

Tables

Table 1
Dairy Farm Selection for Phase 2 of the Representative Groundwater Monitoring Program

Dairy Farm	County	Physical Facility Address	City, State, Zip Code
Amaral and Son Dairy	San Joaquin	5601 Escalon Bellota Rd	Farmington, CA 95230
Brooks-Erman Ranch	San Joaquin	25873 N Kenefick Rd	Galt, CA 95632
Frank Borges Dairy	San Joaquin	8350 E Brady Rd	Manteca, CA 95337
Kaehler Dairy Farms	San Joaquin	1025 E Armstrong Rd	Lodi, CA 95242
Silva Brothers Dairy	San Joaquin	1999 E Grantline Road	Tracy, CA 95304
Woods Dairy	San Joaquin	14250 N DeVries Rd	Lodi, CA 95242
Durrer Dairy	Stanislaus	8861 Beckwith Rd	Modesto, CA 95358
Genasci Dairy	Stanislaus	6555 Blue Gum Ave	Modesto, CA 95358
Sozinho Jerseys	Fresno	13019 S Clovis Ave/ 4877 E Mountain View Ave	Selma, CA 93662
Machado Dairy	Fresno	4423 W Central Ave	Fresno, CA 93706
Maple Avenue Dairy	Fresno	19680 S Maple Ave	Laton, CA 93242
Sozinho Dairy #2	Fresno	8489 E Elkhorn Ave	Selma, CA 93662
Tony Souza Dairy	Fresno	7530 E Davis Ave	Selma, CA 93662
Zonneveld Dairy	Fresno	1560 Cerini Ave	Laton, CA 93242
Diamond H Dairy	Madera	9564 Avenue 18 1/2	Chowchilla, CA 93610
Diepersloot Ranch	Madera	14303 Avenue 14	Madera, CA 93637
La Salle Dairy	Madera	10663 Avenue 7 1/2	Firebaugh, CA 93622
Troost Dairy	Madera	24868 Road 9	Chowchilla, CA 93610
Galhandro Dairy	Kings	9240 19 1/2 Ave	Lemoore, CA 93245
Garcia and Sons Dairy	Kings	15405 17 th Ave	Lemoore, CA 93245
Longfellow Farming Co.	Kings	14782 8th Ave	Hanford, CA 93230
Manuel and Alda Lawrence Dairy	Kings	12871 Kent Ave	Hanford, CA 93230
Warmerdam Dairy	Kings	11336 7th Ave	Hanford, CA 93230
TBD	Kings	NE Kings County	
Richmar Farms Dairy	Kern	1129 E Shafter Rd	Bakersfield, CA 93307
Vanden Berge Dairy	Kern	11701 Old River Rd	Bakersfield, CA 93311
Western Sky Dairy	Kern	18501 Old River Rd	Bakersfield, CA 93311
Aukeman Dairy	Tulare	17297 Road 96	Tulare, CA 93274
Dairyland Farms	Tulare	15982 Road 152	Tipton, CA 93272
Elkhorn Dairy	Tulare	10400 Avenue 368	Visalia, CA 93292
FM Ranch #2	Tulare	196 East Olive Ave	Tipton, CA 93272
Highstreet Dairy	Tulare	15503 Avenue 240	Tulare, CA 93274
Holstein Farms Dairy	Tulare	4315 Avenue 176	Tulare, CA 93274
Homestead Dairy	Tulare	10178 Avenue 352	Visalia, CA 93291
Hynes Dairy	Tulare	4497 N Colpien Rd	Tulare, CA 93274
J & A Dairy	Tulare	12212 Avenue 176	Tulare, CA 93274

Table 1
Dairy Farm Selection for Phase 2 of the Representative Groundwater Monitoring Program

Dairy Farm	County	Physical Facility Address	City, State, Zip Code
K-Baar Dairy	Tulare	32866 Road 108	Visalia, CA 93291
Sierra View Dairy	Tulare	13376 Avenue 224	Tulare, CA 93274
South Lakes Dairy	Tulare	5595 Avenue 96	Pixley, CA 93256
Triple H Dairy	Tulare	13255 Avenue 212	Tulare, CA 93274
Vanderham Dairy	Tulare	8150 Avenue 360	Visalia, CA 93291
Hillside Farms Silveira Dairy	Glenn	3719 CR C	Orland, CA 95963
Leo Martin Dairy	Glenn	7266 Lindsay Ave	Orland, CA 95963
MTSJ Dairy LP	Glenn	6916 CR 30	Orland, CA 95963
Schager Dairy	Glenn	4924 CR KK	Orland, CA 95963
Brentwood Farms	Tehama	24555 Clark Ave	Orland, CA 95963

Table 2
Dairy Farm Herd Size and Animal Housing
Phase 2 Representative Groundwater Monitoring Program

Dairy Farm	Maximum Number of Animals (head)			Animal Housing (head)	
	Mature Milk Cows	Other (1)	Total	Freestall	Open Lot
Amaral and Son Dairy	640	440	1,080	640	440
Brooks-Erman Ranch	380	60	440	tbd	tbd
Frank Borges Dairy	1,100	706	1,806	1,355	451
Kaehler Dairy Farms	763	481	1,244	696	548
Silva Brothers Dairy	500	545	1,045	0	1,045
Woods Dairy	151	120	271	190	81
Durrer Dairy	tbd	tbd	tbd	tbd	tbd
Genasci Dairy	1,341	1,322	2,663	tbd	tbd
Sozinho Jerseys	900	910	1,810	900	910
Machado Dairy	1,590	1,910	3,500	tbd	tbd
Maple Avenue Dairy	2,000	2,016	4,016	2,000	2,016
Sozinho Dairy #2	1,158	999	2,157	1,158	999
Tony Souza Dairy	tbd	tbd	tbd	tbd	tbd
Zonneveld Dairy	4,200	5,908	10,108	0	10,108
Diamond H Dairy	4,301	4,630	8,931	4,501	4,430
Diepersloot Ranch	2,800	2,550	5,350	3,650	1,700
La Salle Dairy	tbd	tbd	tbd	tbd	tbd
Troost Dairy	2,100	2,072	4,172	2,414	1,758
Galhandro Dairy	500	452	952	465	487
Garcia and Sons Dairy	175	233	408	0	408
Longfellow Farming Co.	1,214	1,297	2,511	1,214	1,297
Manuel and Alda Lawrence Dairy	2,165	2,083	4,248	2,165	2,083
Warmerdam Dairy	750	218	968	0	968
TBD	tbd	tbd	tbd	tbd	tbd
Richmar Farms Dairy	2,650	5,500	8,150	2,650	5,500
Vanden Berge Dairy	2,854	1,552	4,406	1,552	2,854
Western Sky Dairy	4,800	2,450	7,250	4,800	2,450

Table 2
Dairy Farm Herd Size and Animal Housing
Phase 2 Representative Groundwater Monitoring Program

Dairy Farm	Maximum Number of Animals (head)			Animal Housing (head)	
	Mature Milk Cows	Other (1)	Total	Freestall	Open Lot
Aukeman Dairy	2,986	5,502	8,488	2,986	5,502
Dairyland Farms	2,640	1,393	4,033	4,033	0
Elkhorn Dairy	3,115	4,599	7,714	3,745	3,969
FM Ranch #2	710	95	805	0	805
Highstreet Dairy	1,880	370	2,250	0	1,982
Holstein Farms Dairy	2,945	8,485	11,430	11,430	0
Homestead Dairy	1,243	150	1,393	0	1,393
Hynes Dairy	1,525	2,105	3,630	0	3,630
J & A Dairy	1,550	425	1,975	0	1,975
K-Baar Dairy	2,906	2,361	5,267	0	5,267
Sierra View Dairy	1,640	675	2,315	0	2,315
South Lakes Dairy	5,830	5,688	11,518	5,780	5,738
Triple H Dairy	1,600	1,700	3,300	0	3,300
Vanderham Dairy	1,795	2,375	4,170	1,795	2,375
Hillside Farms Silveira Dairy	tbd	tbd	tbd	tbd	tbd
Leo Martin Dairy	tbd	tbd	tbd	tbd	tbd
MTSJ Dairy LP	tbd	tbd	tbd	tbd	tbd
Schager Dairy	tbd	tbd	tbd	tbd	tbd
Brentwood Farms	tbd	tbd	tbd	tbd	tbd

(1) dry cows, bred heifers, heifers, calves.

tbd = to be determined

**Table 3
Information on Engineered Lagoon Liners and Existing Monitoring Wells
Phase 2 Representative Groundwater Monitoring Program**

Facility	Information on Engineered Lagoon Liners	Information on Existing Monitoring Wells	Approximate Depth-to-Water (feet, bgs)	Existing MWs			Proposed MWs			Groundwater Monitoring Tier	
				C	L	F	C	L	F	Tier A	Tier B
San Joaquin County											
Amaral and Son Dairy	one lagoon with single 36-mil reinforced polypropylene liner installed in 2008 adjacent to earthen settling basins; CQA rpt (Vector Engineering, 2008); CVDRMP-approved	none	~100 (*)	0	0	0	0	2	0		✓
Brooks-Erman Ranch	one lagoon with single 40-mil HDPE liner installed in 2010 adjacent to earthen settling basins/lagoons; CQA rpt (EAC Engineering, 2011)	none	~50 (*)	0	0	0	0	2	0		✓
Frank Borges Dairy	Middle Lagoon with soil particle analysis available (Quality Control Inspection, Inc., 1997) adjacent to earthen West and East Lagoons	3 MWs installed in 1990; some construction information available	<20	0	1	2	0	0	2	✓	
Kaehler Dairy Farms	not available from CVRWQCB	3 MWs (one damaged and non-functional); construction information to be identified; data record 1990-2008	~50	0	0	3	0	0	2		✓
Silva Brothers Dairy	not available from CVRWQCB	4 MWs installed in 1992; construction information to be identified	>100 (*)	0	4	0	0	0	0		✓
Woods Dairy	not available from CVRWQCB	3 MWs installed in 2010 with construction information	~40	0	1	2	0	0	0	✓	
Stanislaus County											
Durrer Dairy	not available from CVRWQCB	9 MWs; UCCE research dairy, comprehensive data record available; construction information available	<20	3	4	2	0	0	3	✓	
Genasci Dairy	not available from CVRWQCB	10 MWs; UCCE research dairy, comprehensive data record available; construction information available	<20	3	5	2	0	0	3	✓	

Table 3
Information on Engineered Lagoon Liners and Existing Monitoring Wells
Phase 2 Representative Groundwater Monitoring Program

Facility	Information on Engineered Lagoon Liners	Information on Existing Monitoring Wells	Approximate Depth-to-Water (feet, bgs)	Existing MWs			Proposed MWs			Groundwater Monitoring Tier	
				C	L	F	C	L	F	Tier A	Tier B
Fresno County											
Sozinho Jerseys	one lagoon with engineered clay liner (10/10 design standard) installed in 1994 (?); lagoon soil testing rpt by Soil Conservation Service (1994)	4 MWs; construction information to be identified; some MWs temporarily dry; data record 2002-present	median=61; up to 68	2	1	1	0	0	2		✓
Machado Dairy	one lagoon with Tier 2 single 60-mil HDPE liner installed in 2006 adjacent to earthen lagoon; approved CQA Rpt (Provost and Pritchard, 2006)	none	~70-80	0	0	0	0	2	0		✓
Maple Avenue Dairy	not available from CVRWQCB	3 MWs with some construction information	70-90	1	1	1	0	0	0		✓
Sozinho Dairy #2	one lagoon with 1-2' thick engineered clay liner (imported material) installed in 1988 (?); construction report (True Engineering, 1989)	4 MWs with some construction information; some MWs temporarily dry; data record 2003-2009	median=62; up to 71	1	2	1	0	0	3		✓
Tony Souza Dairy	not available from CVRWQCB	none	~70-80?	0	0	0	0	2	0		✓
Zonneveld Dairy	east lagoon with engineered clay-liner (1-ft thick) constructed in 1990 according to 10/10 design standard; soil report (Anderson, 1990); rpt. states that west lagoon will be rebuilt in 1991; these lagoons are now combined to one single lagoon; adjacent to settling basin	6 MW sites (4 of these have 2 single piezometer MWs; one has 3 single piezometer MWs); some construction information available	70-90	1	3	8	0	0	0		✓
Madera County											
Diamond H Dairy	not available from CVRWQCB	7 MWs; some construction information available, data record from 2001-2009; several dry wells	median=103; max >120	3	2	2	0	0	0		✓
Diepersloot Ranch	not available from CVRWQCB	4 MWs; construction information available, data record from 2003-2008	median=97	1	2	1	0	0	0		✓
La Salle Dairy	not available from CVRWQCB	none	~40-80	0	0	0	0	2	0		✓
Troost Dairy	soil resting report concludes sub-soils meet 10/10 design standard (Technicon, 1992)	3 MWs; construction information available; data record from 2006-2009	median=80; up to 115	0	1	2	0	0	0		✓

Table 3
Information on Engineered Lagoon Liners and Existing Monitoring Wells
Phase 2 Representative Groundwater Monitoring Program

Facility	Information on Engineered Lagoon Liners	Information on Existing Monitoring Wells	Approximate Depth-to-Water (feet, bgs)	Existing MWs			Proposed MWs			Groundwater Monitoring Tier	
				C	L	F	C	L	F	Tier A	Tier B
Kings County											
Galhandro Dairy	one lagoon with single 36-mil RPP liner installed in 2006 adjacent to earthen settling basins/lagoons; construction rpt (Kleinfelder, 2007)	3 MWs with construction information; data record 2001-2009	<20	2	1	0	0	0	0	✓	
Garcia and Sons Dairy	not available from CVRWQCB	none	60-80 (*)	0	0	0	0	0	5		✓
Longfellow Farming Co.	one Tier 2 lagoon with 60-mil HDPE liner (Lagoon # 3) installed in 2010 adjacent to earthen lined lagoon; CQA documentation (Ausenco Vector, 2010)	UCCE research dairy; comprehensive data record available; 7 paired well sites each with one single completion MW and one nested MW; construction information available	shallow MWs ~60-90	1	3	3	0	0	0		✓
Manuel and Alda Lawrence Dairy	two lagoons with 40-mil HDPE liners installed in 2005; construction report (Striatus Engineering, 2005)	6 MWs with construction information; data record 2005	<20	2	3	1	0	0	4	✓	
Warmerdam Dairy	two lagoons with 60-mil HDPE liners installed in 2007 (?); O & M Plan (Provost and Prichard, 2007)	3 MWs; construction of wells to be verified	~105	1	1	1	0	0	0		✓
TBD	tbd	tbd	<20	0	0	0	2	2	4	✓	
Kern County											
Richmar Farms Dairy	lagoons constructed in 1999 with partial clay liners to cover sandy areas (10/10 design standard); lagoon soil report (Soils Engineering Inc., 1999)	6 MWs, data record 2003-2008	<20	4	2	0	0	0	3	✓	
Vanden Berge Dairy	lagoons constructed in 1990 with partial clay liners to cover sandy areas (10/10 design standard); lagoon soil report (Carl H. Anderson, 1990)	5 MWs with some construction information; one has damage to wellhead; data record 2001-2008	median=134; up to 150	3	0	2	0	0	0		✓
Western Sky Dairy	lagoons constructed in 2000 with partial clay liners to cover sandy areas (10/10 design standard); lagoon soil report (Soils Engineering, Inc. 2000)	3 MWs with construction information; data record 2002	~70	2	1	0	0	0	0		✓

Table 3
Information on Engineered Lagoon Liners and Existing Monitoring Wells
Phase 2 Representative Groundwater Monitoring Program

Facility	Information on Engineered Lagoon Liners	Information on Existing Monitoring Wells	Approximate Depth-to-Water (feet, bgs)	Existing MWs			Proposed MWs			Groundwater Monitoring Tier	
				C	L	F	C	L	F	Tier A	Tier B
Tulare County											
Aukeman Dairy	not available from CVRWQCB	3 MWs, construction information to be identified; data record 2006-2010	median=71; max=~80	2	1	0	0	0	0		✓
Dairyland Farms	not available from CVRWQCB	3 MWs with construction information, data record 2004-2005	~110	1	1	1	0	0	0		✓
Elkhorn Dairy	not available from CVRWQCB	13 MWs with some construction information, data record 2000-2008	median=28	3	1	9	0	0	0	✓	
FM Ranch #2	not available from CVRWQCB	3 MWs with construction information, data record 2003-2008	~80-90 (deeper in dry wells)	1	1	1	0	0	0		✓
Highstreet Dairy	one lagoon with engineered clay liner constructed in 2003 (10/10 design standard), certification rpt (Howard, 2004)	6 MWs with some construction information; data record 2001-2009	median=58; max=~70 but several dry	1	2	3	0	0	3		✓
Holstein Farms Dairy	not available from CVRWQCB	3 MWs with construction information; data record 2005-2009	median=114; max=131	1	1	1	0	0	0		✓
Homestead Dairy	not available from CVRWQCB	3 MWs, construction information to be identified; data record 2002-2007	median=61; max=~82	0	1	2	0	0	0		✓
Hynes Dairy	not available from CVRWQCB	5 MWs with construction information; data record 2007-2012 (some wells temporarily dry)	100-130	0	1	4	0	0	0		✓
J & A Dairy	not available from CVRWQCB	3 MWs with construction information; data record 2004-2007	median=53; max=~60	2	0	1	0	0	6	✓	
K-Baar Dairy	not available from CVRWQCB	3 MWs with construction information, data record 2003-2006	median=67; max=~90	2	1	0	0	0	0		✓
Sierra View Dairy	not available from CVRWQCB	4 MWs with construction information; data record 2003-2010	median=94; max=~130	1	1	2	0	0	0		✓
South Lakes Dairy	lagoons constructed in 2005 with partial clay liners to cover sandy areas (10/10 design standard); (Provost and Pritchard, 2005)	4 MWs; construction information to be identified; data record 2006-2009	median=33	3	1	0	0	0	6	✓	
Triple H Dairy	not available from CVRWQCB	7 MWs, some with construction information; data record 2001-2010 (MW-3 not included in well count because location needs to be verified)	median=68; max=~95	5	1	0	0	0	0		✓
Vanderham Dairy	not available from CVRWQCB	3 MWs with construction information; data record 2005	~45	2	0	1	0	0	4	✓	

**Table 3
Information on Engineered Lagoon Liners and Existing Monitoring Wells
Phase 2 Representative Groundwater Monitoring Program**

Facility	Information on Engineered Lagoon Liners	Information on Existing Monitoring Wells	Approximate Depth-to-Water (feet, bgs)	Existing MWs			Proposed MWs			Groundwater Monitoring Tier	
				C	L	F	C	L	F	Tier A	Tier B
Glenn County											
Hillside Farms Silveira Dairy	not available from CVRWQCB	none	20-50 (*)	0	0	0	0	0	4	✓	
Leo Martin Dairy	not available from CVRWQCB	none	20-50 (*)	0	0	0	0	0	4	✓	
MTSJ Dairy LP	not available from CVRWQCB	none	20-50 (*)	0	0	0	0	0	4	✓	
Schager Dairy	not available from CVRWQCB	none	20-50 (*)	0	0	0	0	0	4	✓	

Tehama County

Brentwood Farms	not available from CVRWQCB	none	20-50 (*)	0	0	0	0	0	4	✓	
-----------------	----------------------------	------	-----------	---	---	---	---	---	---	---	--

Number of Monitoring Wells by Management Unit 54 51 59 2 12 70

Total Number of Existing Monitoring Wells 164

Total Number of Proposed New Monitoring Wells 84

	<u>Dairies</u>	<u>MWs</u>
Number of Dairies and MWs with Proposed Tier A Monitoring Activities	17	122
Number of Dairies and MWs with Proposed Tier B Monitoring Activities	29	126

C = corral, L = lagoon, F = field; bgs = below ground surface; MW = monitoring well; CQA = construction quality assurance; (*) information is tentative and needs refinement

Tier A refers to increased sampling frequencies and suite of analyses described in text. Tier B refers to sampling frequencies and suite of analyses according to General Order revised MRP, Attachment A, Table 6 (page MRP-20).

The 10/10 design standard refers to California Code of Regulations Title 27, which requires that retention ponds receiving waste from confined animal facilities be lined with or underlain by soils that contain at least 10% clay and not more than 10% gravel.

Glenn and Tehama Counties: The number of proposed monitoring wells is estimated and monitoring well locations are not shown on maps in Attachment 1. Final dairy farms and monitoring well locations will be determined upon review of CVRWQCB files.

Table 4
Tier A and Tier B Groundwater Monitoring Program and Laboratory Analyses
Phase 2 Representative Groundwater Monitoring Program

Frequency	Activity
-----------	----------

Tier A

Monthly	groundwater level measurements
Quarterly	field measurements of electrical conductivity, temperature, pH, dissolved oxygen, oxygen reduction potential, and turbidity laboratory analyses for total dissolved solids, nitrate, ammonia
Annually	sodium, potassium, magnesium, calcium, chloride, sulfate, alkalinity suite (bicarbonate, carbonate, and hydroxide alkalinity), phosphate, total dissolved solids, nitrite, TKN (1)

Tier B

Quarterly	groundwater level measurements
Semi-annually	field measurements of electrical conductivity, temperature, pH, dissolved oxygen, oxygen reduction potential, and turbidity laboratory analyses for nitrate and ammonia
Within six months of well construction and every two years thereafter	laboratory analyses for sodium, potassium, magnesium, calcium, chloride, sulfate, bicarbonate alkalinity, and carbonate alkalinity

TKN = total Kjeldahl nitrogen (sum of ammonia and organic nitrogen)

ammonia = sum of ammonium and ammonia

(1) Nitrite analysis may be discontinued in wells where concentrations are below the reporting limit or otherwise negligibly small. TKN may be discontinued in wells where the comparison of TKN and ammonia results indicate negligibly small organic nitrogen concentrations in groundwater.