCM.

Peak Month
1,189 AF/month
8,681 gallons/minute
59% peak pump rate

Legend
Emission factors based on NMHC+NOx standard

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			Peak Pumping by Transfer Period
Transfer Volume	8,000	acre-feet	(Apr-Jun)	4,757 AF/month
	7,000	acre-feet	(Jul-Sep)	2,667 AF/month
	15,000	acre-feet/year		

Table 35. Pleasant Grove-Verona Mutual Water Company Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Sutter	13	20	0	2	35
Total	13	20	0	2	35

Table 36. Pleasant Grove-Verona Mutual Water Company Criteria Pollutant Emissions

Well	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)	Fuel Consumption (gal/yr) - diesel (MMBtu/yr) - propane	Emission Factors (g/bhp-hr) - diesel and VOC, NOx, and CO for propane (lb/MMBtu) - SOx, PM10, and PM2.5 for propane: VOC	NOx	CO	SOx	PM10	PM2.5	Daily Emissions (pounds per day): VOC	NOx	CO	SOx	PM10	PM2.5	Annual Emissions (tons per year): VOC	NOx	CO	SOx	PM10	PM2.5
Kelly 190 Field Well #2	Sutter	Electric	unknown	30	n/a	2,000	2%	111	350	10	951	n/a																		
Kelly Windmill Field Well #2	Sutter	Electric	2002	62.1	n/a	2,000	2%	111	350	10	951	n/a																		
Kelly Windmill North Field Well	Sutter	Propane	2014	133	T2	1,750	2%	97	306	10	951	321	1.0	2.0	4.0	5.88E-04	9.99E-03	9.99E-03	2.85	5.70	11.40	0.00	0.03	0.03	0.14	0.28	0.56	0.00	0.00	0.00
Kelly306	Sutter	Electric	unknown	60	n/a	2,600	3%	144	455	10	951	n/a																		
MLF Clubhouse B Well	Sutter	Electric	unknown	300	n/a	3,700	4%	205	648	10	951	n/a																		
MLF Marsh Well	Sutter	Electric	unknown	300	n/a	3,700	4%	205	648	10	951	n/a																		
MLF Monster Well	Sutter	Electric	unknown	60	n/a	3,100	4%	172	543	10	951	n/a																		
MLF Well #1	Sutter	Electric	unknown	30	n/a	2,000	2%	111	350	10	951	n/a																		
MLF Well #16	Sutter	Electric	unknown	50	n/a	1,700	2%	94	298	10	951	n/a																		
MLF Well#11	Sutter	Diesel	2004	250	T2	4,200	5%	233	735	10	951	13,332	0.2	4.7	2.6	0.93	0.15	0.15	1.32	25.08	14.00	4.98	0.80	0.80	0.06	1.23	0.68	0.24	0.04	0.04
MLF Well#12/17	Sutter	Electric	unknown	50	n/a	1,500	2%	83	263	10	951	n/a																		
MLF Well#13&#15	Sutter	Electric	2000	215	n/a	4,800	6%	266	840	10	951	n/a																		
MLF Well#2B	Sutter	Electric	2000	300	n/a	3,700	4%	205	648	10	951	n/a																		
Nicholas 72-Acre Field North	Sutter	Electric	unknown	40	n/a	2,000	2%	111	350	10	951	n/a																		
Nicholas 72-Acree Field South	Sutter	Diesel	2002	62.1	T1	2,000	2%	111	350	10	951	3,312	1.1	6.9	3.0	0.93	0.30	0.29	1.52	9.14	4.03	1.24	0.40	0.39	0.07	0.45	0.20	0.06	0.02	0.02
Nicholas BBC Well	Sutter	Electric	unknown	30	n/a	2,000	2%	111	350	10	951	n/a																		
Nicholas Filipino Camp South	Sutter	Diesel	2002	62.1	T1	2,000	2%	111	350	10	951	3,312	1.1	6.9	3.0	0.93	0.30	0.29	1.52	9.14	4.03	1.24	0.40	0.39	0.07	0.45	0.20	0.06	0.02	0.02
Nicholas Filipino Camp#2	Sutter	Electric	unknown	40	n/a	2,000	2%	111	350	10	951	n/a																		
Nicholas Johnston Field Well #2	Sutter	Electric	unknown	40	n/a	2,000	2%	111	350	10	951	n/a																		
Nicholas Sand Field Well	Sutter	Diesel	2002	62.1	T2	2,000	2%	111	350	10	951	3,312	0.3	5.3	3.7	0.93	0.30	0.29	0.37	7.08	4.97	1.24	0.40	0.39	0.02	0.35	0.24	0.06	0.02	0.02
RiverRanch#19	Sutter	Diesel	2008	99	T3	2,000	2%	111	350	10	951	5,279	0.2	3.3	3.7	0.93	0.30	0.29	0.37	7.07	7.92	1.97	0.64	0.62	0.02	0.35	0.39	0.10	0.03	0.03
S&O#16	Sutter	Electric	2014	159	n/a	3,000	4%	167	525	10	951	n/a																		
S&O#17	Sutter	Diesel	1999	101	T0	2,250	3%	125	394	10	951	5,386	1.1	14.1	3.0	0.93	0.22	0.21	2.47	30.45	6.56	2.01	0.48	0.46	0.12	1.49	0.32	0.10	0.02	0.02
S&O#18A	Sutter	Diesel	1999	101	T0	1,800	2%	100	315	10	951	5,386	1.1	14.1	3.0	0.93	0.22	0.21	2.47	30.45	6.56	2.01	0.48	0.46	0.12	1.49	0.32	0.10	0.02	0.02
S&O#19	Sutter	Diesel	2007	215	T3	2,150	3%	119	376	10	951	11,465	0.1	2.8	2.6	0.93	0.15	0.15	0.69	13.07	12.04	4.29	0.69	0.69	0.03	0.64	0.59	0.21	0.03	0.03
S&O#20	Sutter	Propane	2014	154	n/a	2,250	3%	125	394	10	951	372	1.0	2.0	4.0	5.88E-04	9.99E-03	9.99E-03	3.30	6.60	13.21	0.00	0.04	0.04	0.16	0.32	0.65	0.00	0.00	0.00
Willey#1	Sutter	Diesel	2000	168	T1	3,000	4%	167	525	10	951	8,959	1.1	6.9	3.0	0.93	0.22	0.21	4.11	24.73	10.91	3.35	0.79	0.77	0.20	1.21	0.53	0.16	0.04	0.04
Willey#2	Sutter	Diesel	unknown	250	T2	3,000	4%	167	525	10	951	13,332	0.2	4.7	2.6	0.93	0.15	0.15	1.32	25.08	14.00	4.98	0.80	0.78	0.06	1.23	0.68	0.24	0.04	0.04
Willey#3	Sutter	Electric	unknown	75	n/a	2,000	2%	111	350	10	951	n/a																		
Willey#4	Sutter	Diesel	1974	150	T0	2,000	2%	111	350	10	951	7,999	1.1	14.1	3.0	0.93	0.22	0.21	3.67	45.22	9.74	2.99	0.71	0.69	0.18	2.21	0.48	0.15	0.03	0.03
Will-Lee Well#30	Sutter	Diesel	2000	100	T2	2,500	3%	139	438	10	951	5,333	0.2	4.7	3.7	0.93	0.22	0.21	0.53	10.03	8.00	1.99	0.47	0.46	0.03	0.49	0.39	0.10	0.02	0.02
Will-Lee Well#31	Sutter	Electric	unknown	50	n/a	2,500	3%	139	438	10	951	n/a																		
Will-Lee Well#32	Sutter	Electric	unknown	300	n/a	2,500	3%	139	438	10	951	n/a																		
Will-Lee Well#33	Sutter	Electric	unknown	75	n/a	2,500	3%	139	438	10	951	n/a																		
Will-Lee Well#4A	Sutter	Diesel	2000	160	T1	1,500	2%	83	263	10	951	8,532	1.1	6.9	3.0	0.93	0.22	0.21	3.91	23.55	10.39	3.19	0.75	0.74	0.19	1.15	0.51	0.16	0.04	0.04
					Total	**85,700**	**100%**	**4,757**	**15,000**	**340**	**33,270**	**95,632**							**30.41**	**272.37**	**137.77**	**35.49**	**7.88**	**7.72**	**1.49**	**13.31**	**6.73**	**1.73**	**0.38**	**0.38**
					Total (Sutter County)	**85,700**	**100%**	**4,757**	**15,000**	**340**	**33,270**	**95,632**							**30.41**	**272.37**	**137.77**	**35.49**	**7.88**	**7.72**	**1.49**	**13.31**	**6.73**	**1.73**	**0.38**	**0.38**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Federal Attainment Status

	Sutter
PM10	A
PM2.5	N
O3	N

Engines subject to ATCM.

Peak Month

4,757	AF/month
34,722	gallons/minute
41%	peak pump rate

Legend

	Emission factors from 40 CFR 60, Subpart JJJJ, Table 1 for Non-Emergency SI Lean Burn LPG engines, 100<=HP<500, manufactured after 7/1/2008
	Emission factors based on NMHC+NOx standard
	Emission factor from AP-42 because emission standards for pollutant not available for emissions tier

Conversion Factors

1 bhp-hr =	2,542.5	Btu
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	Princeton-Codora-Glenn Irrigation District		Peak Pumping by Transfer Period	
Transfer Volume	2,000	acre-feet (Apr-Jun)	1,189	AF/month
	3,000	acre-feet (Jul-Sep)	1,143	AF/month
	5,000	acre-feet/year		

Table 37. Princeton-Codora-Glenn Irrigation District Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Glenn	4	0	0	0	4
Colusa	0	0	0	0	0
Total	4	0	0	0	4

Table 38. Princeton-Codora-Glenn Irrigation District Criteria Pollutant Emissions

	Well Location			Power Rating	Emission	Pump Rate		Transfer Volume		Operations		Fuel Consumption	Emission Factors (g/bhp-hr)						Daily Emissions (pounds per day)						Annual Emissions (tons per year)					
Well	(County)	Fuel Type	Model Year	(hp)	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
Joel Mann	Glenn	D	1995	150	T0	3,000	34%	405	1,705	24	3,086	25,967	1.1	14.1	3.0	0.93	0.22	0.21	8.93	110.08	23.72	7.28	1.72	1.68	0.58	7.17	1.55	0.47	0.11	0.11
D.Withrow	Glenn	D	1992	180	T0	1,200	14%	162	682	24	3,086	31,160	1.1	14.1	3.0	0.93	0.15	0.15	10.71	132.10	28.47	8.74	1.41	1.38	0.70	8.61	1.86	0.57	0.09	0.09
Chrisman	Glenn	D	1998	195	T1	1,600	18%	216	909	24	3,086	33,757	1.0	6.9	8.5	0.93	0.40	0.40	9.87	69.87	86.58	9.46	4.10	4.10	0.64	4.55	5.64	0.62	0.27	0.27
D.Schmidt	Glenn	D	2013	170	T4I	3,000	34%	405	1,705	24	3,086	29,429	0.14	0.3	3.7	0.93	0.01	0.01	1.26	2.65	33.11	8.25	0.13	0.13	0.08	0.17	2.16	0.54	0.01	0.01
					Total	**8,800**	**100%**	**1,189**	**5,000**	**95**	**12,343**	**120,312**							**30.77**	**314.71**	**171.88**	**33.73**	**7.37**	**7.29**	**2.01**	**20.51**	**11.20**	**2.20**	**0.48**	**0.47**
					Total (Glenn County)	**8,800**	**100%**	**1,189**	**5,000**	**95**	**12,343**	**120,312**							**30.77**	**314.71**	**171.88**	**33.73**	**7.37**	**7.29**	**2.01**	**20.51**	**11.20**	**2.20**	**0.48**	**0.47**
					Total (Colusa County)	**0**	**0%**	**0**	**0**	**0**	**0**	**0**							**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Federal Attainment Status

	Glenn	Colusa
PM10	A	A
PM2.5	A	A
O3	A	A

Engines not subject to ATCM if remotely-located.

Peak Month
1,189 AF/month
8,681 gallons/minute
99% peak pump rate

Legend
Tier 4 Exhaust Emission Standards, Phase-In (100<=hp<=175, 2012-2014 model year)

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
Transfer Volume: 3,000 acre-feet (Apr-Jun); 3,000 acre-feet (Jul-Sep); 6,000 acre-feet/year

Peak Pumping by Transfer Period: 1,000 AF/month; 1,000 AF/month

Table 39. Provident Irrigation District Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Glenn	5	2	0	0	7
Colusa	0	0	0	0	0
Total	5	2	0	0	7

Table 40. Provident Irrigation District Criteria Pollutant Emissions

Well	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)	Fuel Consumption (gal/yr)	Emission Factors (g/bhp-hr) VOC	NOx	CO	SOx	PM10	PM2.5	Daily Emissions (pounds per day) VOC	NOx	CO	SOx	PM10	PM2.5	Annual Emissions (tons per year) VOC	NOx	CO	SOx	PM10	PM2.5
Weller62V	Glenn	Diesel	2014	190	T4	3,000	13%	128	766	7	1,387	14,780	0.14	0.3	2.6	0.93	0.01	0.01	0.44	0.93	8.16	2.90	0.05	0.05	0.04	0.09	0.76	0.27	0.00	0.00
L Hansen#1	Glenn	Diesel	1991	210	T0	4,000	17%	170	1,021	7	1,387	16,336	1.1	14.1	3.0	0.93	0.15	0.15	3.94	48.53	10.46	3.21	0.52	0.51	0.37	4.51	0.97	0.30	0.05	0.05
L Hansen#2	Glenn	Diesel	2013	140	T4I	4,500	19%	191	1,149	7	1,387	10,891	0.14	0.3	3.7	0.93	0.01	0.01	0.33	0.69	8.59	2.14	0.03	0.03	0.03	0.06	0.80	0.20	0.00	0.00
K Hansen#1	Glenn	Diesel	1992	185	T0	2,500	11%	106	638	7	1,387	14,391	1.1	14.1	3.0	0.93	0.15	0.15	3.47	42.75	9.21	2.83	0.46	0.45	0.32	3.98	0.86	0.26	0.04	0.04
K Hansen#2	Glenn	Electric	n/a	170	n/a	3,500	15%	149	894	7	1,387	n/a																		
E Weller	Glenn	Diesel	1993	185	T0	3,000	13%	128	766	7	1,387	14,391	1.1	14.1	3.0	0.93	0.15	0.15	3.47	42.75	9.21	2.83	0.46	0.45	0.32	3.98	0.86	0.26	0.04	0.04
Weller#4	Glenn	Electric	n/a	170	n/a	3,000	13%	128	766	7	1,387	n/a																		
					Total	**23,500**	**100%**	**1,000**	**6,000**	**52**	**9,706**	**70,789**							**11.64**	**135.66**	**45.62**	**13.91**	**1.51**	**1.47**	**1.08**	**12.62**	**4.24**	**1.29**	**0.14**	**0.14**
					Total (Glenn County)	**23,500**	**100%**	**1,000**	**6,000**	**52**	**9,706**	**70,789**							**11.64**	**135.66**	**45.62**	**13.91**	**1.51**	**1.47**	**1.08**	**12.62**	**4.24**	**1.29**	**0.14**	**0.14**
					Total (Colusa County)	**0**	**0%**	**0**	**0**	**0**	**0**	**0**							**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Federal Attainment Status

	Glenn	Colusa
PM10	A	A
PM2.5	A	A
O3	A	A

Engines not subject to ATCM if remotely-located.

Peak Month
1,000 AF/month
7,300 gallons/minute
31% peak pump rate

Legend
- Emission factors based on NMHC+NOx standard
- Information on engine not available; therefore, engine assumed to be diesel as worst-case.
- Engine power rating not provided; assumed to be equal to average horsepower for all engines operating in the study area for fuel type

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	

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Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Reclamation District 108			Peak Pumping by Transfer Period
Transfer Volume	7,500	acre-feet	(Apr-Jun)	2,500 AF/month
	7,500	acre-feet	(Jul-Sep)	2,500 AF/month
	15,000	acre-feet/year		

Table 41. Reclamation District 108 Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Colusa	0	4	0	0	4
Yolo	0	1	0	0	1
Total	0	5	0	0	5

Table 42. Reclamation District 108 Criteria Pollutant Emissions

Well	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)
Well #4 Huff	Colusa	Electric	unknown	250	n/a	4,000	21%	524	3,141	23	4,265
Well #5 RiggsRanch	Colusa	Electric	unknown	150	n/a	1,700	9%	223	1,335	23	4,265
Well #6 CountyLine	Colusa	Electric	unknown	250	n/a	5,900	31%	772	4,634	23	4,265
Well#1 Heidrick	Colusa	Electric	unknown	100	n/a	3,500	18%	458	2,749	23	4,265
Well#7 Tract 6	Yolo	Electric	unknown	250	n/a	4,000	21%	524	3,141	23	4,265
					Total	**19,100**	**100%**	**2,500**	**15,000**	**115**	**21,325**
					Total (Colusa County)	**15,100**	**79%**	**1,976**	**11,859**	**92**	**17,060**
					Total (Yolo County)	**4,000**	**21%**	**524**	**3,141**	**23**	**4,265**

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

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Federal Attainment Status

	Colusa	Yolo
PM10	A	A
PM2.5	A	N
O3	A	N

Engines subject to ATCM.

Peak Month

2,500	AF/month
18,249	gallons/minute
96%	peak pump rate

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

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Groundwater Substitution Air Quality Emissions (Unmitigated)

			Peak Pumping by Transfer Period
Agency	Reclamation District 1004		
Transfer Volume	0	acre-feet (Apr-Jun)	0 AF/month
	7,175	acre-feet (Jul-Sep)	2,733 AF/month
	7,175	acre-feet/year	

Table 43. Reclamation District 1004 Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Glenn	1	5	0	0	6
Colusa	17	5	0	0	22
Sutter	0	0	0	0	0
Total	18	10	0	0	28

Table 44. Reclamation District 1004 Criteria Pollutant Emissions

Well	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)	Fuel Consumption (gal/yr)	Emission Factors (g/bhp-hr) VOC	NOx	CO	SOx	PM10	PM2.5	Daily Emissions (pounds per day) VOC	NOx	CO	SOx	PM10	PM2.5	Annual Emissions (tons per year) VOC	NOx	CO	SOx	PM10	PM2.5
Barale Well	Colusa	Diesel	TBD	225	T0	4,000	4%	119	313	5	424	5,358	1.1	14.1	3.0	0.93	0.15	0.15	2.95	36.38	7.84	2.41	0.39	0.38	0.12	1.48	0.32	0.10	0.02	0.02
Behring Ranch 10 Field Well No. 496441	Colusa	Diesel	2008	225	T3	5,800	6%	173	453	5	424	5,358	0.1	2.8	2.6	0.93	0.15	0.15	0.39	7.34	6.76	2.41	0.39	0.39	0.02	0.30	0.27	0.10	0.02	0.02
Behring Ranch Club House Well No.496461	Colusa	Electric	unknown	125	n/a	3,400	4%	101	266	5	424	n/a																		
Behring Ranch Nursery Well No. 17N1W10H1	Colusa	Diesel	TBD	225	T0	1,000	1%	30	78	5	424	5,358	1.1	14.1	3.0	0.93	0.15	0.15	2.95	36.38	7.84	2.41	0.39	0.38	0.12	1.48	0.32	0.10	0.02	0.02
Behring Ranch Pearl Well No. 20094	Colusa	Diesel	TBD	225	T0	2,500	3%	74	195	5	424	5,358	1.1	14.1	3.0	0.93	0.15	0.15	2.95	36.38	7.84	2.41	0.39	0.38	0.12	1.48	0.32	0.10	0.02	0.02
Behring Ranch West Well No.97863	Colusa	Electric	unknown	125	n/a	2,300	3%	68	180	5	424	n/a																		
Drumheller Well No.7	Colusa	Diesel	TBD	225	T0	4,000	4%	119	313	5	424	5,358	1.1	14.1	3.0	0.93	0.15	0.15	2.95	36.38	7.84	2.41	0.39	0.38	0.12	1.48	0.32	0.10	0.02	0.02
East Morgan Well #1 No. 374667 17N01W14N001M	Colusa	Diesel	TBD	225	T0	2,600	3%	77	203	5	424	5,358	1.1	14.1	3.0	0.93	0.15	0.15	2.95	36.38	7.84	2.41	0.39	0.38	0.12	1.48	0.32	0.10	0.02	0.02
East Morgan Well#2 No. 498195 17N01W15Q001M	Colusa	Diesel	TBD	225	T0	1,300	1%	39	102	5	424	5,358	1.1	14.1	3.0	0.93	0.15	0.15	2.95	36.38	7.84	2.41	0.39	0.38	0.12	1.48	0.32	0.10	0.02	0.02
Gardener No. 374672	Colusa	Diesel	2008	215	T3	3,500	4%	104	274	5	424	5,120	0.1	2.8	2.6	0.93	0.15	0.15	0.37	7.01	6.46	2.30	0.37	0.37	0.02	0.29	0.26	0.09	0.02	0.02
Gardener No. 498178	Colusa	Diesel	2009	215	T3	3,500	4%	104	274	5	424	5,120	0.1	2.8	2.6	0.93	0.15	0.15	0.37	7.01	6.46	2.30	0.37	0.37	0.02	0.29	0.26	0.09	0.02	0.02
Hall Well No. X	Glenn	Electric	TBD	125	n/a	4,500	5%	134	352	5	424	n/a																		
Hall Well No.369428	Glenn	Electric	2011	125	n/a	4,500	5%	134	352	5	424	n/a																		
Mohammad No.e0084085 17N01W02D001M	Colusa	Electric	TBD	125	n/a	4,500	5%	134	352	5	424	n/a																		
Myers Well #1 No.3457	Glenn	Electric	2006	40	n/a	2,200	2%	66	172	5	424	n/a																		
Myers Well #2 No. 340884	Glenn	Electric	1982	100	n/a	4,100	4%	122	320	5	424	n/a																		
Rancho Caleta No. 726883	Colusa	Diesel	2004	170	T2	4,500	5%	134	352	5	424	4,048	0.2	4.7	3.7	0.93	0.22	0.22	0.48	9.15	7.29	1.82	0.44	0.44	0.02	0.37	0.30	0.07	0.02	0.02

Table 44. Reclamation District 1004 Criteria Pollutant Emissions

Well	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)	Fuel Consumption (gal/yr)	Emission Factors (g/bhp-hr) VOC	NOx	CO	SOx	PM10	PM2.5	Daily Emissions (pounds per day) VOC	NOx	CO	SOx	PM10	PM2.5	Annual Emissions (tons per year) VOC	NOx	CO	SOx	PM10	PM2.5
Sikes & Parachini Well #1 WS No.93124	Colusa	Diesel	2006	173	T2	4,000	4%	119	313	5	424	4,120	0.2	4.7	3.7	0.93	0.22	0.22	0.49	9.31	7.42	1.85	0.45	0.45	0.02	0.38	0.30	0.08	0.02	0.02
Sikes & Parachini Well #2 WS No. 374682	Colusa	Diesel	2008	150	T3	4,000	4%	119	313	5	424	3,572	0.1	2.8	3.7	0.93	0.22	0.22	0.26	4.89	6.44	1.60	0.39	0.39	0.01	0.20	0.26	0.07	0.02	0.02
Southam Sartain Well 18N01W26D001M	Glenn	Diesel	TBD	225	T0	4,800	5%	143	375	5	424	5,358	1.1	14.1	3.0	0.93	0.15	0.15	2.95	36.38	7.84	2.41	0.39	0.38	0.12	1.48	0.32	0.10	0.02	0.02
Stone Well #6 No.11334	Colusa	Electric	2006	40	n/a	1,800	2%	54	141	5	424	n/a																		
Wilder Farms Well	Glenn	Electric	unknown	125	n/a	2,500	3%	74	195	5	424	n/a																		
Dan Charter Well#1	Colusa	Diesel	unknown	225	T0	2,500	3%	74	195	5	424	5,358	1.1	14.1	3.0	0.93	0.15	0.15	2.95	36.38	7.84	2.41	0.39	0.38	0.12	1.48	0.32	0.10	0.02	0.02
Dan Charter Well#2	Colusa	Diesel	unknown	225	T0	2,500	3%	74	195	5	424	5,358	1.1	14.1	3.0	0.93	0.15	0.15	2.95	36.38	7.84	2.41	0.39	0.38	0.12	1.48	0.32	0.10	0.02	0.02
GVL Well#1	Colusa	Diesel	unknown	225	T0	2,500	3%	74	195	5	424	5,358	1.1	14.1	3.0	0.93	0.15	0.15	2.95	36.38	7.84	2.41	0.39	0.38	0.12	1.48	0.32	0.10	0.02	0.02
Behring Ranch Well	Colusa	Electric	unknown	125	n/a	4,000	4%	119	313	5	424	n/a																		
Claudia Charter	Colusa	Diesel	unknown	225	T0	2,500	3%	74	195	5	424	5,358	1.1	14.1	3.0	0.93	0.15	0.15	2.95	36.38	7.84	2.41	0.39	0.38	0.12	1.48	0.32	0.10	0.02	0.02
GVL Well#2	Colusa	Diesel	unknown	225	T0	2,500	3%	74	195	5	424	5,358	1.1	14.1	3.0	0.93	0.15	0.15	2.95	36.38	7.84	2.41	0.39	0.38	0.12	1.48	0.32	0.10	0.02	0.02
Total						**91,800**	**100%**	**2,733**	**7,175**	**146**	**11,885**	**91,633**							**37.76**	**481.31**	**134.91**	**41.15**	**7.05**	**6.94**	**1.54**	**19.58**	**5.49**	**1.67**	**0.29**	**0.28**
Total (Glenn County)						**22,600**	**25%**	**673**	**1,766**	**31**	**2,547**	**5,358**							**2.95**	**36.38**	**7.84**	**2.41**	**0.39**	**0.38**	**0.12**	**1.48**	**0.32**	**0.10**	**0.02**	**0.02**
Total (Colusa County)						**69,200**	**75%**	**2,060**	**5,409**	**115**	**9,338**	**86,275**							**34.81**	**444.92**	**127.07**	**38.74**	**6.66**	**6.56**	**1.42**	**18.10**	**5.17**	**1.58**	**0.27**	**0.27**
Total (Sutter County)						**0**	**0%**	**0**	**0**	**0**	**0**	**0**							**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Federal Attainment Status

	Glenn	Colusa	Sutter
PM10	A	A	A
PM2.5	A	A	N
O3	A	A	N

Engines subject to ATCM.

Peak Month
2,733 AF/month
19,952 gallons/minute
22% peak pump rate

Legend
Engine power rating not provided; assumed to be equal to maximum horsepower for all engines operating at the water agency with the same fuel type
Emission factors based on NMHC+NOx standard

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	River Garden Farms		Peak Pumping by Transfer Period	
Transfer Volume	4,000	acre-feet (Apr-Jun)	2,378	AF/month
	5,000	acre-feet (Jul-Sep)	1,905	AF/month
	9,000	acre-feet/year		

Table 45. River Garden Farms Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Yolo	0	8	0	0	8
Total	0	8	0	0	8

Table 46. River Garden Farms Criteria Pollutant Emissions

Well	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)
Field 65 PW	Yolo	Electric	2008	125	n/a	2,500	12%	292	1,103	20	2,397
Field 71 PW	Yolo	Electric	2001	125	n/a	1,700	8%	198	750	20	2,397
Field 98 PW	Yolo	Electric	1963	125	n/a	2,900	14%	338	1,280	20	2,397
Field 104 PW	Yolo	Electric	2008	125	n/a	2,500	12%	292	1,103	20	2,397
Field 104-09 PW	Yolo	Electric	2009	125	n/a	2,990	15%	349	1,319	20	2,397
Field 91-09 PW	Yolo	Electric	2009	125	n/a	2,840	14%	331	1,253	20	2,397
Field 117 PW	Yolo	Electric	2009	125	n/a	1,965	10%	229	867	20	2,397
Shop PW	Yolo	Electric	2009	125	n/a	3,000	15%	350	1,324	20	2,397
					Total	**20,395**	**100%**	**2,378**	**9,000**	**163**	**19,172**
					Total (Yolo County)	**20,395**	**100%**	**2,378**	**9,000**	**163**	**19,172**

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

Key:

AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Federal Attainment Status

	Yolo
PM10	A
PM2.5	N
O3	N

Engines subject to ATCM.

Peak Month

2,378	AF/month
17,361	gallons/minute
85%	peak pump rate

Legend

	Information on engine not available; engine assumed to be electric based on other engines used by water agency.
	Engine power rating not provided; assumed to be equal to average horsepower for all engines operating in the study area for fuel type

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

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Sycamore Mutual Water Company			Peak Pumping by Transfer Period
Transfer Volume	5,000	acre-feet	(Apr-Jun)	2,973 AF/month
	6,300	acre-feet	(Jul-Sep)	2,400 AF/month
	11,300	acre-feet/year		

Table 47. Sycamore Mutual Water Company Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Colusa	0	5	0	0	5
Total	0	5	0	0	5

Table 48. Sycamore Mutual Water Company Criteria Pollutant Emissions

Well	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)
Well #15	Colusa	electric	n/a	125	n/a	3,270	15%	440	1,672	24	2,776
Well #14	Colusa	electric	n/a	125	n/a	3,270	15%	440	1,672	24	2,776
Well #11	Colusa	electric	n/a	125	n/a	6,409	29%	862	3,276	24	2,776
Well #2b	Colusa	electric	n/a	125	n/a	4,578	21%	616	2,340	24	2,776
Well #2a	Colusa	electric	n/a	125	n/a	4,578	21%	616	2,340	24	2,776
					Total	**22,104**	**100%**	**2,973**	**11,300**	**118**	**13,882**
					Total (Colusa County)	**22,104**	**100%**	**2,973**	**11,300**	**118**	**13,882**

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

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Federal Attainment Status

	Colusa
PM10	A
PM2.5	A
O3	A

Engines not subject to ATCM if remotely-located.

Peak Month
2,973 AF/month
21,701 gallons/minute
98% peak pump rate

Legend
Engine power rating not provided; assumed to be equal to average horsepower for all engines operating in the study area for fuel type

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

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	T&P Farms			Peak Pumping by Transfer Period	
Transfer Volume	650	acre-feet	(Apr-Jun)	386	AF/month
	550	acre-feet	(Jul-Sep)	210	AF/month
	1,200	acre-feet/year			

Table 49. T&P Farms Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Colusa	0	2	0	0	2
Total	0	2	0	0	2

Table 50. T&P Farms Criteria Pollutant Emissions

Well	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)
NW-3	Colusa	E	unknown	125	n/a	3,500	47%	180	560	9	869
NW-4	Colusa	E	unknown	125	n/a	4,000	53%	206	640	9	869
					Total	**7,500**	**100%**	**386**	**1,200**	**18**	**1,738**
					Total (Colusa County)	**7,500**	**100%**	**386**	**1,200**	**18**	**1,738**

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

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Federal Attainment Status

	Colusa
PM10	A
PM2.5	A
O3	A

Engines not subject to ATCM if remotely-located.

Peak Month

386	AF/month
2,821	gallons/minute
38%	peak pump rate

Legend

Engine power rating not provided; assumed to be equal to average horsepower for all engines operating in the study area for fuel type

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

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Te Velde Revocable Family Trust			Peak Pumping by Transfer Period
Transfer Volume	2,700	acre-feet	(Apr-Jun)	1,605 AF/month
	4,394	acre-feet	(Jul-Sep)	1,674 AF/month
	7,094	acre-feet/year		

Table 51. Te Velde Revocable Family Trust Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Yolo	0	5	0	0	5
Total	0	5	0	0	5

Table 52. Te Velde Revocable Family Trust Criteria Pollutant Emissions

Well	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)
GW1	Yolo	Electric	N/A	127	n/a	4,656	29%	493	2,090	19	2,438
GW10	Yolo	Electric	N/A	143	n/a	2,833	18%	300	1,272	19	2,438
GW9	Yolo	Electric	N/A	104	n/a	2,400	15%	254	1,077	19	2,438
GW3	Yolo	Electric	N/A	52	n/a	3,715	24%	393	1,668	19	2,438
GW4	Yolo	Electric	N/A	125	n/a	2,200	14%	233	988	19	2,438
					Total	**15,804**	**100%**	**1,674**	**7,094**	**93**	**12,189**
					Total (Yolo County)	**15,804**	**100%**	**1,674**	**7,094**	**93**	**12,189**

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

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Federal Attainment Status

	Yolo
PM10	A
PM2.5	N
O3	N

Engines subject to ATCM.

Peak Month

1,674	AF/month
12,219	gallons/minute
77%	peak pump rate

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

Table 53. General Conformity Applicability Evaluation (Mitigated Emissions)

County/ Nonattainment Area	Emissions (tons per year)					
	VOC	NOx	CO	SOx	PM10	PM2.5
	Sacramento Metro[1]	Sacramento Metro[1]	Sacramento Area[2]	Sacramento[3,4]	Sacramento Co.	Sacramento[4]
Colusa	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
Sacramento	0.1	0.3	2.8	1.0	0.0	0.0
Shasta	n/a	n/a	n/a	n/a	n/a	n/a
Sutter[5]	0.6	1.8	n/a	2.0	n/a	0.1
Tehama	n/a	n/a	n/a	n/a	n/a	n/a
Yolo	0.1	1.7	1.0	0.3	n/a	0.1
Total	0.8	3.8	3.7	3.3	0.0	0.2
Classification	Severe-15	Severe-15	Maintenance	PM2.5 Precursor	Maintenance	Nonattainment
De Minimis Threshold (tpy)	25	25	100	100	100	100
Exceed?	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]VOC and NOx emissions are excluded from Cranmore Farms, 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 54. Emissions Outside of 8-Hour Ozone Nonattainment Area (tons per year)

Water Agency	County	VOC	NOx
Cranmore Farms	Sutter	All Electric	All Electric
Pelger Mutual Water Company	Sutter	0.0	0.7
Reclamation District 1004	Sutter	No Engines	No Engines
Total		**0.0**	**0.7**

Summary of Daily Groundwater Substitution Emissions by County (Mitigated)

Table 55. Daily VOC Emissions (Mitigated)

Water Agency	Daily VOC Emissions (pounds per day)							
	Colusa	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Tehama**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				All Electric		No Engines		0.00
Burroughs Farms					All Electric			0.00
Canal Farms	2.75							2.75
Conaway Preservation Group							4.24	4.24
Cranmore Farms					All Electric			0.00
Eastside Mutual Water Company	1.67							1.67
Glenn-Colusa Irrigation District	64.51	86.02						150.53
Maxwell Irrigation District	All Electric							0.00
Natomas Central Mutual Water Company			1.61		All Electric			1.61
Pelger Mutual Water Company					0.99			0.99
Pleasant Grove-Verona Mutual Water Company					8.71			8.71
Princeton-Codora-Glenn Irrigation District	No Engines	30.77						30.77
Provident Irrigation District	No Engines	11.64						11.64
Reclamation District 108	All Electric						All Electric	0.00
Reclamation District 1004	34.81	2.95			No Engines			37.76
River Garden Farms							All Electric	0.00
Sutter Mutual Water Company	No Groundwater Substitution							0.00
Sycamore Mutual Water Company	All Electric							0.00
T&P Farms	All Electric							0.00
Te Velde Revocable Family Trust							All Electric	0.00
Total	**103.74**	**131.38**	**1.61**	**0.00**	**9.69**	**0.00**	**4.24**	**250.66**

Key:
VOC = volatile organic compounds

Table 56. Daily NOx Emissions (Mitigated)

Water Agency	Daily NOx Emissions (pounds per day)							
	Colusa	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Tehama**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				All Electric		No Engines		0.00
Burroughs Farms					All Electric			0.00
Canal Farms	5.50							5.50
Conaway Preservation Group							80.49	80.49
Cranmore Farms					All Electric			0.00
Eastside Mutual Water Company	31.65							31.65
Glenn-Colusa Irrigation District	795.46	1,060.61						1,856.07
Maxwell Irrigation District	All Electric							0.00
Natomas Central Mutual Water Company			3.39		All Electric			3.39
Pelger Mutual Water Company					18.76			18.76
Pleasant Grove-Verona Mutual Water Company					25.00			25.00
Princeton-Codora-Glenn Irrigation District	No Engines	314.71						314.71
Provident Irrigation District	No Engines	135.66						135.66
Reclamation District 108	All Electric						All Electric	0.00
Reclamation District 1004	444.92	36.38			No Engines			481.31
River Garden Farms							All Electric	0.00
Sutter Mutual Water Company	No Groundwater Substitution							0.00
Sycamore Mutual Water Company	All Electric							0.00
T&P Farms	All Electric							0.00
Te Velde Revocable Family Trust							All Electric	0.00
Total	**1,277.54**	**1,547.36**	**3.39**	**0.00**	**43.76**	**0.00**	**80.49**	**2,952.53**

Key:
NOx = nitrogen oxides

Summary of Daily Groundwater Substitution Emissions by County (Mitigated)

Table 57. Daily CO Emissions (Mitigated)

Water Agency	Daily CO Emissions (pounds per day)							
	Colusa	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Tehama**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				All Electric		No Engines		0.00
Burroughs Farms					All Electric			0.00
Canal Farms	11.00							11.00
Conaway Preservation Group							44.93	44.93
Cranmore Farms					All Electric			0.00
Eastside Mutual Water Company	29.15							29.15
Glenn-Colusa Irrigation District	171.41	228.54						399.95
Maxwell Irrigation District	All Electric							0.00
Natomas Central Mutual Water Company			29.67		All Electric			29.67
Pelger Mutual Water Company					24.68			24.68
Pleasant Grove-Verona Mutual Water Company					191.15			191.15
Princeton-Codora-Glenn Irrigation District	No Engines	171.88						171.88
Provident Irrigation District	No Engines	45.62						45.62
Reclamation District 108	All Electric						All Electric	0.00
Reclamation District 1004	127.07	7.84			No Engines			134.91
River Garden Farms							All Electric	0.00
Sutter Mutual Water Company	No Groundwater Substitution							0.00
Sycamore Mutual Water Company	All Electric							0.00
T&P Farms	All Electric							0.00
Te Velde Revocable Family Trust							All Electric	0.00
Total	**338.63**	**453.89**	**29.67**	**0.00**	**215.83**	**0.00**	**44.93**	**1,082.94**

Key:
CO = carbon monoxide

Table 58. Daily SOx Emissions (Mitigated)

Water Agency	Daily SOx Emissions (pounds per day)							
	Colusa	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Tehama**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				All Electric		No Engines		0.00
Burroughs Farms					All Electric			0.00
Canal Farms	0.00							0.00
Conaway Preservation Group							16.00	16.00
Cranmore Farms					All Electric			0.00
Eastside Mutual Water Company	10.38							10.38
Glenn-Colusa Irrigation District	52.60	70.14						122.74
Maxwell Irrigation District	All Electric							0.00
Natomas Central Mutual Water Company			10.56		All Electric			10.56
Pelger Mutual Water Company					6.15			6.15
Pleasant Grove-Verona Mutual Water Company					53.59			53.59
Princeton-Codora-Glenn Irrigation District	No Engines	33.73						33.73
Provident Irrigation District	No Engines	13.91						13.91
Reclamation District 108	All Electric						All Electric	0.00
Reclamation District 1004	38.74	2.41			No Engines			41.15
River Garden Farms							All Electric	0.00
Sutter Mutual Water Company	No Groundwater Substitution							0.00
Sycamore Mutual Water Company	All Electric							0.00
T&P Farms	All Electric							0.00
Te Velde Revocable Family Trust							All Electric	0.00
Total	**101.73**	**120.18**	**10.56**	**0.00**	**59.74**	**0.00**	**16.00**	**308.20**

Key:
SOx = sulfur oxides

Summary of Daily Groundwater Substitution Emissions by County (Mitigated)

Table 59. Daily PM10 Emissions (Mitigated)

Water Agency	Daily PM10 Emissions (pounds per day)							
	Colusa	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Tehama**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				All Electric		No Engines		0.00
Burroughs Farms					All Electric			0.00
Canal Farms	0.03							0.03
Conaway Preservation Group							2.57	2.57
Cranmore Farms					All Electric			0.00
Eastside Mutual Water Company	1.67							1.67
Glenn-Colusa Irrigation District	12.45	16.59						29.04
Maxwell Irrigation District	All Electric							0.00
Natomas Central Mutual Water Company			0.17		All Electric			0.17
Pelger Mutual Water Company					1.48			1.48
Pleasant Grove-Verona Mutual Water Company					1.34			1.34
Princeton-Codora-Glenn Irrigation District	No Engines	7.37						7.37
Provident Irrigation District	No Engines	1.51						1.51
Reclamation District 108	All Electric						All Electric	0.00
Reclamation District 1004	6.66	0.39			No Engines			7.05
River Garden Farms							All Electric	0.00
Sutter Mutual Water Company	No Groundwater Substitution							0.00
Sycamore Mutual Water Company	All Electric							0.00
T&P Farms	All Electric							0.00
Te Velde Revocable Family Trust							All Electric	0.00
Total	**20.81**	**25.86**	**0.17**	**0.00**	**2.82**	**0.00**	**2.57**	**52.22**

Key:
PM10 = inhalable particulate matter

Table 60. Daily PM2.5 Emissions (Mitigated)

Water Agency	Daily PM2.5 Emissions (pounds per day)							
	Colusa	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Tehama**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				All Electric		No Engines		0.00
Burroughs Farms					All Electric			0.00
Canal Farms	0.03							0.03
Conaway Preservation Group							2.57	2.57
Cranmore Farms					All Electric			0.00
Eastside Mutual Water Company	1.67							1.67
Glenn-Colusa Irrigation District	12.15	16.20						28.34
Maxwell Irrigation District	All Electric							0.00
Natomas Central Mutual Water Company			0.17		All Electric			0.17
Pelger Mutual Water Company					1.48			1.48
Pleasant Grove-Verona Mutual Water Company					1.34			1.34
Princeton-Codora-Glenn Irrigation District	No Engines	7.29						7.29
Provident Irrigation District	No Engines	1.47						1.47
Reclamation District 108	All Electric						All Electric	0.00
Reclamation District 1004	6.56	0.38			No Engines			6.94
River Garden Farms							All Electric	0.00
Sutter Mutual Water Company	No Groundwater Substitution							0.00
Sycamore Mutual Water Company	All Electric							0.00
T&P Farms	All Electric							0.00
Te Velde Revocable Family Trust							All Electric	0.00
Total	**20.41**	**25.34**	**0.17**	**0.00**	**2.82**	**0.00**	**2.57**	**51.29**

Key:
PM2.5 = fine particulate matter

Summary of Annual Groundwater Substitution Emissions by County (Mitigated)

Table 61. Annual VOC Emissions (Mitigated)

Water Agency	Annual VOC Emissions (tons per year)							
	Colusa	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Tehama**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				All Electric		No Engines		0.00
Burroughs Farms					All Electric			0.00
Canal Farms	0.12							0.12
Conaway Preservation Group							0.09	0.09
Cranmore Farms					All Electric			0.00
Eastside Mutual Water Company	0.09							0.09
Glenn-Colusa Irrigation District	6.00	8.00						14.00
Maxwell Irrigation District	All Electric							0.00
Natomas Central Mutual Water Company			0.15		All Electric			0.15
Pelger Mutual Water Company					0.03			0.03
Pleasant Grove-Verona Mutual Water Company					0.57			0.57
Princeton-Codora-Glenn Irrigation District	No Engines	2.01						2.01
Provident Irrigation District	No Engines	1.08						1.08
Reclamation District 108	All Electric						All Electric	0.00
Reclamation District 1004	1.42	0.12			No Engines			1.54
River Garden Farms							All Electric	0.00
Sutter Mutual Water Company	No Groundwater Substitution							0.00
Sycamore Mutual Water Company	All Electric							0.00
T&P Farms	All Electric							0.00
Te Velde Revocable Family Trust							All Electric	0.00
Total	**7.63**	**11.21**	**0.15**	**0.00**	**0.61**	**0.00**	**0.09**	**19.69**

Key:
VOC = volatile organic compounds

Table 62. Annual NOx Emissions (Mitigated)

Water Agency	Annual NOx Emissions (tons per year)							
	Colusa	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Tehama**	**Yolo**	**Total**
Anderson-Cottonwood Irrigation District				All Electric		No Engines		0.00
Burroughs Farms					All Electric			0.00
Canal Farms	0.25							0.25
Conaway Preservation Group							1.74	1.74
Cranmore Farms					All Electric			0.00
Eastside Mutual Water Company	1.72							1.72
Glenn-Colusa Irrigation District	73.98	98.64						172.61
Maxwell Irrigation District	All Electric							0.00
Natomas Central Mutual Water Company			0.32		All Electric			0.32
Pelger Mutual Water Company					0.66			0.66
Pleasant Grove-Verona Mutual Water Company					1.75			1.75
Princeton-Codora-Glenn Irrigation District	No Engines	20.51						20.51
Provident Irrigation District	No Engines	12.62						12.62
Reclamation District 108	All Electric						All Electric	0.00
Reclamation District 1004	18.10	1.48			No Engines			19.58
River Garden Farms							All Electric	0.00
Sutter Mutual Water Company	No Groundwater Substitution							0.00
Sycamore Mutual Water Company	All Electric							0.00
T&P Farms	All Electric							0.00
Te Velde Revocable Family Trust							All Electric	0.00
Total	**94.05**	**133.24**	**0.32**	**0.00**	**2.41**	**0.00**	**1.74**	**231.76**

Key:
NOx = nitrogen oxides

Summary of Annual Groundwater Substitution Emissions by County (Mitigated)

Table 63. Annual CO Emissions (Mitigated)

Water Agency	Annual CO Emissions (tons per year)							
	Colusa	Glenn	Sacramento	Shasta	Sutter	Tehama	Yolo	Total
Anderson-Cottonwood Irrigation District				All Electric		No Engines		0.00
Burroughs Farms					All Electric			0.00
Canal Farms	0.50							0.50
Conaway Preservation Group							0.97	0.97
Cranmore Farms					All Electric			0.00
Eastside Mutual Water Company	1.59							1.59
Glenn-Colusa Irrigation District	15.94	21.25						37.20
Maxwell Irrigation District	All Electric							0.00
Natomas Central Mutual Water Company			2.76		All Electric			2.76
Pelger Mutual Water Company					0.87			0.87
Pleasant Grove-Verona Mutual Water Company					7.32			7.32
Princeton-Codora-Glenn Irrigation District	No Engines	11.20						11.20
Provident Irrigation District	No Engines	4.24						4.24
Reclamation District 108	All Electric						All Electric	0.00
Reclamation District 1004	5.17	0.32			No Engines			5.49
River Garden Farms							All Electric	0.00
Sutter Mutual Water Company	No Groundwater Substitution							0.00
Sycamore Mutual Water Company	All Electric							0.00
T&P Farms	All Electric							0.00
Te Velde Revocable Family Trust							All Electric	0.00
Total	**23.20**	**37.02**	**2.76**	**0.00**	**8.19**	**0.00**	**0.97**	**72.14**

Key:
CO = carbon monoxide

Table 64. Annual SOx Emissions (Mitigated)

Water Agency	Annual SOx Emissions (tons per year)							
	Colusa	Glenn	Sacramento	Shasta	Sutter	Tehama	Yolo	Total
Anderson-Cottonwood Irrigation District				All Electric		No Engines		0.00
Burroughs Farms					All Electric			0.00
Canal Farms	0.00							0.00
Conaway Preservation Group							0.35	0.35
Cranmore Farms					All Electric			0.00
Eastside Mutual Water Company	0.57							0.57
Glenn-Colusa Irrigation District	4.89	6.52						11.41
Maxwell Irrigation District	All Electric							0.00
Natomas Central Mutual Water Company			0.98		All Electric			0.98
Pelger Mutual Water Company					0.22			0.22
Pleasant Grove-Verona Mutual Water Company					1.73			1.73
Princeton-Codora-Glenn Irrigation District	No Engines	2.20						2.20
Provident Irrigation District	No Engines	1.29						1.29
Reclamation District 108	All Electric						All Electric	0.00
Reclamation District 1004	1.58	0.10			No Engines			1.67
River Garden Farms							All Electric	0.00
Sutter Mutual Water Company	No Groundwater Substitution							0.00
Sycamore Mutual Water Company	All Electric							0.00
T&P Farms	All Electric							0.00
Te Velde Revocable Family Trust							All Electric	0.00
Total	**7.03**	**10.11**	**0.98**	**0.00**	**1.95**	**0.00**	**0.35**	**20.43**

Key:
SOx = sulfur oxides

Summary of Annual Groundwater Substitution Emissions by County (Mitigated)

Table 65. Annual PM10 Emissions (Mitigated)

Water Agency	Annual PM10 Emissions (tons per year)							
	Colusa	Glenn	Sacramento	Shasta	Sutter	Tehama	Yolo	Total
Anderson-Cottonwood Irrigation District				All Electric		No Engines		0.00
Burroughs Farms					All Electric			0.00
Canal Farms	0.00							0.00
Conaway Preservation Group							0.06	0.06
Cranmore Farms					All Electric			0.00
Eastside Mutual Water Company	0.09							0.09
Glenn-Colusa Irrigation District	1.16	1.54						2.70
Maxwell Irrigation District	All Electric							0.00
Natomas Central Mutual Water Company			0.02		All Electric			0.02
Pelger Mutual Water Company					0.05			0.05
Pleasant Grove-Verona Mutual Water Company					0.07			0.07
Princeton-Codora-Glenn Irrigation District	No Engines	0.48						0.48
Provident Irrigation District	No Engines	0.14						0.14
Reclamation District 108	All Electric						All Electric	0.00
Reclamation District 1004	0.27	0.02			No Engines			0.29
River Garden Farms							All Electric	0.00
Sutter Mutual Water Company	No Groundwater Substitution							0.00
Sycamore Mutual Water Company	All Electric							0.00
T&P Farms	All Electric							0.00
Te Velde Revocable Family Trust							All Electric	0.00
Total	**1.52**	**2.18**	**0.02**	**0.00**	**0.12**	**0.00**	**0.06**	**3.90**

Key:
PM10 = inhalable particulate matter

Table 66. Annual PM2.5 Emissions (Mitigated)

Water Agency	Annual PM2.5 Emissions (tons per year)							
	Colusa	Glenn	Sacramento	Shasta	Sutter	Tehama	Yolo	Total
Anderson-Cottonwood Irrigation District				All Electric		No Engines		0.00
Burroughs Farms					All Electric			0.00
Canal Farms	0.00							0.00
Conaway Preservation Group							0.06	0.06
Cranmore Farms					All Electric			0.00
Eastside Mutual Water Company	0.09							0.09
Glenn-Colusa Irrigation District	1.13	1.51						2.64
Maxwell Irrigation District	All Electric							0.00
Natomas Central Mutual Water Company			0.02		All Electric			0.02
Pelger Mutual Water Company					0.05			0.05
Pleasant Grove-Verona Mutual Water Company					0.07			0.07
Princeton-Codora-Glenn Irrigation District	No Engines	0.47						0.47
Provident Irrigation District	No Engines	0.14						0.14
Reclamation District 108	All Electric						All Electric	0.00
Reclamation District 1004	0.27	0.02			No Engines			0.28
River Garden Farms							All Electric	0.00
Sutter Mutual Water Company	No Groundwater Substitution							0.00
Sycamore Mutual Water Company	All Electric							0.00
T&P Farms	All Electric							0.00
Te Velde Revocable Family Trust							All Electric	0.00
Total	**1.49**	**2.13**	**0.02**	**0.00**	**0.12**	**0.00**	**0.06**	**3.82**

Key:
PM2.5 = fine particulate matter

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Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Pleasant Grove-Verona Mutual Water Company		Peak Pumping by Transfer Period	
Transfer Volume	8,000	acre-feet (Apr-Jun)	4,757	AF/month
	7,000	acre-feet (Jul-Sep)	2,667	AF/month
	15,000	acre-feet/year		

Table 67. Pleasant Grove-Verona Mutual Water Company Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Sutter	13	20	0	2	35
Total	13	20	0	2	35

Table 68. Pleasant Grove-Verona Mutual Water Company Criteria Pollutant Emissions

Well	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)	Fuel Consumption (gal/yr) - diesel (MMBtu/yr) - propane	Emission Factors (g/bhp-hr) - diesel and VOC, NOx, and CO for propane (lb/MMBtu) - SOx, PM10, and PM2.5 for propane						Daily Emissions (pounds per day)						Annual Emissions (tons per year)					
													VOC	NOx	CO	SOx	PM10	PM2.5	VOC	NOx	CO	SOx	PM10	PM2.5	VOC	NOx	CO	SOx	PM10	PM2.5
Kelly 190 Field Well #2	Sutter	Electric	unknown	30	n/a	2,000	2%	111	350	19	951	n/a																		
Kelly Windmill Field Well #2	Sutter	Electric	2002	62.1	n/a	2,000	2%	111	350	19	951	n/a																		
Kelly Windmill North Field Well	Sutter	Propane	2014	133	n/a	1,750	2%	97	306	2	951	321	1.0	2.0	4.0	5.88E-04	9.99E-03	9.99E-03	0.46	0.92	1.84	0.00	0.01	0.01	0.14	0.28	0.56	0.00	0.00	0.00
Kelly306	Sutter	Electric	unknown	60	n/a	2,600	3%	144	455	19	951	n/a																		
MLF Clubhouse B Well	Sutter	Electric	unknown	300	n/a	3,700	4%	205	648	19	951	n/a																		
MLF Marsh Well	Sutter	Electric	unknown	300	n/a	3,700	4%	205	648	19	951	n/a																		
MLF Monster Well	Sutter	Electric	unknown	60	n/a	3,100	4%	172	543	19	951	n/a																		
MLF Well #1	Sutter	Electric	unknown	30	n/a	2,000	2%	111	350	19	951	n/a																		
MLF Well #16	Sutter	Electric	unknown	50	n/a	1,700	2%	94	298	19	951	n/a																		
MLF Well#11	Sutter	Diesel	2011	250	T4I	4,200	5%	233	735	14	951	13,332	0.14	0.30	2.61	0.93	0.01	0.01	1.12	2.36	20.68	7.36	0.12	0.12	0.04	0.08	0.68	0.24	0.00	0.00
MLF Well#12/17	Sutter	Electric	unknown	50	n/a	1,500	2%	83	263	19	951	n/a																		
MLF Well#13&#15	Sutter	Electric	2000	215	n/a	4,800	6%	266	840	19	951	n/a																		
MLF Well#2B	Sutter	Electric	2000	300	n/a	3,700	4%	205	648	19	951	n/a																		
Nicholas 72-Acre Field North	Sutter	Electric	unknown	40	n/a	2,000	2%	111	350	19	951	n/a																		
Nicholas 72-Acree Field South	Sutter	Diesel	2008	62.1	T4I	2,000	2%	111	350	6	951	3,312	0.18	3.33	3.73	0.93	0.22	0.22	0.13	2.52	2.82	0.70	0.17	0.17	0.01	0.22	0.24	0.06	0.01	0.01
Nicholas BBC Well	Sutter	Electric	unknown	30	n/a	2,000	2%	111	350	19	951	n/a																		
Nicholas Filipino Camp South	Sutter	Diesel	2008	62.1	T4I	2,000	2%	111	350	6	951	3,312	0.18	3.33	3.73	0.93	0.22	0.22	0.13	2.52	2.82	0.70	0.17	0.17	0.01	0.22	0.24	0.06	0.01	0.01
Nicholas Filipino Camp#2	Sutter	Electric	unknown	40	n/a	2,000	2%	111	350	19	951	n/a																		
Nicholas Johnston Field Well #2	Sutter	Electric	unknown	40	n/a	2,000	2%	111	350	19	951	n/a																		
Nicholas Sand Field Well	Sutter	Diesel	2008	62.1	T4I	2,000	2%	111	350	6	951	3,312	0.18	3.33	3.73	0.93	0.22	0.22	0.13	2.52	2.82	0.70	0.17	0.17	0.01	0.22	0.24	0.06	0.01	0.01
RiverRanch#19	Sutter	Diesel	2012	99	T4I	2,000	2%	111	350	17	951	5,279	0.14	0.30	3.73	0.93	0.01	0.01	0.54	1.13	14.15	3.53	0.06	0.06	0.01	0.03	0.39	0.10	0.00	0.00
S&O#16	Sutter	Electric	2014	159	n/a	3,000	4%	167	525	19	951	n/a																		
S&O#17	Sutter	Diesel	2012	101	T4I	2,250	3%	125	394	17	951	5,386	0.14	0.30	3.73	0.93	0.01	0.01	0.55	1.15	14.41	3.59	0.06	0.06	0.02	0.03	0.39	0.10	0.00	0.00
S&O#18A	Sutter	Diesel	2012	101	T4I	1,800	2%	100	315	17	951	5,386	0.14	0.30	3.73	0.93	0.01	0.01	0.55	1.15	14.41	3.59	0.06	0.06	0.02	0.03	0.39	0.10	0.00	0.00
S&O#19	Sutter	Diesel	2011	215	T4I	2,150	3%	119	376	15	951	11,465	0.14	0.30	2.61	0.93	0.01	0.01	1.01	2.13	18.65	6.64	0.11	0.11	0.03	0.07	0.59	0.21	0.00	0.00
S&O#20	Sutter	Propane	2014	154	n/a	2,250	3%	125	394	0	951	372	1.0	2.0	4.0	5.88E-04	9.99E-03	9.99E-03	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.32	0.65	0.00	0.00	0.00
Willey#1	Sutter	Diesel	2012	168	T4I	3,000	4%	167	525	16	951	8,959	0.14	0.30	3.73	0.93	0.01	0.01	0.84	1.77	22.12	5.51	0.09	0.09	0.02	0.05	0.66	0.16	0.00	0.00
Willey#2	Sutter	Diesel	2011	250	T4I	3,000	4%	167	525	14	951	13,332	0.14	0.30	2.61	0.93	0.01	0.01	1.12	2.36	20.68	7.36	0.12	0.12	0.04	0.08	0.68	0.24	0.00	0.00
Willey#3	Sutter	Electric	unknown	75	n/a	2,000	2%	111	350	19	951	n/a																		
Willey#4	Sutter	Diesel	2012	150	T4I	2,000	2%	111	350	16	951	7,999	0.14	0.30	3.73	0.93	0.01	0.01	0.77	1.62	20.19	5.03	0.08	0.08	0.02	0.05	0.59	0.15	0.00	0.00
Will-Lee Well#30	Sutter	Diesel	2012	100	T4I	2,500	3%	139	438	17	951	5,333	0.14	0.30	3.73	0.93	0.01	0.01	0.54	1.14	14.28	3.56	0.06	0.06	0.01	0.03	0.39	0.10	0.00	0.00
Will-Lee Well#31	Sutter	Electric	unknown	50	n/a	2,500	3%	139	438	19	951	n/a																		
Will-Lee Well#32	Sutter	Electric	unknown	300	n/a	2,500	3%	139	438	19	951	n/a																		
Will-Lee Well#33	Sutter	Electric	unknown	75	n/a	2,500	3%	139	438	19	951	n/a																		
Will-Lee Well#4A	Sutter	Diesel	2012	160	T4I	1,500	2%	83	263	16	951	8,532	0.14	0.30	3.73	0.93	0.01	0.01	0.81	1.70	21.27	5.30	0.09	0.09	0.02	0.05	0.63	0.16	0.00	0.00
					Total	**85,700**	**100%**	**4,757**	**15,000**	**567**	**33,270**	**95,632**							**8.71**	**25.00**	**191.15**	**53.59**	**1.34**	**1.34**	**0.57**	**1.75**	**7.32**	**1.73**	**0.07**	**0.07**
					Total (Sutter County)	**85,700**	**100%**	**4,757**	**15,000**	**567**	**33,270**	**95,632**							**8.71**	**25.00**	**191.15**	**53.59**	**1.34**	**1.34**	**0.57**	**1.75**	**7.32**	**1.73**	**0.07**	**0.07**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Federal Attainment Status

	Sutter
PM10	A
PM2.5	N
O3	N

Engines subject to ATCM.

Peak Month

4,757	AF/month
34,722	gallons/minute
41%	peak pump rate

Legend

Emission factors from 40 CFR 60, Subpart JJJJ, Table 1 for Non-Emergency SI Lean Burn LPG engines, 100<=HP<500, manufactured after 7/1/2008

Mitigation requirement

Conversion Factors

1 bhp-hr =	2,542.5	Btu
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	

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

Table 69. 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 70. 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 71. 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 72. Tier 1, Tier 2, and Tier 3 Exhaust Emission Standards

			(g/kW-hr)					(g/hp-hr)				
Maximum Rated Power	**Tier**	**Model Year**	**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 73. 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 74. 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 75. Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines [a]

	Gasoline Fuel		Diesel Fuel		
	Emission Factor		Emission Factor		Emission
Pollutant	(lb/hp-hr) (power output)	(lb/MMBtu) (fuel input)	(lb/hp-hr) (power output)	(lb/MMBtu) (fuel input)	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 76. 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 $gr/10^o$scf.

[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 77. Engine Power Rating Summary by Fuel Type

Fuel Type	No. Engines	Avg. HP	Max HP	Min HP
Diesel	23	170	250	60
Electric	47	125	300	30
Natural Gas	0	n/a	0	0
Propane	3	180	250	135

Summary of Crop Idling Emissions by Air District

Table 78. 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**
Colusa County APCD												
Canal Farms	(0)	(5)	(6)	(2)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Eastside Mutual Water Company	(1)	(14)	(18)	(4)	(1)	(1)	(0)	(0)	(1)	(0)	(0)	(0)
Glenn-Colusa Irrigation District	(13)	(244)	(321)	(80)	(19)	(19)	(0)	(9)	(11)	(3)	(1)	(1)
Maxwell Irrigation District	(1)	(18)	(23)	(6)	(1)	(1)	(0)	(1)	(1)	(0)	(0)	(0)
Princeton-Codora-Glenn Irrigation District	(1)	(11)	(15)	(4)	(1)	(1)	(0)	(0)	(1)	(0)	(0)	(0)
Provident Irrigation District	(1)	(11)	(15)	(4)	(1)	(1)	(0)	(0)	(1)	(0)	(0)	(0)
Reclamation District 108	(4)	(74)	(97)	(24)	(6)	(6)	(0)	(3)	(3)	(1)	(0)	(0)
Reclamation District 1004	(2)	(31)	(41)	(10)	(2)	(2)	(0)	(1)	(1)	(0)	(0)	(0)
Sycamore Mutual Water Company	(4)	(74)	(97)	(24)	(6)	(6)	(0)	(3)	(3)	(1)	(0)	(0)
T&P Farms	(0)	(7)	(9)	(2)	(1)	(1)	(0)	(0)	(0)	(0)	(0)	(0)
Colusa County APCD Subtotal	(26)	(487)	(641)	(160)	(38)	(38)	(1)	(17)	(23)	(6)	(1)	(1)
Glenn County APCD												
Glenn-Colusa Irrigation District	(13)	(244)	(321)	(80)	(19)	(19)	(0)	(9)	(11)	(3)	(1)	(1)
Princeton-Codora-Glenn Irrigation District	(1)	(11)	(15)	(4)	(1)	(1)	(0)	(0)	(1)	(0)	(0)	(0)
Provident Irrigation District	(1)	(11)	(15)	(4)	(1)	(1)	(0)	(0)	(1)	(0)	(0)	(0)
Reclamation District 1004	(2)	(31)	(41)	(10)	(2)	(2)	(0)	(1)	(1)	(0)	(0)	(0)
Glenn County APCD Subtotal	(16)	(297)	(391)	(97)	(23)	(23)	(1)	(10)	(14)	(3)	(1)	(1)
Feather River AQMD												
Burroughs Farms	0	0	0	0	0	0	0	0	0	0	0	0
Cranmore Farms	0	0	0	0	0	0	0	0	0	0	0	0
Natomas Central Mutual Water Company	0	0	0	0	0	0	0	0	0	0	0	0
Pelger Mutual Water Company	(1)	(19)	(25)	(6)	(1)	(1)	(0)	(1)	(1)	(0)	(0)	(0)
Pleasant Grove-Verona Mutual Water Company	(4)	(67)	(88)	(22)	(5)	(5)	(0)	(2)	(3)	(1)	(0)	(0)
Reclamation District 1004	(2)	(31)	(41)	(10)	(2)	(2)	(0)	(1)	(1)	(0)	(0)	(0)
Sutter Mutual Water Company	(7)	(133)	(175)	(44)	(11)	(11)	(0)	(5)	(6)	(2)	(0)	(0)
Feather River AQMD Subtotal	(13)	(249)	(328)	(82)	(20)	(20)	(0)	(9)	(12)	(3)	(1)	(1)
Yolo-Solano AQMD												
Conaway Preservation Group	(8)	(158)	(208)	(52)	(12)	(12)	(0)	(6)	(7)	(2)	(0)	(0)
Reclamation District 108	(4)	(74)	(97)	(24)	(6)	(6)	(0)	(3)	(3)	(1)	(0)	(0)
River Garden Farms	(1)	(26)	(34)	(8)	(2)	(2)	(0)	(1)	(1)	(0)	(0)	(0)
Te Velde Revocable Family Trust	(3)	(52)	(68)	(17)	(4)	(4)	(0)	(2)	(2)	(1)	(0)	(0)
Yolo-Solano AQMD Subtotal	(16)	(309)	(407)	(101)	(24)	(24)	(1)	(11)	(14)	(4)	(1)	(1)
GRAND TOTAL	(71)	(1,343)	(1,767)	(440)	(106)	(106)	(2)	(47)	(62)	(16)	(4)	(4)

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

Table 79. 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**
Colusa County APCD								
Canal Farms	(11)	(1)	2	(9)	(2)	(0)	0	(1)
Eastside Mutual Water Company	(31)	(3)	7	(26)	(5)	(0)	1	(4)
Glenn-Colusa Irrigation District	(548)	(46)	132	(462)	(82)	(7)	26	(63)
Maxwell Irrigation District	(40)	(3)	9	(34)	(6)	(1)	2	(5)
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	(69)	(6)	12	(63)	(10)	(1)	2	(9)
Sycamore Mutual Water Company	(166)	(14)	39	(141)	(25)	(2)	8	(19)
T&P Farms	(15)	(1)	3	(13)	(2)	(0)	1	(2)
Colusa County APCD Subtotal	(1,095)	(92)	240	(947)	(164)	(14)	48	(130)
Glenn County APCD								
Glenn-Colusa Irrigation District	(548)	(46)	132	(462)	(82)	(7)	26	(63)
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	(69)	(6)	12	(63)	(10)	(1)	2	(9)
Glenn County APCD Subtotal	(667)	(56)	156	(567)	(100)	(8)	31	(77)
Feather River AQMD								
Burroughs Farms	0	0	0	0	0	0	0	0
Cranmore Farms	0	0	0	0	0	0	0	0
Natomas Central Mutual Water Company	0	0	0	0	0	0	0	0
Pelger Mutual Water Company	(42)	(4)	1	(45)	(6)	(1)	0	(7)
Pleasant Grove-Verona Mutual Water Company	(149)	(13)	3	(159)	(22)	(2)	1	(24)
Reclamation District 1004	(69)	(6)	12	(63)	(10)	(1)	2	(9)
Sutter Mutual Water Company	(299)	(25)	6	(318)	(45)	(4)	1	(47)
Feather River AQMD Subtotal	(518)	(43)	20	(541)	(78)	(7)	4	(80)
Yolo-Solano AQMD								
Conaway Preservation Group	(355)	(30)	11	(373)	(53)	(4)	2	(55)
Reclamation District 108	(166)	(14)	22	(158)	(25)	(2)	4	(23)
River Garden Farms	(58)	(5)	2	(61)	(9)	(1)	0	(9)
Te Velde Revocable Family Trust	(116)	(10)	4	(122)	(17)	(1)	1	(18)
Yolo-Solano AQMD Subtotal	(694)	(58)	38	(714)	(104)	(9)	8	(105)
GRAND TOTAL	(2,974)	(250)	454	(2,770)	(446)	(37)	91	(392)

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

Table 80. 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**
Colusa County APCD								
Canal Farms	(1)	(0)	0	(1)	(0)	(0)	0	(0)
Eastside Mutual Water Company	(3)	(0)	1	(2)	(0)	(0)	0	(0)
Glenn-Colusa Irrigation District	(49)	(4)	12	(42)	(7)	(1)	2	(6)
Maxwell Irrigation District	(4)	(0)	1	(3)	(1)	(0)	0	(0)
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	(6)	(1)	1	(6)	(1)	(0)	0	(1)
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	(99)	(8)	22	(85)	(15)	(1)	4	(12)
Glenn County APCD								
Glenn-Colusa Irrigation District	(49)	(4)	12	(42)	(7)	(1)	2	(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	(6)	(1)	1	(6)	(1)	(0)	0	(1)
Glenn County APCD Subtotal	(60)	(5)	14	(51)	(9)	(1)	3	(7)
Feather River AQMD								
Burroughs Farms	0	0	0	0	0	0	0	0
Cranmore Farms	0	0	0	0	0	0	0	0
Natomas Central Mutual Water Company	0	0	0	0	0	0	0	0
Pelger Mutual Water Company	(4)	(0)	0	(4)	(1)	(0)	0	(1)
Pleasant Grove-Verona Mutual Water Company	(13)	(1)	0	(14)	(2)	(0)	0	(2)
Reclamation District 1004	(6)	(1)	1	(6)	(1)	(0)	0	(1)
Sutter Mutual Water Company	(27)	(2)	0	(29)	(4)	(0)	0	(4)
Feather River AQMD Subtotal	(47)	(4)	2	(49)	(7)	(1)	0	(7)
Yolo-Solano AQMD								
Conaway Preservation Group	(32)	(3)	1	(34)	(5)	(0)	0	(5)
Reclamation District 108	(15)	(1)	2	(14)	(2)	(0)	0	(2)
River Garden Farms	(5)	(0)	0	(6)	(1)	(0)	0	(1)
Te Velde Revocable Family Trust	(10)	(1)	0	(11)	(2)	(0)	0	(2)
Yolo-Solano AQMD Subtotal	(63)	(5)	3	(64)	(9)	(1)	1	(9)
GRAND TOTAL	(268)	(22)	41	(249)	(40)	(3)	8	(35)

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

Table 81. 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**
Colusa County APCD												
Canal Farms	(0)	(5)	(6)	(2)	(9)	(2)	(0)	(0)	(0)	(0)	(1)	(0)
Eastside Mutual Water Company	(1)	(14)	(18)	(4)	(27)	(5)	(0)	(0)	(1)	(0)	(2)	(0)
Glenn-Colusa Irrigation District	(13)	(244)	(321)	(80)	(481)	(82)	(0)	(9)	(11)	(3)	(42)	(6)
Maxwell Irrigation District	(1)	(18)	(23)	(6)	(35)	(6)	(0)	(1)	(1)	(0)	(3)	(0)
Princeton-Codora-Glenn Irrigation District	(1)	(11)	(15)	(4)	(22)	(4)	(0)	(0)	(1)	(0)	(2)	(0)
Provident Irrigation District	(1)	(11)	(15)	(4)	(22)	(4)	(0)	(0)	(1)	(0)	(2)	(0)
Reclamation District 108	(4)	(74)	(97)	(24)	(164)	(28)	(0)	(3)	(3)	(1)	(14)	(2)
Reclamation District 1004	(2)	(31)	(41)	(10)	(66)	(11)	(0)	(1)	(1)	(0)	(6)	(1)
Sycamore Mutual Water Company	(4)	(74)	(97)	(24)	(147)	(25)	(0)	(3)	(3)	(1)	(13)	(2)
T&P Farms	(0)	(7)	(9)	(2)	(13)	(2)	(0)	(0)	(0)	(0)	(1)	(0)
Colusa County APCD Subtotal	(26)	(487)	(641)	(160)	(986)	(168)	(1)	(17)	(23)	(6)	(87)	(13)
Glenn County APCD												
Glenn-Colusa Irrigation District	(13)	(244)	(321)	(80)	(481)	(82)	(0)	(9)	(11)	(3)	(42)	(6)
Princeton-Codora-Glenn Irrigation District	(1)	(11)	(15)	(4)	(22)	(4)	(0)	(0)	(1)	(0)	(2)	(0)
Provident Irrigation District	(1)	(11)	(15)	(4)	(22)	(4)	(0)	(0)	(1)	(0)	(2)	(0)
Reclamation District 1004	(2)	(31)	(41)	(10)	(66)	(11)	(0)	(1)	(1)	(0)	(6)	(1)
Glenn County APCD Subtotal	(16)	(297)	(391)	(97)	(590)	(101)	(1)	(10)	(14)	(3)	(52)	(8)
Feather River AQMD												
Burroughs Farms	0	0	0	0	0	0	0	0	0	0	0	0
Cranmore Farms	0	0	0	0	0	0	0	0	0	0	0	0
Natomas Central Mutual Water Company	0	0	0	0	0	0	0	0	0	0	0	0
Pelger Mutual Water Company	(1)	(19)	(25)	(6)	(46)	(8)	(0)	(1)	(1)	(0)	(4)	(1)
Pleasant Grove-Verona Mutual Water Company	(4)	(67)	(88)	(22)	(164)	(29)	(0)	(2)	(3)	(1)	(15)	(2)
Reclamation District 1004	(2)	(31)	(41)	(10)	(66)	(11)	(0)	(1)	(1)	(0)	(6)	(1)
Sutter Mutual Water Company	(7)	(133)	(175)	(44)	(329)	(58)	(0)	(5)	(6)	(2)	(29)	(5)
Feather River AQMD Subtotal	(12)	(230)	(303)	(76)	(559)	(98)	(0)	(8)	(11)	(3)	(49)	(8)
Yolo-Solano AQMD												
Conaway Preservation Group	(8)	(158)	(208)	(52)	(386)	(68)	(0)	(6)	(7)	(2)	(34)	(5)
Reclamation District 108	(4)	(74)	(97)	(24)	(164)	(28)	(0)	(3)	(3)	(1)	(14)	(2)
River Garden Farms	(1)	(26)	(34)	(8)	(63)	(11)	(0)	(1)	(1)	(0)	(6)	(1)
Te Velde Revocable Family Trust	(3)	(52)	(68)	(17)	(126)	(22)	(0)	(2)	(2)	(1)	(11)	(2)
Yolo-Solano AQMD Subtotal	(16)	(309)	(407)	(101)	(739)	(130)	(1)	(11)	(14)	(4)	(65)	(10)
GRAND TOTAL	(70)	(1,324)	(1,742)	(434)	(2,874)	(497)	(2)	(47)	(61)	(15)	(253)	(39)

Table 82. 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**
Anderson-Cottonwood Irrigation District												
Exhaust Emissions	0	0	0	0	0	0	0	0	0	0	0	0
Land Preparation	--	--	--	--	0	0	--	--	--	--	0	0
Harvesting	--	--	--	--	0	0	--	--	--	--	0	0
Wind Erosion	--	--	--	--	--	--	--	--	--	--	--	-
Anderson-Cottonwood Irrigation District Subtotal	0	0	0	0	0	0	0	0	0	0	0	0
Burroughs Farms												
Exhaust Emissions	0	0	0	0	0	0	0	0	0	0	0	0
Land Preparation	--	--	--	--	0	0	--	--	--	--	0	0
Harvesting	--	--	--	--	0	0	--	--	--	--	0	0
Wind Erosion	--	--	--	--	--	--	--	--	--	--	--	-
Burroughs Farms Subtotal	0	0	0	0	0	0	0	0	0	0	0	0
Canal Farms												
Exhaust Emissions	(0)	(5)	(6)	(2)	(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)	(5)	(6)	(2)	(9)	(2)	(0)	(0)	(0)	(0)	(1)	(0)
Conaway Preservation Group												
Exhaust Emissions	(8)	(158)	(208)	(52)	(12)	(12)	(0)	(6)	(7)	(2)	(0)	(0)
Land Preparation	--	--	--	--	(355)	(53)	--	--	--	--	(32)	(5)
Harvesting	--	--	--	--	(30)	(4)	--	--	--	--	(3)	(0)
Wind Erosion	--	--	--	--	11	2	--	--	--	--	1	0
Conaway Preservation Group Subtotal	(8)	(158)	(208)	(52)	(386)	(68)	(0)	(6)	(7)	(2)	(34)	(5)
Cranmore Farms												
Exhaust Emissions	0	0	0	0	0	0	0	0	0	0	0	0
Land Preparation	--	--	--	--	0	0	--	--	--	--	0	0
Harvesting	--	--	--	--	0	0	--	--	--	--	0	0
Wind Erosion	--	--	--	--	--	--	--	--	--	--	--	-
Cranmore Farms Subtotal	0	0	0	0	0	0	0	0	0	0	0	0
Eastside Mutual Water Company												
Exhaust Emissions	(1)	(14)	(18)	(4)	(1)	(1)	(0)	(0)	(1)	(0)	(0)	(0)
Land Preparation	--	--	--	--	(31)	(5)	--	--	--	--	(3)	(0)
Harvesting	--	--	--	--	(3)	(0)	--	--	--	--	(0)	(0)
Wind Erosion	--	--	--	--	7	1	--	--	--	--	1	0
Eastside Mutual Water Company Subtotal	(1)	(14)	(18)	(4)	(27)	(5)	(0)	(0)	(1)	(0)	(2)	(0)
Glenn-Colusa Irrigation District												
Exhaust Emissions	(26)	(488)	(642)	(160)	(39)	(39)	(1)	(17)	(23)	(6)	(1)	(1)
Land Preparation	--	--	--	--	(1,096)	(164)	--	--	--	--	(99)	(15)
Harvesting	--	--	--	--	(92)	(14)	--	--	--	--	(8)	(1)
Wind Erosion	--	--	--	--	265	53	--	--	--	--	24	5
Glenn-Colusa Irrigation District Subtotal	(26)	(488)	(642)	(160)	(962)	(164)	(1)	(17)	(23)	(6)	(84)	(13)

Table 82. 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**
Maxwell Irrigation District												
Exhaust Emissions	(1)	(18)	(23)	(6)	(1)	(1)	(0)	(1)	(1)	(0)	(0)	(0)
Land Preparation	--	--	--	--	(40)	(6)	--	--	--	--	(4)	(1)
Harvesting	--	--	--	--	(3)	(1)	--	--	--	--	(0)	(0)
Wind Erosion	--	--	--	--	9	2	--	--	--	--	1	0
Maxwell Irrigation District Subtotal	(1)	(18)	(23)	(6)	(35)	(6)	(0)	(1)	(1)	(0)	(3)	(0)
Natomas Central Mutual Water Company												
Exhaust Emissions	0	0	0	0	0	0	0	0	0	0	0	0
Land Preparation	--	--	--	--	0	0	--	--	--	--	0	0
Harvesting	--	--	--	--	0	0	--	--	--	--	0	0
Wind Erosion	--	--	--	--	--	--	--	--	--	--	--	-
Natomas Central Mutual Water Company Subtotal	0	0	0	0	0	0	0	0	0	0	0	0
Pelger Mutual Water Company												
Exhaust Emissions	(1)	(19)	(25)	(6)	(1)	(1)	(0)	(1)	(1)	(0)	(0)	(0)
Land Preparation	--	--	--	--	(42)	(6)	--	--	--	--	(4)	(1)
Harvesting	--	--	--	--	(4)	(1)	--	--	--	--	(0)	(0)
Wind Erosion	--	--	--	--	1	0	--	--	--	--	0	0
Pelger Mutual Water Company Subtotal	(1)	(19)	(25)	(6)	(46)	(8)	(0)	(1)	(1)	(0)	(4)	(1)
Pleasant Grove-Verona Mutual Water Company												
Exhaust Emissions	(4)	(67)	(88)	(22)	(5)	(5)	(0)	(2)	(3)	(1)	(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	(4)	(67)	(88)	(22)	(164)	(29)	(0)	(2)	(3)	(1)	(15)	(2)
Princeton-Codora-Glenn Irrigation District												
Exhaust Emissions	(1)	(22)	(29)	(7)	(2)	(2)	(0)	(1)	(1)	(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	(1)	(22)	(29)	(7)	(44)	(7)	(0)	(1)	(1)	(0)	(4)	(1)
Provident Irrigation District												
Exhaust Emissions	(1)	(22)	(29)	(7)	(2)	(2)	(0)	(1)	(1)	(0)	(0)	(0)
Land Preparation	--	--	--	--	(50)	(7)	--	--	--	--	(4)	(1)
Harvesting	--	--	--	--	(4)	(1)	--	--	--	--	(0)	(0)
Wind Erosion	--	--	--	--	12	2	--	--	--	--	1	0
Provident Irrigation District Subtotal	(1)	(22)	(29)	(7)	(44)	(7)	(0)	(1)	(1)	(0)	(4)	(1)
Reclamation District 108												
Exhaust Emissions	(8)	(148)	(195)	(48)	(12)	(12)	(0)	(5)	(7)	(2)	(0)	(0)
Land Preparation	--	--	--	--	(332)	(50)	--	--	--	--	(30)	(4)
Harvesting	--	--	--	--	(28)	(4)	--	--	--	--	(3)	(0)
Wind Erosion	--	--	--	--	44	9	--	--	--	--	4	1
Reclamation District 108 Subtotal	(8)	(148)	(195)	(48)	(327)	(57)	(0)	(5)	(7)	(2)	(29)	(4)

Table 82. 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**
Reclamation District 1004												
Exhaust Emissions	(5)	(92)	(122)	(30)	(7)	(7)	(0)	(3)	(4)	(1)	(0)	(0)
Land Preparation	--	--	--	--	(208)	(31)	--	--	--	--	(19)	(3)
Harvesting	--	--	--	--	(17)	(3)	--	--	--	--	(2)	(0)
Wind Erosion	--	--	--	--	35	7	--	--	--	--	3	1
Reclamation District 1004 Subtotal	(5)	(92)	(122)	(30)	(198)	(34)	(0)	(3)	(4)	(1)	(17)	(3)
River Garden Farms												
Exhaust Emissions	(1)	(26)	(34)	(8)	(2)	(2)	(0)	(1)	(1)	(0)	(0)	(0)
Land Preparation	--	--	--	--	(58)	(9)	--	--	--	--	(5)	(1)
Harvesting	--	--	--	--	(5)	(1)	--	--	--	--	(0)	(0)
Wind Erosion	--	--	--	--	2	0	--	--	--	--	0	0
River Garden Farms Subtotal	(1)	(26)	(34)	(8)	(63)	(11)	(0)	(1)	(1)	(0)	(6)	(1)
Sutter Mutual Water Company												
Exhaust Emissions	(7)	(133)	(175)	(44)	(11)	(11)	(0)	(5)	(6)	(2)	(0)	(0)
Land Preparation	--	--	--	--	(299)	(45)	--	--	--	--	(27)	(4)
Harvesting	--	--	--	--	(25)	(4)	--	--	--	--	(2)	(0)
Wind Erosion	--	--	--	--	6	1	--	--	--	--	0	0
Sutter Mutual Water Company Subtotal	(7)	(133)	(175)	(44)	(329)	(58)	(0)	(5)	(6)	(2)	(29)	(5)
Sycamore Mutual Water Company												
Exhaust Emissions	(4)	(74)	(97)	(24)	(6)	(6)	(0)	(3)	(3)	(1)	(0)	(0)
Land Preparation	--	--	--	--	(166)	(25)	--	--	--	--	(15)	(2)
Harvesting	--	--	--	--	(14)	(2)	--	--	--	--	(1)	(0)
Wind Erosion	--	--	--	--	39	8	--	--	--	--	4	1
Sycamore Mutual Water Company Subtotal	(4)	(74)	(97)	(24)	(147)	(25)	(0)	(3)	(3)	(1)	(13)	(2)
T&P Farms												
Exhaust Emissions	(0)	(7)	(9)	(2)	(1)	(1)	(0)	(0)	(0)	(0)	(0)	(0)
Land Preparation	--	--	--	--	(15)	(2)	--	--	--	--	(1)	(0)
Harvesting	--	--	--	--	(1)	(0)	--	--	--	--	(0)	(0)
Wind Erosion	--	--	--	--	3	1	--	--	--	--	0	0
T&P Farms Subtotal	(0)	(7)	(9)	(2)	(13)	(2)	(0)	(0)	(0)	(0)	(1)	(0)
Te Velde Revocable Family Trust												
Exhaust Emissions	(3)	(52)	(68)	(17)	(4)	(4)	(0)	(2)	(2)	(1)	(0)	(0)
Land Preparation	--	--	--	--	(116)	(17)	--	--	--	--	(10)	(2)
Harvesting	--	--	--	--	(10)	(1)	--	--	--	--	(1)	(0)
Wind Erosion	--	--	--	--	4	1	--	--	--	--	0	0
Te Velde Revocable Family Trust Subtotal	(3)	(52)	(68)	(17)	(126)	(22)	(0)	(2)	(2)	(1)	(11)	(2)
Exhaust Emissions Total	(71)	(1,343)	(1,767)	(440)	(106)	(106)	(2)	(47)	(62)	(16)	(4)	(4)
Land Preparation Total	0	0	0	0	(3,016)	(452)	0	0	0	0	(271)	(41)
Harvesting Total	0	0	0	0	(253)	(38)	0	0	0	0	(23)	(3)
Wind Erosion Total	0	0	0	0	455	91	0	0	0	0	41	8
GRAND TOTAL	**(71)**	**(1,343)**	**(1,767)**	**(440)**	**(2,921)**	**(505)**	**(2)**	**(47)**	**(62)**	**(16)**	**(257)**	**(40)**

Table 83. 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**
Colusa												
Canal Farms	(0)	(5)	(6)	(2)	(9)	(2)	(0)	(0)	(0)	(0)	(1)	(0)
Eastside Mutual Water Company	(1)	(14)	(18)	(4)	(27)	(5)	(0)	(0)	(1)	(0)	(2)	(0)
Glenn-Colusa Irrigation District	(13)	(244)	(321)	(80)	(481)	(82)	(0)	(9)	(11)	(3)	(42)	(6)
Maxwell Irrigation District	(1)	(18)	(23)	(6)	(35)	(6)	(0)	(1)	(1)	(0)	(3)	(0)
Princeton-Codora-Glenn Irrigation District	(1)	(11)	(15)	(4)	(22)	(4)	(0)	(0)	(1)	(0)	(2)	(0)
Provident Irrigation District	(1)	(11)	(15)	(4)	(22)	(4)	(0)	(0)	(1)	(0)	(2)	(0)
Reclamation District 108	(4)	(74)	(97)	(24)	(164)	(28)	(0)	(3)	(3)	(1)	(14)	(2)
Reclamation District 1004	(2)	(31)	(41)	(10)	(66)	(11)	(0)	(1)	(1)	(0)	(6)	(1)
Sycamore Mutual Water Company	(4)	(74)	(97)	(24)	(147)	(25)	(0)	(3)	(3)	(1)	(13)	(2)
T&P Farms	(0)	(7)	(9)	(2)	(13)	(2)	(0)	(0)	(0)	(0)	(1)	(0)
Colusa Subtotal	(26)	(487)	(641)	(160)	(986)	(168)	(1)	(17)	(23)	(6)	(87)	(13)
Glenn												
Glenn-Colusa Irrigation District	(13)	(244)	(321)	(80)	(481)	(82)	(0)	(9)	(11)	(3)	(42)	(6)
Princeton-Codora-Glenn Irrigation District	(1)	(11)	(15)	(4)	(22)	(4)	(0)	(0)	(1)	(0)	(2)	(0)
Provident Irrigation District	(1)	(11)	(15)	(4)	(22)	(4)	(0)	(0)	(1)	(0)	(2)	(0)
Reclamation District 1004	(2)	(31)	(41)	(10)	(66)	(11)	(0)	(1)	(1)	(0)	(6)	(1)
Glenn Subtotal	(16)	(297)	(391)	(97)	(590)	(101)	(1)	(10)	(14)	(3)	(52)	(8)
Sutter												
Burroughs Farms	0	0	0	0	0	0	0	0	0	0	0	0
Cranmore Farms	0	0	0	0	0	0	0	0	0	0	0	0
Natomas Central Mutual Water Company	0	0	0	0	0	0	0	0	0	0	0	0
Pelger Mutual Water Company	(1)	(19)	(25)	(6)	(46)	(8)	(0)	(1)	(1)	(0)	(4)	(1)
Pleasant Grove-Verona Mutual Water Company	(4)	(67)	(88)	(22)	(164)	(29)	(0)	(2)	(3)	(1)	(15)	(2)
Reclamation District 1004	(2)	(31)	(41)	(10)	(66)	(11)	(0)	(1)	(1)	(0)	(6)	(1)
Sutter Mutual Water Company	(7)	(133)	(175)	(44)	(329)	(58)	(0)	(5)	(6)	(2)	(29)	(5)
Sutter Subtotal	(13)	(249)	(328)	(82)	(606)	(106)	(0)	(9)	(12)	(3)	(53)	(9)
Yolo												
Conaway Preservation Group	(8)	(158)	(208)	(52)	(386)	(68)	(0)	(6)	(7)	(2)	(34)	(5)
Reclamation District 108	(4)	(74)	(97)	(24)	(164)	(28)	(0)	(3)	(3)	(1)	(14)	(2)
River Garden Farms	(1)	(26)	(34)	(8)	(63)	(11)	(0)	(1)	(1)	(0)	(6)	(1)
Te Velde Revocable Family Trust	(3)	(52)	(68)	(17)	(126)	(22)	(0)	(2)	(2)	(1)	(11)	(2)
Yolo Subtotal	(16)	(309)	(407)	(101)	(739)	(130)	(1)	(11)	(14)	(4)	(65)	(10)
GRAND TOTAL	(71)	(1,343)	(1,767)	(440)	(2,921)	(505)	(2)	(47)	(62)	(16)	(257)	(40)

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Table 84. Reduced Exhaust Emissions from Cropland Idling

Water Agency	Groundwater Substitution (acre-feet/year)	Cropland Idling/ Crop Shifting (acre-feet/year)	GW Pumping Equivalent (acre-feet/year)	Reduced Daily Emissions (lbs/day)						Reduced Annual Emissions (tons/year)					
				VOC	NOx	CO	SOx	PM10	PM2.5	VOC	NOx	CO	SOx	PM10	PM2.5
Anderson-Cottonwood Irrigation District	4,800	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Burroughs Farms	2,000	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Canal Farms	1,000	635	149	0.25	4.68	6.16	1.53	0.37	0.37	0.01	0.16	0.22	0.05	0.01	0.01
Conaway Preservation Group	5,368	21,350	5,024	8.31	157.83	207.68	51.75	12.46	12.46	0.29	5.56	7.31	1.82	0.44	0.44
Cranmore Farms	3,400	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eastside Mutual Water Company	2,230	1,846	434	0.72	13.63	17.94	4.47	1.08	1.08	0.03	0.48	0.63	0.16	0.04	0.04
Glenn-Colusa Irrigation District	10,000	66,000	15,529	25.68	487.86	641.92	159.97	38.52	38.52	0.90	17.18	22.60	5.63	1.36	1.36
Maxwell Irrigation District	3,600	2,400	565	0.93	17.75	23.36	5.82	1.40	1.40	0.03	0.62	0.82	0.20	0.05	0.05
Natomas Central Mutual Water Company	20,000	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pelger Mutual Water Company	4,670	2,538	597	0.99	18.76	24.68	6.15	1.48	1.48	0.03	0.66	0.87	0.22	0.05	0.05
Pleasant Grove-Verona Mutual Water Company	15,000	9,000	2,118	3.50	66.54	87.55	21.82	5.25	5.25	0.12	2.34	3.08	0.77	0.18	0.18
Princeton-Codora-Glenn Irrigation District	5,000	3,000	706	1.17	22.18	29.18	7.27	1.75	1.75	0.04	0.78	1.03	0.26	0.06	0.06
Provident Irrigation District	6,000	3,000	706	1.17	22.18	29.18	7.27	1.75	1.75	0.04	0.78	1.03	0.26	0.06	0.06
Reclamation District 108	15,000	20,000	4,706	7.78	147.84	194.53	48.48	11.67	11.67	0.27	5.21	6.85	1.71	0.41	0.41
Reclamation District 1004	7,175	12,500	2,941	4.86	92.39	121.57	30.30	7.29	7.29	0.17	3.25	4.28	1.07	0.26	0.26
River Garden Farms	9,000	3,500	824	1.36	25.89	34.06	8.49	2.04	2.04	0.05	0.91	1.20	0.30	0.07	0.07
Sutter Mutual Water Company	0	18,000	4,235	7.00	133.05	175.06	43.63	10.50	10.50	0.25	4.68	6.16	1.54	0.37	0.37
Sycamore Mutual Water Company	11,300	10,000	2,353	3.89	73.92	97.27	24.24	5.84	5.84	0.14	2.60	3.42	0.85	0.21	0.21
T&P Farms	1,200	890	209	0.35	6.57	8.64	2.15	0.52	0.52	0.01	0.23	0.30	0.08	0.02	0.02
Te Velde Revocable Family Trust	7,094	6,975	1,641	2.71	51.55	67.83	16.90	4.07	4.07	0.10	1.82	2.39	0.60	0.14	0.14
Total	**133,837**	**181,634**	**42,737**	**70.66**	**1,342.63**	**1,766.62**	**440.26**	**106.00**	**106.00**	**2.49**	**47.27**	**62.20**	**15.50**	**3.73**	**3.73**

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."

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Fugitive Dust Emissions from Cropland Idling

Table 85. 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/Tehama	0	0	0
Burroughs Farms	Sutter	0	0	0
Canal Farms	Colusa	192	11	1
Conaway Preservation Group	Yolo	6,470	355	32
Cranmore Farms	Sutter	0	0	0
Eastside Mutual Water Company	Colusa	559	31	3
Glenn-Colusa Irrigation District	Glenn/Colusa	20,000	1,096	99
Maxwell Irrigation District	Colusa	727	40	4
Natomas Central Mutual Water Company	Sacramento/Sutter	0	0	0
Pelger Mutual Water Company	Sutter	769	42	4
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	Glenn/Colusa/Sutter	3,788	208	19
River Garden Farms	Yolo	1,061	58	5
Sutter Mutual Water Company	Sutter	5,455	299	27
Sycamore Mutual Water Company	Colusa	3,030	166	15
T&P Farms	Colusa	270	15	1
Te Velde Revocable Family Trust	Yolo	2,114	116	10
Total		**55,041**	**3,016**	**271**

Table 86. 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/Tehama	0	0	0
Burroughs Farms	Sutter	0	0	0
Canal Farms	Colusa	192	1	0
Conaway Preservation Group	Yolo	6,470	30	3
Cranmore Farms	Sutter	0	0	0
Eastside Mutual Water Company	Colusa	559	3	0
Glenn-Colusa Irrigation District	Glenn/Colusa	20,000	92	8
Maxwell Irrigation District	Colusa	727	3	0
Natomas Central Mutual Water Company	Sacramento/Sutter	0	0	0
Pelger Mutual Water Company	Sutter	769	4	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	Glenn/Colusa/Sutter	3,788	17	2
River Garden Farms	Yolo	1,061	5	0
Sutter Mutual Water Company	Sutter	5,455	25	2
Sycamore Mutual Water Company	Colusa	3,030	14	1
T&P Farms	Colusa	270	1	0
Te Velde Revocable Family Trust	Yolo	2,114	10	1
Total		**55,041**	**253**	**23**

Table 87. 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/Tehama	0	--	--
Burroughs Farms	Sutter	0	--	--
Canal Farms	Colusa	192	2	0
Conaway Preservation Group	Yolo	6,470	11	1
Cranmore Farms	Sutter	0	--	--
Eastside Mutual Water Company	Colusa	559	7	1
Glenn-Colusa Irrigation District	Glenn/Colusa	20,000	265	24
Maxwell Irrigation District	Colusa	727	9	1
Natomas Central Mutual Water Company	Sacramento/Sutter	0	--	--
Pelger Mutual Water Company	Sutter	769	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	Glenn/Colusa/Sutter	3,788	35	3
River Garden Farms	Yolo	1,061	2	0
Sutter Mutual Water Company	Sutter	5,455	6	0
Sycamore Mutual Water Company	Colusa	3,030	39	4
T&P Farms	Colusa	270	3	0
Te Velde Revocable Family Trust	Yolo	2,114	4	0
Total		**55,041**	**455**	**41**

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 88. 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 88. 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: January 21, 2015. Available at: http://www.arb.ca.gov/ei/areasrc/arbmiscprocresfarmop.htm.

Agricultural Harvest Operations

Table 89. 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
188499	HAY, GRAIN	Alfalfa	Cotton/2	1.68

Agricultural Harvest Operations

Table 89. Summary of Crop Emission Factor Assumptions

CDFA Crop Code	CDFA Crop Description	Crop Profile	Assumption	Emission Factor (lbs PM10/acre/yr)
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
229999	KIWIFRUIT	Citrus	Cotton/40	0.08
230639	BERRIES, BLACKBERRIES	Grapes-Table	Cotton/40	0.08

Agricultural Harvest Operations

Table 89. Summary of Crop Emission Factor Assumptions

CDFA Crop Code	CDFA Crop Description	Crop Profile	Assumption	Emission Factor (lbs PM10/acre/yr)
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
325999	CUCUMBERS	Vegetables	Cotton/40	0.08
330999	EGGPLANT, ALL	Vegetables	Cotton/40	0.08
331999	ENDIVE, ALL	Lettuce	Cotton/40	0.08

Agricultural Harvest Operations

Table 89. Summary of Crop Emission Factor Assumptions

CDFA Crop Code	CDFA Crop Description	Crop Profile	Assumption	Emission Factor (lbs PM10/acre/yr)
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
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

Agricultural Harvest Operations

Table 89. Summary of Crop Emission Factor Assumptions

CDFA Crop Code	CDFA Crop Description	Crop Profile	Assumption	Emission Factor (lbs PM10/acre/yr)
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: January 21, 2015. Available at: http://www.arb.ca.gov/ei/areasrc/arbmiscprocresfarmop.htm.

Windblown Dust - Agricultural Lands

Table 90. 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 91. 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 92. 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: January 21, 2015. Available at: http://www.arb.ca.gov/ei/areasrc/arbmiscprocfugwbdst.htm.