Please print or type in the unshaded areas only. Form Approved. OMB No. 2040-0086.

FORM 1 GENERAL	EPA	U.S. ENVIRONMENTAL PROTECTION AGENCY **GENERAL INFORMATION** *Consolidated Permits Program* *(Read the "General Instructions" before starting.)*	I. EPA I.D. NUMBER

S		T/A	C
F			D
1	2 13	14	15

LABEL ITEMS	
I. EPA I.D. NUMBER	PLEASE PLACE LABEL IN THIS SPACE
III. FACILITY NAME	
V. FACILITY MAILING ADDRESS	
VI. FACILITY LOCATION	

GENERAL INSTRUCTIONS

If a preprinted label has been provided, affix it in the designated space. Review the information carefully; if any of it is incorrect, cross through it and enter the correct data in the appropriate fill-in area below. Also, if any of the preprinted data is absent *(the area to the left of the label space lists the information that should appear)*, please provide it in the proper fill-in area(s) below. If the label is complete and correct, you need not complete Items I, III, V, and VI *(except VI-B which must be completed regardless)*. Complete all items if no label has been provided. Refer to the instructions for detailed item descriptions and for the legal authorizations under which this data is collected.

II. POLLUTANT CHARACTERISTICS

INSTRUCTIONS: Complete A through J to determine whether you need to submit any permit application forms to the EPA. If you answer "yes" to any questions, you must submit this form and the supplemental form listed in the parenthesis following the question. Mark "X" in the box in the third column if the supplemental form is attached. If you answer "no" to each question, you need not submit any of these forms. You may answer "no" if your activity is excluded from permit requirements; see Section C of the instructions. See also, Section D of the instructions for definitions of **bold-faced terms**.

SPECIFIC QUESTIONS	Mark "X" YES	NO	FORM ATTACHED	SPECIFIC QUESTIONS	Mark "X" YES	NO	FORM ATTACHED
A. Is this facility a **publicly owned treatment works** which results in a **discharge** to **waters of the U.S.**? (FORM 2A)	16	X 17	18	B. Does or will this facility *(either existing or proposed)* include a **concentrated animal feeding operation** or **aquatic animal production facility** which results in a **discharge** to **waters of the U.S.**? (FORM 2B)	X 19	20	X 21
C. Is this a facility which currently results in **discharges** to **waters of the U.S.** other than those described in A or B above? (FORM 2C)	22	X 23	24	D. Is this a proposed facility *(other than those described in A or B above)* which will result in a **discharge** to **waters of the U.S.**? (FORM 2D)	25	X 26	27
E. Does or will this facility treat, store, or dispose of **hazardous wastes**? (FORM 3)	28	X 29	30	F. Do you or will you inject at this facility industrial or municipal effluent below the lowermost stratum containing, within one quarter mile of the well bore, underground sources of drinking water? (FORM 4)	31	X 32	33
G. Do you or will you inject at this facility any produced water or other fluids which are brought to the surface in connection with conventional oil or natural gas production, inject fluids used for enhanced recovery of oil or natural gas, or inject fluids for storage of liquid hydrocarbons? (FORM 4)	34	X 35	36	H. Do you or will you inject at this facility fluids for special processes such as mining of sulfur by the Frasch process, solution mining of minerals, in situ combustion of fossil fuel, or recovery of geothermal energy? (FORM 4)	37	X 38	39
I. Is this facility a proposed **stationary source** which is one of the 28 industrial categories listed in the instructions and which will potentially emit 100 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)	40	X 41	42	J. Is this facility a proposed **stationary source** which is NOT one of the 28 industrial categories listed in the instructions and which will potentially emit 250 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an **attainment** area? (FORM 5)	43	X 44	45

III. NAME OF FACILITY

C	SKIP	
1		Joseph Gallo Farms-Heifer City
15	16 - 29	30 69

IV. FACILITY CONTACT

C	A. NAME & TITLE *(last, first, & title)*	B. PHONE *(area code & no.)*
2	Roland Perez; Environmental Administrator	(209) 394-7984
15	16 45	46 48 49 51 52- 55

V. FACILTY MAILING ADDRESS

C	A. STREET OR P.O. BOX
3	10561 West Highway 140
15	16 45

C	B. CITY OR TOWN	C. STATE	D. ZIP CODE
4	Atwater	CA	95301
15	16 40	41 42	47 51

VI. FACILITY LOCATION

C	A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER
5	31701 Johnson Canyon Road
15	16 45

B. COUNTY NAME
Monterey
46 70

C	C. CITY OR TOWN	D. STATE	E. ZIP CODE	F. COUNTY CODE *(if known)*
6	Gonzales	CA	93926	
15	16 40	41 42	47 51	52 -54

CONTINUED FROM THE FRONT

VII. SIC CODES (4-digit, in order of priority)

A. FIRST		B. SECOND	
7 0241	(specify) Dairy Replacement Stock-Heifers	7	(specify)

C. THIRD		D. FOURTH	
7	(specify)	7	(specify)

VIII. OPERATOR INFORMATION

A. NAME: 8 Joseph Gallo Farms

B. Is the name listed in Item VIII-A also the owner? ☑ YES ☐ NO

C. STATUS OF OPERATOR (Enter the appropriate letter into the answer box: if "Other," specify.)

F = FEDERAL
S = STATE
P = PRIVATE
M = PUBLIC (other than federal or state)
O = OTHER (specify)

P (specify)

D. PHONE (area code & no.): A (209) 394-7984

E. STREET OR P.O. BOX: 10561 West Highway 140

F. CITY OR TOWN	G. STATE	H. ZIP CODE
B Atwater	CA	95301

IX. INDIAN LAND

Is the facility located on Indian lands? ☐ YES ☑ NO

X. EXISTING ENVIRONMENTAL PERMITS

A. NPDES (Discharges to Surface Water)	D. PSD (Air Emissions from Proposed Sources)	
9 N CA0050601	9 P	

B. UIC (Underground Injection of Fluids)	E. OTHER (specify)	
9 U	9 R3-2003-0126	(specify) WDR Order

C. RCRA (Hazardous Wastes)	E. OTHER (specify)	
9 R	9	(specify)

XI. MAP

Attach to this application a topographic map of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers, and other surface water bodies in the map area. See instructions for precise requirements.

XII. NATURE OF BUSINESS (provide a brief description)

The Joseph Gallo Farms-Heifer City Facility raises dairy replacement cattle (heifers) for its operating dairy farms. Young calves are brought to this facility where they are raised to 22-24 months. The heifers are then brought back to one of the operating Farms. The bull calves are sold.

The site is approximately 529 acres in size, 101 acres of this site is used as a production area and 31 acres is used for feed storage and solid manure composting. The remaining land is open land with portions being used storm water retention ponds and cropland. Figure 1 shows the facility location on a USGS topographic map and includes surface water features. Figure 2 shows the site features including pens, feed lanes, buildings, cropland and stormwater and wastewater evaporation/storage ponds. In addition, Figure 2 shows the surface water flow patterns based on a recent survey of the site.

Waste water is collected and contained in 3 ponds (ponds 1,2 and 146). Stormwater from the site is contained in ponds 12B, 13N and 13S. The center ponds (Lake Crandall East and West, and 12A) are used to contain either waste water or storm water as necessary. Stormwater and waste water that has not evaporated is used as irrigation water on a 64 acre field in the north east portion of the site. Solid manure is composted on site and shipped off site as fertilizer.

See the Nutrient Management Plan dated March 2009 (attached) for additional detail in volumes generated, storage capacity and end use (irrigation) of the liquids.

XIII. CERTIFICATION (see instructions)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME & OFFICIAL TITLE (type or print)	B. SIGNATURE	C. DATE SIGNED
Michael D. Gallo - CEO	[signature]	07-20-09

COMMENTS FOR OFFICIAL USE ONLY

C

Form Approved
OMB No. 2040-0250
Approval expires 12-15-05

EPA I.D. NUMBER *(copy from Item 1 of Form 1)*

FORM 2B NPDES	**EPA**	U.S. ENVIRONMENTAL PROTECTION AGENCY APPLICATIONS FOR PERMIT TO DISCHARGE WASTEWATER CONCENTRATED ANIMAL FEEDING OPERATIONS AND AQUATIC ANIMAL PRODUCTION FACILITIES

I. GENERAL INFORMATION

Applying for: Individual Permit ☒ Coverage Under General Permit ☐

A. TYPE OF BUSINESS	B. CONTACT INFORMATION	C. FACILITY OPERATION STATUS
☒ 1. Concentrated Animal Feeding Operation (complete items B, C, D, and Section II) ☐ 2. Concentrated Aquatic Animal Production Facility (complete items B, C, and section III)	Owner/or Operator Name: Joseph Gallo Farms Telephone: (209.0( ) 3,947,984.00 Address: 10561 West Highway 140 Facsimile: (209.0( ) 394-4988 City: Gonzales State: CA Zip Code: 95301	☒ 1. Existing Facility ☐ 2. Proposed Facility

D. FACILITY INFORMATION

Name: Joseph Gallo Farms-Heifer City Telephone: (209.0( ) 3,947,984.00
Address: 31701 Johnson Canyon Road Facsimile: (209.00) 3944988
City: Gonzales State: CA Zip Code: 93926
County: Monterey Latitude: 36.32.12N Longitude: 121.24.37W

If contract operation: Name of Integrator: ____________
Address of Integrator: ____________

II. CONCENTRATED ANIMAL FEEDING OPERATION CHARACTERISTICS

A. TYPE AND NUMBER OF ANIMALS

1. TYPE	2. ANIMALS: NO. IN OPEN CONFINEMENT	2. ANIMALS: NO. HOUSED UNDER ROOF
☐ Mature Dairy Cows		
☒ Dairy Heifers	30,000.00	
☐ Veal Calves		
☐ Cattle (not dairy or veal)		
☐ Swine (55 lbs. or over)		
☐ Swine (under 55 lbs.)		
☐ Horses		
☐ Sheep or Lambs		
☐ Turkeys		

B. Manure, Litter and/or Wastewater Production and Use

a) How much manure, litter and wastewater is generated annually by the facility? 34,700 tons 6,200,00(gallons

b) If land applied how many acres of land under the control of the applicant are available for applying the CAFOs manure/litter/wastewater? 64.00 acres

c) How many tons of manure or litter, or gallons of wastewater produced by the CAFO will be transferred annually to other persons? tons/gallons *(circle one)* 36,000.00 tons

☐ Chickens (Broilers)		
☐ Chickens (Layers)		
☐ Ducks		
☐ Other Specify ________		
3. TOTAL ANIMALS		

C. ☒ TOPOGRAPHIC MAP

D. TYPE OF CONTAINMENT, STORAGE AND CAPACITY

1. Type of Containment	Total Capacity (in gallons)
☐ Lagoon	
☐ Holding Pond	
☒ Evaporation Pond	22,728,000.00
☐ Other: Specify ________	

2. Report the total number of acres contributing drainage: 132.00 acres

3. Type of Storage	Total Number of Days	Total Capacity (gallons/tons)
☐ Anaerobic Lagoon		
☐ Storage Lagoon		
☒ Evaporation Pond	120.00	22,728,000.00
☐ Aboveground Storage Tanks		
☐ Belowground Storage Tanks		
☐ Roofed Storage Shed		
☐ Concrete Pad		
☐ Impervious Soil Pad		
☐ Other: Specify ________		

E. NUTRIENT MANAGEMENT PLAN

A. Has a nutrient management plan been developed? ☒ Yes ☐ No

B. Is a nutrient management plan being implemented for the facility? ☒ Yes ☐ No

C. If no, when will the nutrient management plan be developed? Date: ________

D. The date of the last review or revision of the nutrient management plan. Date: 07/10/2009

E. If not land applying, describe alternative use(s) of manure, litter and or wastewater: Solid manure is composted and exported. Liquid is irrigated on 64 acres.

Form Approved
OMB No. 2040-0250
Approval expires 12-15-05

F. LAND APPLICATION BEST MANAGEMENT PRACTICES
Please check any of the following best management practices that are being implemented at the facility to control runoff and protect water quality:

☐ Buffers ☒ Setbacks ☐ Conservation tillage ☐ Constructed wetlands ☐ Infiltration field ☐ Grass filter ☐ Terrace

III. CONCENTRATED AQUATIC ANIMAL PRODUCTION FACILITY CHARACTERISTICS

A. For each outfall give the maximum daily flow, maximum 30-day flow, and the long-term average flow.				B. Indicate the total number of ponds, raceways, and similar structures in your facility.		
1. Outfall No.	2. Flow (*gallons per day*)			1. Ponds	2. Raceways	3. Other
	a. Maximum Daily	b. Maximum 30 Day	c. Long Term Average	C. Provide the name of the receiving water and the source of water used by your facility.		
				1. Receiving Water	2. Water Source	

D. List the species of fish or aquatic animals held and fed at your facility. For each species, give the total weight produced by your facility per year in pounds of harvestable weight, and also give the maximum weight present at any one time.

1. Cold Water Species			2. Warm Water Species		
a. Species	b. Harvestable Weight (*pounds*)		a. Species	b. Harvestable Weight (*pounds*)	
	(1) Total Yearly	(2) Maximum		(1) Total Yearly	(2) Maximum

E. Report the total pounds of food during the calendar month of maximum feeding.	1. Month	2. Pounds of Food

IV. CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. Name and Official Title (*print or type*)	B. Phone No. ( )
Michael D. Gallo	(209) 394-7984
C. Signature [signature]	D. Date Signed 07-20-09

APPENDIX B

DAIRY PLANNING TOOL

Dairy Waste Storage Pond Design

Producer: Gallo-Heifer City
Date: 07/14/09

Entered by: CRA
Checked by:

	Flushed Freestall	Flushed Lanes	Scraped Freestall	Scraped Drylot	Animal Weight lbs	Daily Waste ft^3/day
Milking Cows					1,400	
Dry Cows				95	1,500	195
Bred Heifers					1,100	
Heifers, 1 year to breeding				10243	700	9,830
Calves, 3 months to 1 year					470	
Calves, birth to 3 months					140	

Days of Storage	120	days
Net Daily Water Use per Milking Cow		gal/cow/day
Other Daily Fresh Water added to the pond		gal/day
25 year 24 hour Storm Rainfall	2.7	inches
Manured surfaces draining to the pond	132.1	acres
Concrete surfaces draining to the pond	176,443	ft^2
Roof surfaces draining to the pond	110,128	ft^2

Storage Volume Calculations

1) Animal Waste Volume

Manure Waste to be stored in the Pond		1,003	ft^3/day
Manure Waste handled dry and not stored in the Pond		9023	ft^3/day
Total Manure waste volume for the storage period of	120 days =	120,360	ft^3

2) Barn Water Volume

Wash Water used during the Storage Period of	120 days =		ft^3
Other Fresh Water used during the Storage Period o	120 days =		ft^3
	Total =		ft^3

3) Rainfall and Runoff Volume

	25 YR. STORM	NORMAL	
Runoff Volume from Manured Surfaces	798,657	745,179	ft^3
Runoff Volume from Concrete Surfaces	33,993	57,123	ft^3
Runoff Volume from Roof Surfaces	24,309	71,308	ft^3
Rainfall on Pond Surface	53,966	158,233	ft^3
Rainfall Subtotals	910,925	1,031,843	ft^3

Total Rainfall Influence (25 Yr. + Normal)	1,942,768	ft^3
Evaporation Credit	112,848	ft^3

4) Total Required Volume **1,950,280** ft^3

APPENDIX C

MANURE MANAGEMENT PLANNER

-ANNUAL FIELD NUTRIENT NEEDS
-FIELD NUTRIENT BALANCE
-FIELD NUTRIENT STATUS DETAILS

Annual Field Nutrient Needs

Plan File: 052271-RPT26-APPC.mmp
Operation: Joseph Gallo Farms
State: California
Last Saved: 7/24/2009
Init. File Rev: 5/29/2008

Year	*Field ID*	*Sub ID*	*Size Acres*	*Crop*	*Yield Goal /Acre*	*N Lb/Acre*	*P_2O_5 Lb/Acre*	*K_2O Lb/Acre*	*N Lb/Field*	*P_2O_5 Lb/Field*	*K_2O Lb/Field*
2009	Field 1		64	Oats, silage, soft dough	36	504	133	360	32,256	8,512	23,040
Total			64						32,256	8,512	23,040
2010	Field 1		64	Oats, silage, soft dough	36	504	133	360	32,256	8,512	23,040
Total			64						32,256	8,512	23,040
2011	Field 1		64	Oats, silage, soft dough	36	504	133	360	32,256	8,512	23,040
Total			64						32,256	8,512	23,040
2012	Field 1		64	Oats, silage, soft dough	36	504	133	360	32,256	8,512	23,040
Total			64						32,256	8,512	23,040
2013	Field 1		64	Oats, silage, soft dough	36	504	133	360	32,256	8,512	23,040
Total			64						32,256	8,512	23,040

Notes
¤ Indicates a custom fertilizer recommendation.

Field Nutrient Balance

Plan File: \052271-RPT26-APPC.mmp
Operation: Joseph Gallo Farms
State: California
Last Saved: 7/24/2009
Init. File Rev: 5/29/2008

Year	Field ID	Sub ID	Size	Crop	Yield	Fertilizer Recs[2]			Nutrients Applied[3]			Balance After Recs[4]			After Removal[5]	
					Goal	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	P_2O_5	K_2O
			Acres[1]		/Acre	Lb/A	Lb/A	Lb/A	Lb/A	Lb/A	Lb/A	Lb/A	Lb/A	Lb/A	Lb/A	Lb/A
2009	Field 1		64	Oats, silage, soft dough	36	504	133	360	153	15	0	-351	-118	-360	-118	-360
2010	Field 1		64	Oats, silage, soft dough	36	504	133	360	191	24	0	-313	-109	-360	-109	-360
2011	Field 1		64	Oats, silage, soft dough	36	504	133	360	191	24	0	-313	-109	-360	-109	-360
2012	Field 1		64	Oats, silage, soft dough	36	504	133	360	191	24	0	-313	-109	-360	-109	-360
2013	Field 1		64	Oats, silage, soft dough	36	504	133	360	191	24	0	-313	-109	-360	-109	-360
Total	**Field 1**		**64**			**2,520**	**665**	**1,800**	**917**	**111**	**0**					

Notes

1 If a field has a non-spreadable area, it is listed separately following the field's spreadable area.

2 Fertilizer Recs are the crop fertilizer recommendations. The N rec accounts for any N credit from previous legume crop.

3 Nutrients Applied are the nutrients expected to be available to the crop from that year's manure applications plus nutrients from that year's commercial fertilizer applications. With a double crop year, the total nutrients applied for both crops and the year's balances are listed on the second crop's line.

4 Nutrients Applied minus Fertilizer Recs through indicated crop year. With N, includes amount of residual N expected to become available that year from prior years' manure applications. Negative values indicate a potential need to apply additional nutrients.

5 Nutrients Applied minus amount removed by harvested portion of crop through indicated crop year.

¤ Indicates a custom fertilizer recommendation in the Fertilizer Recs columns.

ª Indicates in the Balance After Recs N column that the legume crop is assumed to utilize some or all of the supplied N.

† Indicates in the Balance After Recs N column that the value includes residual N expected to become available that year from prior years' manure applications.

Field Nutrient Status Details

Plan File: 052271-RPT26-APPC.mmp
Operation: Joseph Gallo Farms
State: California
Last Saved: 7/24/2009
Init. File Rev: 5/29/2008

Year	*Field ID*	*Sub ID*	*Nutrient Needs*	*Crop*		*Yield Goal*	*Acres*	*N*	P_2O_5	K_2O
2009	Field 1		Crop Fertilizer Recs	Oats, silage, soft dough		36 Ton	64	504	133	360
2009	Field 1		Crop Nutrient Removal	Oats, silage, soft dough		36 Ton	64	360	133	360
Date	*Field ID*	*Sub ID*	*Nutrient Activity*	*Source*	*Equipment/Method*	*Rate*	*Acres*	*N*	P_2O_5	K_2O
Apr 09	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
May 09	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Jun 09	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Jul 09	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Aug 09	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Apr 09	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	3.1 In	64	15		
May 09	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	6.3 In	64	30		
Jun 09	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	7.3 In	64	35		
Jul 09	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	8.3 In	64	40		
Aug 09	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	7 In	64	33		
2009	Field 1		Total Nutrients Applied	Spreadable Area			64	153	15	0
2009	Field 1		Balance After Recs	Spreadable Area			64	-351	-118	-360
2009	Field 1		Balance After Removal	Spreadable Area			64	-207	-118	-360

Year	*Field ID*	*Sub ID*	*Nutrient Needs*	*Crop*	*Yield Goal*	*Acres*	*N*	P_2O_5	K_2O
2010	Field 1		Crop Fertilizer Recs	Oats, silage, soft dough	36 Ton	64	504	133	360
2010	Field 1		Crop Nutrient Removal	Oats, silage, soft dough	36 Ton	64	360	133	360

Date	*Field ID*	*Sub ID*	*Nutrient Activity*	*Source*	*Equipment/Method*	*Rate*	*Acres*	*N*	P_2O_5	K_2O
Sep 09	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Oct 09	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Mar 10	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Apr 10	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
May 10	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Jun 10	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Jul 10	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Aug 10	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Apr 10	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	3.1 In	64	15		
May 10	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	6.3 In	64	30		
Jun 10	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	7.3 In	64	35		
Jul 10	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	8.3 In	64	40		
Aug 10	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	7 In	64	33		
Sep 09	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	4.5 In	64	21		
Oct 09	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	2.5 In	64	12		
Mar 10	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	1 In	64	5		
2010	Field 1		Total Nutrients Applied	Spreadable Area			64	191	24	0
2010	Field 1		Balance After Recs	Spreadable Area			64	-313	-109	-360
2010	Field 1		Balance After Removal	Spreadable Area			64	-169	-109	-360

Year	*Field ID*	*Sub ID*	*Nutrient Needs*	*Crop*	*Yield Goal*	*Acres*	*N*	P_2O_5	K_2O
2011	Field 1		Crop Fertilizer Recs	Oats, silage, soft dough	36 Ton	64	504	133	360
2011	Field 1		Crop Nutrient Removal	Oats, silage, soft dough	36 Ton	64	360	133	360

Date	*Field ID*	*Sub ID*	*Nutrient Activity*	*Source*	*Equipment/Method*	*Rate*	*Acres*	*N*	P_2O_5	K_2O
Sep 10	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Oct 10	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Mar 11	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Apr 11	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
May 11	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Jun 11	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Jul 11	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Aug 11	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Apr 11	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	3.1 In	64	15		
May 11	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	6.3 In	64	30		
Jun 11	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	7.3 In	64	35		
Jul 11	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	8.3 In	64	40		
Aug 11	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	7 In	64	33		
Sep 10	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	4.5 In	64	21		
Oct 10	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	2.5 In	64	12		
Mar 11	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	1 In	64	5		

2011	Field 1		Total Nutrients Applied	Spreadable Area			64	191	24	0
2011	Field 1		Balance After Recs	Spreadable Area			64	-313	-109	-360
2011	Field 1		Balance After Removal	Spreadable Area			64	-169	-109	-360

Year	*Field ID*	*Sub ID*	*Nutrient Needs*	*Crop*	*Yield Goal*	*Acres*	*N*	*P_2O_5*	*K_2O*
2012	Field 1		Crop Fertilizer Recs	Oats, silage, soft dough	36 Ton	64	504	133	360
2012	Field 1		Crop Nutrient Removal	Oats, silage, soft dough	36 Ton	64	360	133	360

Date	*Field ID*	*Sub ID*	*Nutrient Activity*	*Source*	*Equipment/Method*	*Rate*	*Acres*	*N*	*P_2O_5*	*K_2O*
Sep 11	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Oct 11	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Mar 12	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Apr 12	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
May 12	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Jun 12	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Jul 12	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Aug 12	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Apr 12	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	3.1 In	64	15		
May 12	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	6.3 In	64	30		
Jun 12	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	7.3 In	64	35		
Jul 12	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	8.3 In	64	40		
Aug 12	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	7 In	64	33		
Sep 11	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	4.5 In	64	21		
Oct 11	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	2.5 In	64	12		
Mar 12	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	1 In	64	5		

2012	Field 1		Total Nutrients Applied	Spreadable Area			64	191	24	0
2012	Field 1		Balance After Recs	Spreadable Area			64	-313	-109	-360
2012	Field 1		Balance After Removal	Spreadable Area			64	-169	-109	-360

Year	*Field ID*	*Sub ID*	*Nutrient Needs*	*Crop*	*Yield Goal*	*Acres*	*N*	*P_2O_5*	*K_2O*
2013	Field 1		Crop Fertilizer Recs	Oats, silage, soft dough	36 Ton	64	504	133	360
2013	Field 1		Crop Nutrient Removal	Oats, silage, soft dough	36 Ton	64	360	133	360

Date	*Field ID*	*Sub ID*	*Nutrient Activity*	*Source*	*Equipment/Method*	*Rate*	*Acres*	*N*	*P_2O_5*	*K_2O*
Sep 12	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Oct 12	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Mar 13	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Apr 13	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
May 13	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Jun 13	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Jul 13	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Aug 13	Field 1		Manure App	Pond 12A	Sprinkler	26,500 Gal	64.0		3	
Apr 13	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	3.1 In	64	15		
May 13	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	6.3 In	64	30		
Jun 13	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	7.3 In	64	35		
Jul 13	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	8.3 In	64	40		
Aug 13	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	7 In	64	33		
Sep 12	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	4.5 In	64	21		
Oct 12	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	2.5 In	64	12		
Mar 13	Field 1		Irrigation Water	21 ppm nitrates	Sprinkler irrigation	1 In	64	5		
2013	Field 1		Total Nutrients Applied	Spreadable Area			64	191	24	0
2013	Field 1		Balance After Recs	Spreadable Area			64	-313	-109	-360
2013	Field 1		Balance After Removal	Spreadable Area			64	-169	-109	-360

Notes

(1) If a field has a non-spreadable area, it is listed in a separate section following the field's spreadable area.
(2) Yield Goal, Rate, N, P2O5 and K2O values are all per acre.
(3) The crop's N fertilizer rec accounts for any N credit from a previous legume crop.
(4) If a field has more than one manure application in the same crop year, or if the total area covered that year is less than or greater than the field's area, a field average is used in calculating balances. This field average is the sum of each manure application's area times its per-acre amount of nutrient applied, divided by the field's area.
(5) Any positive P2O5 or K2O balance is carried over to the next year. Available N not utilized in the current crop year is assumed lost.
¤ Indicates a custom fertilizer recommendation in the Crop Fertilizer Recs columns.
[a] Indicates in the Balance After Recs N column that the legume crop is assumed to utilize some or all of the supplied N.

APPENDIX D

NRCS CPS-590 NUTRIENT MANAGEMENT

NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

NUTRIENT MANAGEMENT

(Ac.)

CODE 590

DEFINITION

Managing the amount, source, placement, form and timing of the application of plant nutrients and soil amendments.

PURPOSE

- To budget and supply nutrients for plant production.
- To properly utilize manure or organic by-products as a plant nutrient source.
- To minimize agricultural nonpoint source pollution of surface and ground water resources.
- To protect air quality by reducing nitrogen emissions (ammonium and NO_x compounds) and the formation of atmospheric particulates.
- To maintain or improve the physical, chemical and biological condition of soil.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all lands where plant nutrients and soil amendments are applied.

CRITERIA

General Criteria Applicable to All Purposes

A nutrient budget for nitrogen, phosphorus, and potassium shall be developed that considers all potential sources of nutrients including, but not limited to animal manure and organic by-products, waste water, commercial fertilizer, crop residues, legume credits, and irrigation water. The nutrient budget shall use reasonable yields to set nutrient requirements based on currently accepted University of California guidance, or industry standards when acceptable to University of California.

Realistic yield goals shall be established based on soil productivity information, historical yield data, climatic conditions, level of management and/or local research on similar soil, cropping systems, and soil, tissue, and manure/organic by-products tests.

For new crops or varieties, industry yield recommendations may be used until documented yield information is available.

Plans for nutrient management shall specify the source, amount, timing and method of application of nutrients on each field to achieve realistic production goals, while minimizing movement of nutrients and other potential contaminants to surface and/or ground waters.

Areas contained within established minimum application setbacks (e.g., sinkholes, wells, gullies, ditches, surface inlets or rapidly permeable soil areas) shall not receive direct application of nutrients.

On irrigated lands, irrigation management shall be optimized based on Practice 449 "Irrigation Water Management". This applies whether or not nutrients are being applied with the irrigation water.

Nutrient loss to erosion, leaching, runoff, and subsurface drainage shall be addressed, as needed.

Soil, Manure, and Tissue Sampling and Laboratory Analyses (Testing) Nutrient planning shall be based on current soil, manure, and tissue test results developed in accordance with University of California guidance, or industry practice if recognized by the University of California. When used to assess P and K, current soil tests are no older than three years. Soil sampling used for managing N applications shall be timely, collected very near anticipated application times and considering previous and planned irrigation events or N applications.

Soil, manure, irrigation water, and tissue samples shall be collected and prepared according to University of California guidance or standard industry practice. Soil, water, manure, and tissue test analyses shall be performed by laboratories that are accepted in one or more of the following:

- Laboratories successfully meeting the requirements and performance standards of the North American Proficiency Testing Program (NAPT) under the auspices of the Soil Science Society of America http://www.naptprogram.org/about/participants/, or
- Environmental Laboratory Accreditation Program (ELAP) http://www.dhs.ca.gov/ps/ls/elap/default.htm
- For manure, laboratories successfully meeting the requirements and performance standards of the Manure Proficiency (MAP) Program http://ghex.colostate.edu/map/

Soil and tissue testing shall include analyses for any nutrients for which specific information is needed to develop the nutrient plan. Request analyses pertinent to monitoring or amending the annual nutrient budget, e.g. pH, electrical conductivity (EC), soil organic matter, texture, nitrogen, phosphorus and potassium.

Nutrient Application Rates. Soil amendments shall be applied as needed, to adjust soil properties, including soil pH, to adequately provide for crop nutrient availability and utilization.

Recommended nutrient application rates shall be based on current (updated, as appropriate) University of California recommendations, (and/or industry practice when recognized by the university) that consider current soil test results, tissue tests, realistic yield goals and management capabilities. If University of California does not provide state or regional recommendations, then UC guidance from County Farm Advisors on nutrient application rates, or industry practice when consistent with local UC guidance, is acceptable. The planned rates of nutrient application, as documented in the nutrient budget, shall be determined based on the following guidance:

- Nitrogen Application - Planned nitrogen application rates shall match the recommended rates as closely as possible, except when manure or organic by-products are a source of nutrients. When manure or organic by-products are a source of nutrients, see "Additional Criteria" below.
- Phosphorus Application - Planned phosphorus application rates shall match the recommended rates as closely as possible, except when manure or organic by-products are sources of nutrients. When manure or organic by-products are a source of nutrients, see "Additional Criteria" below.
- Potassium Application - When forage quality is impaired by excess soil potassium levels, application of potassium shall be reduced or suspended until desirable levels in the soil and forage are regained.
- Other Plant Nutrients - The planned rates of application of other nutrients shall be consistent with University of California guidance or industry practice if recognized by University of California.
- Starter Fertilizers - When starter fertilizers are used, they shall be included in the overall nutrient budget, and applied in accordance with University of California recommendations, or industry practice if recognized by University of California.

Nutrient Application Timing. Timing of nutrient application (particularly nitrogen) shall correspond as closely as possible with plant nutrient uptake characteristics, while considering cropping system limitations, weather and climatic conditions, risk assessment tools (e.g., leaching index, P index) and field accessibility.

Nutrient Application Methods. Application methods to reduce the risk of nutrient transport to surface and ground water, or into the atmosphere shall be employed.

To minimize nutrient losses:

- Apply nutrient materials uniformly to application area(s) unless precision application technology indicates variable rates are appropriate. Precise placement with banding, use of drip irrigation, or other strategies to maximize root access to nutrients, is desirable.
- Nutrients shall not be applied to frozen, snow-covered or saturated soil if the potential risk for runoff exists.
- Nutrients shall be applied considering plant nutrient uptake patterns during the growing season, root growth patterns, irrigation practices, nutrient mobility, and other conditions so as to maximize availability to the plant and minimize the risk of runoff, leaching, and volatilization losses.
- Nutrient applications associated with irrigation systems shall be applied in a manner that prevents or minimizes leaching, runoff, or volatilization of nutrients.
- Incorporate or irrigate in any broadcast fertilizers within the shortest practicable timeframe. Apply nitrogen fertilizers as close to anticipated plant need as is possible.

Conservation Management Unit (CMU) Risk Assessment. In areas with identified or designated agricultural phosphorus related water quality impairment, a CMU specific risk assessment of the potential for phosphorus transport from the area shall be completed using the California P Index. In areas with identified or designated agricultural nitrogen related water quality impairment, a CMU specific risk assessment of the potential for nitrogen transport from the area to ground water or surface water shall be completed by evaluating the irrigation, soils, cropping, runoff management, nitrogen application strategies in use, and other factors pertinent to the site.

Note: California regulators may select an alternative method to the PI to manage P application. California NRCS is developing a tool for evaluating risk of N loss. This section will be revised in either case.

Additional Criteria Applicable to Manure and Organic By-Products or Biosolids Applied as a Plant Nutrient Source

When animal manures or organic by-products are applied, a risk assessment of the potential for nutrient transport from the CMU shall be completed using the California P Index to adjust the management of nutrient applications.

Nutrient values of manure and organic by-products shall be determined prior to land application. Samples will be taken and analyzed for nutrient concentration, moisture content, and Ec, as appropriate, with each hauling/emptying cycle for a storage/treatment facility. Manure sampling frequency may vary based on the operation's manure handling strategy and spreading schedule. Dilute manure storage ponds shall be tested at least seasonally when drawdown occurs, with testing at each application recommended. If "stable" (maintaining a certain nutrient concentration with minimal variation) levels are found after three years or more of sampling average values from all sampling may be used for planning manure applications unless continued testing is desirable for other purposes or required by law. When changes occur in manure collection, treatment, storage, herd size, or any other factor capable of significantly altering manure nutrient characteristics renew sampling to establish new characteristics. Samples shall be collected and prepared according to University of California guidance or industry practice. Manure exported from any facility shall be tested and measured as required by law.

In planning for new operations, acceptable "book values" recognized by the NRCS and/or University of California may be used (e.g., NRCS Agricultural Waste Management Field Handbook, UCCE publications, regulatory guidelines, ASABE standards, or unpublished data when appropriate).

Biosolids (sewage sludge) shall be applied in accordance with USEPA regulations. (40 CFR Parts 403 (Pretreatment) and 503 (Biosolids) and other state and/or local regulations regarding the use of biosolids as a nutrient source.

Manure and Organic By-Product Nutrient Application Rates. Manure and organic by-product nutrient application rates shall be based on nutrient analyses procedures recommended by state regulation, or University of California. As indicated above, "book values" may be used in planning for new operations. At a minimum, manure analyses shall include appropriate nutrient and specific ion concentrations. Solid manure test results will include percent moisture. Salt concentration (Ec) shall be monitored so that manure applications do not cause plant damage or negatively impact soil or water quality.

When applying manure with sprinkler irrigation, the application rate (in/hr) of liquid materials applied shall not exceed the soil intake/infiltration rate. All applications with irrigation water shall be managed to minimize ponding, minimize leaching below the root zone, and avoid runoff. Applications with irrigation water shall conform to the principles found in NRCS Practice 449, Irrigation Water Management.

The planned rates of nitrogen and phosphorus application recorded in the plan shall be determined based on the following guidance:

Nitrogen Application Rates

- When manure or organic by-products are used, the nitrogen availability of the planned application rates shall match plant uptake characteristics as closely as possible, taking into consideration the timing of nutrient application(s) in order to minimize leaching and atmospheric losses.
- Management activities and technologies shall be used that effectively utilize mineralized nitrogen and that minimize nitrogen losses through denitrification, leaching, and ammonia volatilization.
- Manure or organic by-products may be applied on legumes at rates equal to the estimated removal of nitrogen in harvested plant biomass.
- When the nutrient management plan component is being implemented on a phosphorus basis, manure or organic by-products shall be applied at rates consistent with a phosphorus limited application rate. In such situations, an additional nitrogen application, from non-organic sources, may be required to supply, but not exceed, the recommended amounts of nitrogen in any given year.

Phosphorus Application Rates

- When manure or organic by-products are used, the planned rates of phosphorus application shall be consistent with state regulation or the Phosphorus Index (PI) Rating. **

  ** Acceptable phosphorus-based manure application rates shall be determined as a function of soil test recommendation or estimated phosphorus removal in harvested plant biomass.

- The application of phosphorus applied as manure may be made at a rate equal to the recommended phosphorus application or estimated phosphorus removal in harvested plant biomass for the crop rotation or multiple years in the crop sequence. When such applications are made, the application rate shall:
  - ◊ Not exceed the recommended nitrogen application rate during the year of application, or
  - ◊ Not exceed the estimated nitrogen removal in harvested plant biomass during the year of application when there is no recommended nitrogen application.
  - ◊ Not be made on sites considered vulnerable to off-site phosphorus transport unless appropriate conservation practices, best

management practices or management activities are used to reduce the vulnerability.

Heavy Metal Monitoring. When sewage sludge (biosolids) is applied, the accumulation of potential pollutants (including arsenic, cadmium, copper, lead, mercury, selenium, and zinc) in the soil shall be monitored in accordance with the US Code, Reference 40 CFR, Parts 403 and 503, and/or any applicable state and local laws or regulations.

Additional Criteria to Protect Air Quality by Reducing Nitrogen and/or Particulate Emissions to the Atmosphere

In areas with an identified or designated nutrient management related air quality concern, any component(s) of nutrient management (i.e., amount, source, placement, form, timing of application) identified by available risk assessment tools as a potential source of atmospheric pollutants shall be adjusted, as necessary, to minimize the loss(es).

Comply with any Federal, State, or Local air quality regulations governing the use of fertilizers or the application of manure or biosolids to land.

When tillage can be performed, surface applications of manure and fertilizer nitrogen formulations that are subject to volatilization on the soil surface (e.g., urea) shall be incorporated into the soil within 24 hours after application.

When manure or organic by-products are applied to grassland, hayland, pasture or minimum-till areas the rate, form and timing of application(s) shall be managed to minimize volatilization losses.

When liquid forms of manure are applied with irrigation equipment, operators will select weather conditions during application that will minimize volatilization losses.

Operators will handle and apply poultry litter or other dry types of animal manures when the potential for wind-driven loss is low and there is less potential for transport of particulates into the atmosphere.

Weather and climatic conditions during manure or organic by-product application(s) shall be recorded and maintained in accordance with the operation and maintenance section of this standard.

CAFO operations seeking permits under CARB or USEPA regulations (40 CFR Parts 122 and 412) should consult with their respective state or local permitting authority for additional criteria.

Additional Criteria to Improve the Physical, Chemical and Biological Condition of the Soil

Nutrients shall be applied and managed in a manner that maintains or improves the physical, chemical and biological condition of the soil.

Minimize the use of nutrient sources with high salt content unless provisions are made to leach salts below the crop root zone and water quality impacts to receiving waters are considered.

To the extent practicable nutrients shall not be applied when the potential for soil compaction and rutting is high.

CONSIDERATIONS

The use of management activities and technologies listed in this section may improve both the production and environmental performance of nutrient management systems.

The addition of these management activities, when applicable, increases the management intensity of the system and is recommended in a nutrient management system.

Action should be taken to protect National Register listed and other eligible cultural resources.

The nutrient budget should be reviewed annually to determine if any changes are needed for the next planned crop.

For some sites specific soil sampling techniques may be appropriate to better manage nitrogen. These include post-harvest deep soil profile sampling for nitrogen, Pre-Sidedress Nitrogen Test (PSNT), Pre-Plant

Soil Nitrate Test (PPSN) or soil surface sampling for phosphorus accumulation or pH changes.

Additional practices to enhance the producer's ability to manage manure effectively include modification of the animal's diet to reduce the manure nutrient content, or utilizing manure amendments that stabilize or tie-up nutrients.

Soil test information should be no older than one year when developing new plans, particularly if animal manures are to be used as a nutrient source.

Excessive levels of some nutrients can cause induced deficiencies of other nutrients.

If increases in soil phosphorus levels are expected, consider a more frequent (annual) soil testing interval.

To manage the conversion of nitrogen in manure or fertilizer, use products or materials (e.g. nitrification inhibitors, urease inhibitors and slow or controlled release fertilizers) that more closely match nutrient release and availability for plant uptake. These materials may improve the nitrogen use efficiency (NUE) of the nutrient management system by reducing losses of nitrogen into water and/or air.

Sample the liquid manure/irrigation water mixture during each application to cropland.

Considerations to Minimize Agricultural Nonpoint Source Pollution of Surface and Ground Water

Erosion control and runoff reduction practices can improve soil nutrient and water storage, infiltration, aeration, tilth, diversity of soil organisms and protect or improve water and air quality (Consider installation of one or more NRCS FOTG, Section IV – Conservation Practice Standards).

Cover crops can effectively utilize and/or recycle residual nitrogen.

Application methods and timing that reduce the risk of nutrients being transported to ground and surface waters, or into the atmosphere include:

- Split applications of nitrogen to provide nutrients at the times of maximum crop utilization,
- Use corn stalk-test or other tissue tests to minimize risk of applying nitrogen in excess of crop needs.
- Where only summer crops are grown, avoid winter nutrient application for spring seeded crops,
- Band applications of phosphorus near the seed row,
- Incorporate surface applied manures or organic by-products as soon as possible after application to minimize nutrient losses,
- Delay field application of animal manures or organic by-products if precipitation capable of producing runoff and erosion is forecast within 24 hours of the time of the planned application.

Apply calcium or acidic soil amendments, as appropriate, to soils with infiltration rates reduced by low salt content in irrigation water or excessive sodium in the soil or irrigation water. This will improve crop health and help control runoff.

Use risk assessment tools for planning, such as the California P Index, where there is significant risk to water quality from nutrients even in areas without identified or designated nutrient related water quality impairment.

Considerations to Protect Air Quality by Reducing Nitrogen and/or Particulate Emissions to the Atmosphere

Odors associated with the land application of manures and organic by-products can be offensive to the occupants of nearby homes. Avoid applying these materials upwind of occupied structures when residents are likely to be home (evenings, weekends and holidays).

When applying manure with irrigation equipment, modifying the equipment can reduce the potential for volatilization of nitrogen from the time the manure leaves the application equipment until it reaches the surface of the soil (e.g., reduced pressure, drop down tubes for center pivots). N volatilization from manure in a surface irrigation system will be reduced when applied under a crop canopy.

When planning nutrient applications and tillage operations, encourage soil carbon buildup while discouraging greenhouse gas emissions (e.g., nitrous oxide N_2O, carbon dioxide CO_2).

Storage and application of ammonia based materials will be done considering methods that limit volatilization.

Endangered Species Considerations

If during the Environmental Assessment, NRCS determines that installation of this practice, along with any others proposed, will have an effect on any federal or state listed Rare, Threatened or Endangered species or their habitat, NRCS will advise the client of the requirements of the Endangered Species Act and recommend alternative conservation treatments that avoid the adverse effects. Further assistance will be provided only if the client selects one of the alternative conservation treatments for installation; or with concurrence of the client, NRCS initiates consultations concerning the listed species with the U.S. Fish and Wildlife Service, National Marine Fisheries Service and/or California Department of Fish and Game.

Cultural Resources Considerations

NRCS policy is to avoid any effect to cultural resources and protect them in their original location. Determine if installation of this practice or associated practices in the plan could have an effect on cultural resources. The National Historic Preservation Act may require consultation with the California State Historic Preservation Officer.

http://www.nrcs.usda.gov/technical/cultural.html is the primary website for cultural resources information. The California Environmental Handbook and the California Environmental Assessment Worksheet also provide guidance on how the NRCS must account for cultural resources. The e-Field Office Technical Guide, Section II contains general information, with Web sites for additional information.

Document any specific considerations for cultural resources in the design docket and the Practice Requirements worksheet.

PLANS AND SPECIFICATIONS

Plans and specifications for nutrient management shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose(s), using nutrients to achieve production goals and to prevent or minimize resource impairment.

Nutrient management plans shall include a statement that the plan was developed based on requirements of the current standard and any applicable Federal, state, or local regulations, policies, or programs, which may include the implementation of other practices and/or management activities. Changes in any of these requirements may necessitate a revision of the plan.

The following components shall be included in the nutrient management plan:

- aerial site photograph(s) or site map(s), and a soil survey map of the site,
- location of designated sensitive areas or resources and the associated, nutrient management restriction,
- current and/or planned plant production sequence or crop rotation,
- results of soil, water, manure and/or organic by-product sample analyses,
- results of plant tissue analyses, when used for nutrient management,
- realistic yield goals for the crops,
- complete nutrient budget for nitrogen, phosphorus, and potassium for the crop rotation or sequence,
- listing and quantification of all nutrient sources,
- CMU specific recommended nutrient application rates, timing, form, and method of application and incorporation, and

- guidance for implementation, operation, maintenance, and recordkeeping

If increases in soil phosphorus levels are expected, the nutrient management plan shall document:

- the potential for soil phosphorus drawdown from the production and harvesting of crops when phosphorus inputs are reduced, and
- management activities or techniques used to reduce the potential for phosphorus loss

OPERATION AND MAINTENANCE

The owner/client is responsible for safe operation and maintenance of this practice including all equipment. Operation and maintenance addresses the following:

- periodic plan review to determine if adjustments or modifications to the plan are needed. As a minimum, plans will be reviewed and revised with each soil test cycle.
- significant changes in animal numbers and/or feed management will necessitate additional manure sampling and analyses to establish a revised average nutrient content.
- protection of fertilizer and organic by-product storage facilities from weather and accidental leakage or spillage.
- calibration of application equipment to ensure uniform distribution of material at planned rates.
- documentation of the actual rate at which nutrients were applied. When the actual rates used differ from the recommended and planned rates, records will indicate the reasons for the differences.
- Maintaining records to document plan implementation. As applicable, records include:
    - Soil, plant tissue, water, manure, and organic by-product analyses resulting in recommendations for nutrient application,
    - quantities, analyses and sources of nutrients applied,
    - dates and method(s) of nutrient applications,
    - weather conditions and soil moisture at the time of application; lapsed time to manure incorporation, rainfall or irrigation event.
    - crops planted, planting and harvest dates, yields, and crop residues removed,
    - dates of plan review, name of reviewer, and recommended changes resulting from the review.

Records should be maintained for five years; or for a period longer than five years if required by other Federal, state or local ordinances, or program or contract requirements.

Workers should be protected from and avoid unnecessary contact with plant nutrient sources. Extra caution must be taken when handling ammoniacal nutrient sources, or when dealing with organic wastes stored in unventilated enclosures.

Material generated from cleaning nutrient application equipment should be utilized in an environmentally safe manner. Excess material should be collected and stored or field applied in an appropriate manner.

Nutrient containers should be recycled in compliance with state and local guidelines or regulations.

REFERENCES

Follett, R.F. 2001. Nitrogen Transformation and Transport Processes. pp. 17-44, In R.F. Follett and J. Hatfield. (eds.). 2001. Nitrogen in the Environment; Sources, Problems, and Solutions. Elsevier Science Publishers. The Netherlands. 520 pp.

Sims, J.T. (ed.) 2005. Phosphorus: Agriculture and the Environment. Agron. Monogr. 46. ASA, CSSA, and SSSA, Madison, WI.

Stevenson, F.J. (ed.) 1982. Nitrogen in Agricultural Soils. Agron. Series 22. ASA, CSSA, and SSSA, Madison, WI.

Western Fertilizer Handbook, 8th Edition or later, Western Plant Health Association

University of California publications such as crop production manuals, crop specific IPM manuals, and crop or research group websites

NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

IRRIGATION WATER MANAGEMENT

(Ac.)

CODE 449

DEFINITION

The process of determining and controlling the volume, frequency and application rate of irrigation water in a planned, efficient manner.

PURPOSE

- Manage soil moisture to promote desired crop response
- Optimize use of available water supplies
- Minimize irrigation induced soil erosion
- Decrease non-point source pollution of surface and groundwater resources
- Manage salts in the crop root zone
- Manage air, soil, or plant micro-climate
- Proper and safe chemigation or fertigation
- Improve air quality by managing soil moisture to reduce particulate matter movement

CONDITIONS WHERE PRACTICE APPLIES

This practice is applicable to all irrigated lands.

An irrigation system adapted for site conditions (soil, slope, crop grown, climate, water quantity and quality, air quality, etc.) must be available and capable of efficiently applying water to meet the intended purpose(s).

CRITERIA

General Criteria Applicable to All Purposes

Irrigation water shall be applied in accordance with federal, state, and local rules, laws, and regulations. Water shall not be applied in excess of the needs to meet the intended purpose.

Measurement and determination of flow rate is a critical component of irrigation water management and shall be a part of all irrigation water management purposes.

The irrigator or decision-maker must possess the knowledge, skills, and capabilities of management coupled with a properly designed, efficient and functioning irrigation system to reasonably achieve the purposes of irrigation water management.

An "Irrigation Water Management Plan" shall be developed to assist the irrigator or decision-maker in the proper management and application of irrigation water.

Irrigator Skills and Capabilities. Proper irrigation scheduling, in both timing and amount, control of runoff, minimizing deep percolation, and the uniform application of water are of primary concern. The irrigator or decision-maker shall possess or obtain the knowledge and capability to accomplish the purposes which include:

A. General

1. How to determine when irrigation water should be applied, based on the rate of water used by crops and on the stages of plant growth and/or soil moisture monitoring.
2. How to determine the amount of water required for each irrigation, including any leaching needs.
3. How to recognize and control erosion caused by irrigation.

4. How to measure or determine the uniformity of application of an irrigation.
5. How to perform system maintenance to assure efficient operation.
6. Knowledge of "where the water goes" after it is applied considering soil surface and subsurface conditions, soil intake rates and permeability, crop root zones, and available water holding capacity.
7. How to manage salinity and shallow water tables through water management.
8. The capability to control the irrigation delivery.

B. Surface Systems

1. The relationship between advance rate, time of opportunity, intake rate, and other aspects of distribution uniformity and the amount of water infiltrated.
2. How to determine and control the amount of irrigation runoff.
3. How to adjust stream size, adjust irrigation time, or employ techniques such as "surge irrigation" to compensate for seasonal changes in intake rate or to improve efficiency of application.

C. Subsurface Systems

1. How to balance the relationship between water tables, leaching needs, and irrigation water requirements.
2. The relationship between the location of the subsurface system to normal farming operations.
3. How to locate and space the system to achieve uniformity of water application.
4. How to accomplish crop germination in arid climates and during dry periods.

D. Pressurized Systems

1. How to adjust the application rate and/or duration to apply the required amount of water.
2. How to recognize and control runoff.
3. How to identify and improve uniformity of water application.
4. How to account for surface storage due to residue and field slope in situations where sprinkler application rate exceeds soil intake rate.
5. How to identify and manage for weather conditions that adversely impact irrigation efficiency and uniformity of application.

System Capability. The irrigation system must be capable of applying water uniformly and efficiently and must provide the irrigator with adequate control over water application.

Additional Criteria to Manage Soil Moisture to Promote Desired Crop Response

The following principles shall be applied for various crop growth stages:

- The volume of water needed for each irrigation shall be based on plant available water-holding capacity of the soil for the crop rooting depth, management allowed soil water depletion, irrigation efficiency and water table contribution.
- The irrigation frequency shall be based on the volume of irrigation water needed and/or available to the crop, the rate of crop evapotranspiration, and effective precipitation.
- The application rate shall be based on the volume of water to be applied, the frequency of irrigation applications, soil infiltration and permeability characteristics, and the capacity of the irrigation system.

Appropriate field adjustments shall be made for seasonal variations and field variability.

Additional Criteria to Optimize Use of Water Supplies

Limited irrigation water supplies shall be managed to meet critical crop growth stages.

When water supplies are estimated to be insufficient to meet even the critical crop growth stage, the irrigator or decision-maker shall modify plant populations, crop and variety selection, and/or irrigated acres to match available or anticipated water supplies.

Additional Criteria to Minimize Irrigation-Induced Soil Erosion

Application rates shall be consistent with local field conditions for long-term productivity of the soil.

Additional Criteria to Decrease Non-Point Source Pollution of Surface and Groundwater Resources

Water application shall be at rates that minimize transport of sediment, nutrients and chemicals to surface waters and that minimize transport of nutrients and chemicals to groundwater.

Additional Criteria to Manage Salts in the Crop Root Zone

The irrigation application volume shall be increased by the amount required to maintain an appropriate salt balance in the soil profile.

The requirement shall be based on the leaching procedure contained in the National Engineering Handbook (NEH) Part 623, Chapter 2 and NEH, Part 652, chapters 3 and 13.

Additional Criteria to Manage Air, Soil or Plant Micro-Climate

The irrigation system shall have the capacity to apply the required rate of water for cold or heat protection as determined by the methodology contained in NEH Part 623, Chapter 2.

Additional Criteria for Proper and Safe Chemigation or Fertigation

Chemigation or fertigation shall be done in accordance with all local, state and federal laws.

The scheduling of nutrient and chemical application should coincide with the irrigation cycle in a manner that will not cause excess leaching of nutrients or chemicals below the root zone to the groundwater or to cause excess runoff to surface waters.

Chemigation or fertigation should not be applied if rainfall is imminent. Application of chemicals or nutrients will be limited to the minimum length of time required to deliver them and flush the pipelines. Irrigation application amount shall be limited to the amount necessary to apply the chemicals or nutrients to the soil depth recommended by label. The timing and rate of application shall be based on the pest, herbicide, or nutrient management plan.

The irrigation and delivery system shall be equipped with properly designed and operating valves and components to prevent backflows into the water source(s) and/or contamination of groundwater, surface water, or the soil.

Additional Criteria to Reduce Particulate Matter Movement

Sprinkler irrigation water shall be applied at a rate and frequency sufficient to reduce the wind erodibility index (I Factor) of the soil by one class.

CONSIDERATIONS

The following items should be considered when planning irrigation water management:

- Consideration should be given to managing precipitation effectiveness, crop residues, and reducing system losses.
- Consider potential for spray drift and odors when applying agricultural and municipal waste waters. Timing of irrigation should be based on prevailing winds to reduce odor. In areas of high visibility, irrigating at night should be considered.
- Consider potential for overspray from end guns onto public roads.
- Equipment modifications and/or soil amendments such as polyacrylamides and mulches should be considered to decrease erosion.
- Consider the quality of water and the potential impact to crop quality and plant development.
- Quality of irrigation water should be considered relative to its potential effect on the soil's physical and chemical properties, such as soil crusting, pH, permeability, salinity, and structure.
- Avoid traffic on wet soils to minimize soil compaction.
- Consider the effects that irrigation water has on wetlands, water related wildlife

habitats, riparian areas, cultural resources, and recreation opportunities.

- Management of nutrients and pesticides.
- Schedule salt leaching events to coincide with low residual soil nutrients and pesticides.
- Water should be managed in such a manner as to not drift or come in direct contact with surrounding electrical lines, supplies, devices, controls, or components that would cause shorts in the same or the creation of an electrical safety hazard to humans or animals.
- Consideration should be given to electrical load control/interruptible power schedules, repair and maintenance downtime, and harvest downtime.
- Consider improving the irrigation system to increase distribution uniformity or application efficiency of irrigation water applications.

CULTURAL RESOURCES CONSIDERATIONS

NRCS policy is to avoid any effect to cultural resources and protect them in their original location. Determine if installation of this practice or associated practices in the plan could have an effect on cultural resources. The National Historic Preservation Act may require consultation with the California State Historic Preservation Officer.

http://www.nrcs.usda.gov/technical/cultural.html is the primary website for cultural resources information. The California Environmental Handbook and the California Environmental Assessment Worksheet also provide guidance on how the NRCS must account for cultural resources. The e-Field Office Technical Guide, Section II contains general information, with Web sites for additional information.

Document any specific considerations for cultural resources in the design docket and the Practice Requirements worksheet.

Endangered Species Considerations

If during the Environmental Assessment NRCS determines that installation of this practice, along with any others proposed, will have an effect on any federal or state listed Rare, Threatened or Endangered species or their habitat, NRCS will advise the client of the requirements of the Endangered Species Act and recommend alternative conservation treatments that avoid the adverse effects. Further assistance will be provided only if the client selects one of the alternative conservation treatments for installation; or with concurrence of the client, NRCS initiates consultations concerning the listed species with the U.S. Fish and Wildlife Service, National Marine Fisheries Service and/or California Department of Fish and Game.

PLANS AND SPECIFICATIONS

Application of this standard may include job sheets or similar documents that specify the applicable requirements, system operations, and components necessary for applying and maintaining the practice to achieve its intended purpose(s).

OPERATION AND MAINTENANCE

The operation and maintenance (O&M) aspects applicable to this standard consist of evaluating available field soil moisture, changes in crop evapotranspiration rates and changes in soil intake rates and adjusting the volume, application rate, or frequency of water application to achieve the intended purpose(s). Other necessary O&M items are addressed in the physical component standards considered companions to this standard.

APPENDIX E

SAMPLING AND RECORD KEEPING REQUIREMENTS

SAMPLING AND RECORD KEEPING REQUIREMENTS

FOR NUTRIENT MANAGEMENT PLAN
JOSEPH GALLO FARMS
31701 JOHNSON CANYON ROAD
GONZALES, CALIFORNIA 93401

The Sample and Analytical Recommendations and the Record-Keeping Requirements listed below are for the 5-year period of the permit (2009 – 2013). The sampling and record keeping are NMP requirements and should supplement any sampling required by other permits.

SAMPLE AND ANALYTICAL RECOMMENDATIONS

The sample requirements outlined in the Best Management Practices (BMPs), 40 CFR Part 412, 4 requires sampling and analytical as follows:

- Manure samples annually and tested for total nitrogen and phosphorus
- Soil samples every five years and analyzed for phosphorus

It is recommended that the following sample and analytical be conducted:

1. Collect a representative wastewater sample from Pond 12A, during an irrigation event, twice a year. Sampling is recommended in late April, to represent the mid-way point through the spring applications and again in late August to represent the summer applications. Analyze the wastewater sample for nitrate-nitrogen (NO_3-N), ammonium-nitrogen (NH_4-N), total Kjeldahl nitrogen (TKN), and phosphorus.
2. Collect a representative freshwater sample, from each source during an irrigation event. Sampling is recommended in late April, to represent the mid-way point through the spring freshwater irrigations and again in late August to represent the summer freshwater irrigations. Analyze the freshwater sample for total nitrogen.
3. Collect a composite soil sample from the field, composed of 20 sub-samples, from the depth of 0 to 4 inches. Analyze the composite soil sample for pH, nitrate-nitrogen, ammonium-nitrogen, organic matter, potassium, and phosphorus.

RECORD KEEPING REQUIREMENTS

Record-keeping requirements to substantiate the Nutrient Management Plan include the following:

- Volume of liquid irrigated both waste water and clean water
- Date(s) of irrigation
- Irrigator's initials

- Soil conditions at time of irrigation (dry, moist, wet)
- Yield of plant material removed from the field annually

The BMPs also require periodic inspection of equipment used for the land application of manure, litter, or process wastewater. It is recommended that any faulty equipment and repairs be documented including the date, person, and method of who inspected and/or repaired the equipment.

SAMPLING LIQUID MANURE

Liquid manure is comprised of both solids and liquid. Dissolved in the liquid phase is the ammonium form of nitrogen, dissolved phosphorus, potassium and other soluble nutrients. The solids phase contains organic forms of nitrogen, phosphorus, potassium and other nutrients that are bound in the solid material. It is these organic solids that give liquid manure its brown color. In most cases, some, but not all, solids will tend to settle, so liquid drawn from the bottom of the pond will have more solids (and correspondingly higher amounts of the organic-forms of nitrogen) than one drawn from higher up in the pond. If a pump intake is located at the bottom of the pond, the liquid manure coming out of the pump will initially have more solids in it than later in the irrigation when more of the water is drawn from higher up in the pond. If the pump intake is near the top of the pond, such as with a floating pump, the reverse is true and the water will contain more solids during the latter part of the irrigation. It may be necessary to sample more frequently during the period when the portion of solids is changing during an irrigation.

How much a pond will vary depends on how the pond has been managed. For example, if fresh water has recently been added at the top of the pond, the difference in nitrogen concentration from top to bottom may be large.

Ideally, samples should be taken periodically throughout an irrigation because the concentration of nutrients in the pond may vary depending on where in the pond the water is being taken from. Ponds may vary more during an irrigation at some times of the year than at others, and many ponds will change in concentration from irrigation to irrigation. Experience with a particular pond will indicate how many samples will be needed over the course of an irrigation, but a minimum of one sample per irrigation is necessary in almost all cases.

If the liquid manure is in a pressurized pipe, the sample may be taken from a spigot installed in the pipe or from the outfall of the pipe, if accessible. Allow the spigot to run sufficient to clear the tube from previous material. Remove the container from the spigot or outlet as soon as it is full to avoid packing a disproportionate amount of solids into the sample. Samples taken from a box in a gravity flow system should be taken from the middle of the stream to avoid floating debris. This can be done by attaching a line to a cork in a narrow-mouth collection bottle and pulling the cork out and allowing the bottle to fill after lowering the bottle (attached to a pole) well into the main part of the flow.

It is best to sample directly into the container you will be analyzing. Do not try to pour a sample from one container into another unless the entire sample can be transferred, otherwise a disproportionate amount of solids may remain in the bottom of the original container.

Sometimes it is necessary to obtain a preliminary estimate of nutrient concentration in order to target the next application. In deciding where to take a sample, consider what part of the pond water applied to the field will come from and try to take a sample from that location. A sample should be taken from the flush only if the irrigation pump and the flush pump share the same intake. A sample taken prior to the irrigation, regardless of where the sample was drawn from, should not substitute for samples drawn during the irrigation itself. A quick test procedure run on all samples will give an indication of the variability of the pond over the course of the irrigation. From these, representative sample should be sent to a laboratory to determine other nutrients and to confirm quick test values.

Usually, a **1** pint sample will be adequate. Samples should be analyzed for ammonium and organic nitrogen. Total phosphorus, potassium, and perhaps other nutrients may also be desirable.

Minimum **1** sample per irrigation, +/-15% accuracy ammonium, +/- 30% organic.

The above recommendation is for producers that have the capacity to apply liquid manure with the 10% accuracy called for in the CNMP. All producers with CNMPs applying liquid manure should be progressing to that capability. For those in transition, several samples per year, and at least one per season, are needed to establish the minimum information needed to evaluate current nutrient application rates and trends in nutrient content with respect to time for the pond and management system.

However, when managing liquid manure as a nitrogen source for crops, taking less than the recommended number of samples is very likely to result in over- or under-applications of the targeted rate, and the potential for reduced yields.

To estimate the N application per acre =

[NO3-N X 0.008345] + [NH4-N X 0.008345] + [Organic N X 0.008345] X volume applied per 1,000 gallons

To estimate the P application per acre =

[P X 0.008345] X volume applied per 1,000 gallons

SAMPLING SOLID MANURE

Each manure pile that comes from a different source, that has been stored for a different length of time, or that has undergone different storage conditions should be sampled separately. Manure piles should be sampled and analyzed as close to the time of usage as possible. Biological and chemical processes change the content of manure over time.

Nutrient content of solid manure depends on many factors. Manure from the milk cow corral that has been stored for 6 months will be different from manure in the dry cow lot that was just scraped. Rations fed to cows will affect manure constituents. Many biological and chemical processes occur as manure is stored. Length of storage, environmental conditions during storage, and whether the manure is spread out or in a pile affects nutrient content, especially nitrogen content.

It is critical for good nutrient management that the manure sample taken to the laboratory represents what is in the pile. Since conditions are different on the surface of a pile compared to areas inside the stack, it is important to take several samples from in the pile. From each manure pile that has been handled in a uniform manner, such as manure from a corral that was scraped and stored for 6 weeks, sample 8 to 12 random locations. Samples should represent both the outside of the stack and the inner portions as well. A shovel or auger can be used. Place samples in a clean bucket or bag and thoroughly mix them. Remove a representative composite subsample of approximately one pint in size and place it in a sealed bag. Keep it cool until it can be taken to the lab. A refrigerator or ice chest is best; avoid direct sunlight such as on the dashboard of a vehicle.

Ask the laboratory how large a sample they would like. Make your representative composite sample, described above, the appropriate size for your laboratory.

What should the laboratory analysis include?
Moisture content is critical to relating the tons applied to the nutrient analysis that is done on a dry weight basis. Moisture content is the most highly variable component of manure.
Nitrogen should be analyzed as Total Nitrogen (TN).
Phosphorus and **potassium** are important crop nutrients and manure can be an important source.
Electrical conductivity (EC) is a measurement of the total salts and reinforces the need for leaching, by sufficient rain or irrigation, before planting.

Other nutrients that are of interest to your farming operation, such as sulfur or micronutrients, may also be analyzed. Be certain to request the laboratory to report results in units convenient to you. Units you may want include ppm, %, and lbs (N,P, or K) per wet ton. Others may be available.

To estimate the nutrient quantity applied with the manure, measure the weight of material in a loaded manure truck and count the loads applied per field. Calculate the tons per acre, then utilize the example calculations below to estimate the nutrient content of the manure and the nutrient application rate. Alternatively, follow the calibration procedures contained in Appendix B3.

References:

Meyer, Deanne and D. Mullinax. 1997. Nutrient Content of Dairy Manure. Dairy Manure Management Series, University of California Cooperative Extension.

McFarland, Mark L., T.L. Provin, and S.E. Feagley. Managing Crop Nutrients Through Soil, Manure and Effluent Testing. L-5175. Texas Agricultural Extension Service, Texas A&M University.1997

SAMPLE CALCULATIONS FOR SOLID MANURE ANALYSIS

Results from the laboratory:
Moisture: 46 %
Total Nitrogen (N): 2.8 % (the same as 28,000 ppm)
Phosphorus (P): 0.5 % (the same as 5,000 ppm)
Potassium (K):2.3 % (the same as 23,000 ppm)

The Total Nitrogen, Phosphorus and Potassium are reported on a dry weight basis.

For each ton of the manure "as is" in the pile, 46 % of the weight, or 920 lbs, is water. The remaining 54%, or 1,080 lbs., is dry weight.

$$1 \text{ ton} \times \frac{2000 \text{ lbs.}}{\text{ton}} \times .54 = 1{,}080 \text{ lbs. dry weight}$$

Total nitrogen is 2.8% of 1,080 lbs.

1,080 lbs. x 0.028 = 30.2 lbs. per ton of field applied manure.

Phosphorus (P) is 0.5 % of 1,080 lbs.

1,080 lbs. x 0.005 = 5.4 lbs. P per ton of field applied manure.

5.4 lbs. P x 2.27 = 12.3 lbs. of P_2O_5 per ton of field applied manure.

Potassium (K) is 2.3% of 1,080 lbs.

1,080 x 0.023 = 24.8 lbs K per ton of field applied manure.

24.8 lbs. K x 1.2 = 29.8 lbs. K_2O per ton of field applied manure.

To estimate the N application per acre:
Acres in the field: 30
Number of loads applied to the field: 20
Tons of manure applied per load: 3
Total tons applied per acre: $\frac{20 \times 3}{30} = 2$ tons per acre

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Using the above information about the manure N content:

2 tons per acre x 30.2 lbs. per ton of field applied manure = 60 lbs. N per acre

To estimate the loads needed for a planned N application per acre:
Target application rate is 80 lbs. N per acre to a 40-acre field

~~Measure the material applied per truckload. (For example, 3 tons)~~

Using the above calculations, 3 t x 30.2 lbs. N/t = 91 lbs. per load

$$\frac{\text{40 acres x 80 lbs/ac}}{\text{91 lbs. N per load}} = \frac{\text{3200 lbs.}}{\text{91 lbs.N/load}} = \text{about 35 loads for the field}$$

It is essential to distribute the manure evenly on the field to achieve the benefit of the manure and to avoid unnecessary leaching or runoff of nutrients.

APPENDIX D

SAMPLING PLANTS, SOILS, AND CROPS FOR NUTRIENT REMOVAL.

A key aspect of designing a nutrient application program is evaluating the needs of the crop to be grown. This can be done by evaluating previous crop management strategies, visual observation of the growing crop, keeping records of manure—both solid and liquid lagoon water nutrient applications, nutrients applied in irrigation water, soil analysis, plant tissue testing and crop nutrient removal. Using all of these tools in combination provides the best results. Apply manure, lagoon water or fertilizer to correct nutrient deficiencies after careful consideration of the amount of nutrients removed by the crop, the yield potential of the field, current soil-test levels, and historical responses to fertilization.

PREVIOUS CROP MANAGEMENT STRATEGIES

Careful evaluation of past fertilizer, manure and lagoon water nutrient applications, both timing and total amount relative to crop yields is the first step. Visual observation of the plants during the growing season for nutrient deficiencies, yellowing of leaves or possible excesses such as leaf burn caused by excess salt, very dark green leaves along with leaf or soil analysis will be tools to use to detect low or high nutrient applications and the need to increase or reduce rates of applied nutrients.

VISUAL OBSERVATION

Nutrient deficiencies may be indicated by visual plant symptoms such as obvious plant stunting or yellowing. Nitrogen deficiencies in corn and most cereals like wheat, oats, barley and rye usually show as general yellowing of the plant and "V-shaped" yellowing beginning at the tip of older leaves and extending down the midrib or center of the leaf. Very dark green leaves, particularly older leaves of more mature plants may indicate excessively high nitrogen rates have been applied. Premature dying of the lower leaves, often called "firing" in corn, is the result of nitrogen deficiency. Purple colored leaves particularly on young plants during the fall and winter or early in the spring may be the result of cool growing conditions or perhaps phosphorus deficiency. Potassium deficiencies begin to show as yellowing of the leaf tips and then extend down the edges or margins of the more mature leaves. As deficiencies become more severe, the leaf margins die and turn brown. Zinc deficiency may be found on recently graded or leveled fields where topsoil containing higher amounts of organic matter has been removed. Deficiency symptoms often appear on corn as yellowing in the middle of the leaf between the midrib or center of the leaf and the outer edge midway between the tip and base of the leaf. Animal manures are an excellent source to supply this essential nutrient. Unfortunately, visual symptoms are not definitive and may be confused or mistaken for symptoms caused by other factors—insect injury, diseases, restricted root growth. The other problem with using visual observation of plant symptoms to diagnose nutrient deficiencies is that significant yield losses may have already occurred by the time the symptoms appear. Always confirm visual diagnosis with plant tissue analysis or test strips with selected fertilizers.

SOIL SAMPLING AND TESTING FOR CROP NUTRIENT MANAGEMENT AND ENVIRONMENTAL CONCERNS

Both soil and plant tissue test results are used to detect plant nutrient deficiencies or in some cases excess nutrient applications. These two tests differ in their ability to reliably diagnose nutrition problems in corn, wheat, oats, barley and rye. To fully understand and correct deficiencies and excesses, testing both soil and plant tissue may be desirable.

Soil tests provide an estimate of nutrient availability for uptake by plants and are most useful for assessing the fertility of fields prior to planting or at the end of the cropping season. Soil sampling methods are critical, since soil samples must adequately reflect the nutrient status of the field. Because a representative sample of an entire field is intended to give an average of all the variation in that field, it is not the best way to develop recommendations for parts of the field that are less productive. The best technique is to divide each field into two or three areas representing good, medium, and poor crop growth. Within each area establish permanent benchmark locations approximately 50 x 50 feet in size (Figure 1). To ensure that you will be able to find each benchmark area again, describe it in relation to measured distances to specific landmarks on the edge of the field or use a global positioning system (GPS) to locate the area. By using this method to collect soil and plant tissue samples, you will be able to compare areas of the field with different crop production levels, develop appropriate management responses, and track changes over the years.

The best time to sample soil is soon after an irrigation or rainfall, so the probe easily penetrates the moist soil. Before taking a soil sample, remove debris or residual plant material from the soil surface. The sample can be taken with a shovel, but an Oakfield or similar sampling probe (3/4 - 1" in diameter) is preferred. Sample the top 6 to 8 inches of soil. Take 15 to 20 cores at random from each benchmark area and mix them thoroughly in a plastic bucket to produce a single 1 - 2 pint composite sample for each benchmark area. Place each sample in a separate double-thick paper bag and dry the soil at room temperature before mailing to the laboratory. To get a complete profile of the nutrition status of a field, perform the following analyses: pH, organic matter for nitrogen, bicarbonate-P for phosphorus, exchangeable K for potassium, DTPA-Zn for zinc and EC or electrical conductivity to assess potential salt accumulation. A more complete salt analysis would include calcium (Ca), magnesium (Mg), sodium (Na) and sodium absorption ratio (SAR). Other analyses may be helpful in some

Table 1. Interpretation of soil test results for assessing plant growth responses.

		Soil test value, ppm[1]			
Nutrient	Extract	Deficient	Critical	Adequate	High
Phosphorus	Sodium Bicarbonate	< 5	5 - 10	> 10	> 40
Potassium	Ammonium Acetate	< 40	40 - 80	80 - 125	> 200
Zinc	DTPA	< 0.5	0.5 – 1.0	> 1.0	> 5.0

[1]An economic yield response to fertilizer application is very likely for values below the deficient level, somewhat likely for values in the critical range, and unlikely over the adequate level.

Situations. A list of laboratories is found in University of California Special Publication 3024, *California Commercial Laboratories Providing Agricultural Testing*.

Taking soil samples every other or every third or fourth year may be adequate once historical trends have been established. If poor crop growth is observed in other parts of the field, take samples from both good and poor growth areas so the fertility and salt level of the two areas can be compared. Table 1 lists guidelines for interpreting soil tests. Values are given for deficient, marginal, adequate, and high levels. An economic yield response to fertilizer application is very likely for values below the deficient level, somewhat likely for values in the marginal level, and unlikely for values over the adequate level.

SOIL TESTING TO ASSESS EXCESSIVE NITROGEN APPLICATIONS AND ENVIRONMENTAL CONCERNS

To assess the potential excessive application of nitrogen, soil samples from the two or three benchmark areas in the field should be sampled in one-foot increments to the 4-foot depth. It may be desirable to sample the surface foot as two samples—0 - 6″ and 6 - 12″ so that the surface sample can be analyzed as discussed above. The 6 - 12″ and the deeper depth samples require only 6 to 8 cores for a composite sample. These samples should be analyzed for ammonium-N and nitrate-N concentrations. Ammonium-N and nitrate-N concentrations in the surface 1 or 2 foot increments could be considered to be available for the following crop provided excessive leaching does not move this nitrogen below the rooting zone. Excessive nitrate concentrations in the lower depths (3 to 5 foot depths) would indicate excessive applications of nitrogen and water that were not utilized by the crop and have little opportunity to be available for the next crop.

Table 2. Interpretation of soil test results for assessing excessive nitrate-N concentrations in the deeper portion (third, fourth and fifth foot depths) of the soil profile. Nitrate-N concentrations are expressed on a dry soil basis.

		Soil test value, ppm		
Nutrient	Extract	Desirable	High	Excessive
Nitrate	Potassium Chloride (1 M)	< 5	5-10	> 10

PLANT TISSUE SAMPLING AND TESTING

Leaf sampling followed by chemical analysis of corn, wheat, oats, barley and rye is an effective way of determining the nutrient status of the crop. Such tests are the best reflection of what nutrients the plant has taken up and are far more accurate than trying to predict what may occur with the use of soil tests. Unfortunately the early growth stage samples may not predict very effectively what nutrient additions are needed during the later growth stages to achieve high yields or crop quality. Samples taken at later growth stages may be more highly correlated with yield or quality but do not provide for nutrient applications to be made in time to correct deficiencies that will influence crop yield or quality. Sampling the small grains wheat, barley and oats at tillering (Feekes growth stage 3) should include the entire aboveground portion of 20 - 30 plants from each of the benchmark areas. Taking samples at tillering may allow time for correction of nutrient deficiencies on the current crop. Collect 12 to 16 leaves from as many corn plants when 75% of the plants are tasselling and take the ear leaf or the leaf opposite and below the ear from each of the benchmark areas. Samples should be analyzed for total nitrogen (N), phosphorus (P), potassium (K), zinc (Zn) and other nutrients as desired.

Table 3. Interpretation of plant tissue test results for assessing plant growth responses.

			Plant tissue test value[1]			
Crop	Plant growth stage[2]	Nutrient	Deficient	Critical	Adequate	High
Barley, oats wheat, rye and triticale	Tillering (GS3)	Nitrogen	< 3.0	3.0-4.0	4.0-5.0	> 5.0
		Phosphorus	< 0.2	0.2-0.3	0.4-0.7	> 0.7
		Potassium	< 2.0	2.0-3.2	3.2-4.0	> 4.0
		Zinc (ppm)	< 15	15-20	20-70	> 70
Barley, oats wheat, rye and triticale	Heading (GS10.3)	Nitrogen	< 2.0	2.0-2.5	2.5-3.5	> 3.5
		Phosphorus	< 0.15	0.15-0.2	0.2-0.4	> 0.4
		Potassium	< 1.5	1.5-2.0	2.0-3.0	> 3.0
		Zinc (ppm)	< 15	15-20	20-70	> 70
Corn	75% Tassel	Nitrogen	< 2.25	2.25-2.5	2.5-3.0	> 3.5
		Phosphorus	< 0.23	0.23-0.26	0.26-0.3	> 0.3
		Potassium	< 1.5	1.5-2.0	2.0-3.0	> 3.0
		Zinc (ppm)	< 15	15-20	20-50	> 50

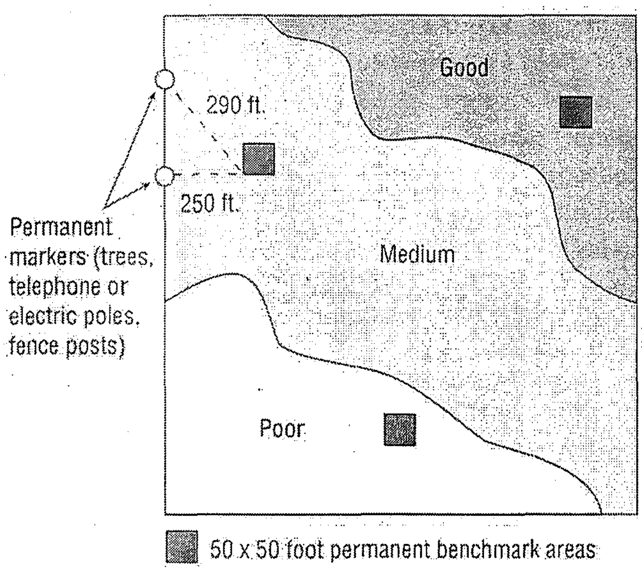
[1] An economic yield response to fertilizer application is very likely for values below the deficient level, somewhat likely for values in the critical range, and unlikely over the adequate level.
[2] Approximate Feekes scale growth stage.

ESTIMATING CROP NUTRIENT REMOVAL

Whole plant tissue tests are useful in determining total nutrient uptake and removal by the crop as well as determining feed value for the animals. Sampling whole plants to achieve accurate nutrient concentrations is difficult because of the wide differences in concentration between various plant parts. Leaf concentrations of nitrogen for example may be 2.0-2.5% whereas the midrib of a corn leaf or the stalk might be only 1/3 to ¼ of that concentration. Even the range of nitrogen concentration in the grain of corn or one of the cereal grains may differ by a factor of 1½ - 2 or more. One method for taking a sample would be to use a hay-sampling probe to take 15 to 20 cores that are composited in the same bag from the silage pit as it is being filled. These cores should be taken to represent the forage coming from specific fields so that yields and crop removal can be calculated from each field. The core samples should be mixed thoroughly and an approximate 2-3 pound representative subsample taken that can be submitted to the laboratory and used for chemical analysis. Another good way of sampling is to collect 10-15 whole plants, dry and then chop or grind to pass through about a 4 mesh screen (4-6 mm openings) or ¼ to ½ inch in length. Mix thoroughly and take an approximate 2-3 pound representative subsample that can be taken to the laboratory and used for chemical analysis. Samples should be analyzed for total nitrogen (N), phosphorus (P), potassium (K), and perhaps zinc (Zn) and other nutrients as desired.

FIGURES

Figure 1. Sound soil and plant tissue sampling procedures involve establishing permanent benchmark sampling locations (50 x 50 feet in size) within areas of the field that support good, medium and poor crop growth. Define these benchmark areas in relation to measured distances to specific landmarks on the edge of the field or use global positioning systems.



See file: intermtnalfmgmt.jpg for above diagram

CNMPSPT1_010803.doc

EXHIBIT B

CREEK ENVIRONMENTAL LABORATORIES, INC.

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Mark Vidensek
Joseph Gallo Dairies
P.O. Box 775
Atwater, CA 95326

Log Number: 04-C4627
Order: L1832
Received: 04/14/04

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	SAMPLED BY	SAMPLED DATE @ TIME	MATRIX
Wastewater-collected from pond 12A Sample ID: 041404 A	Mark Vidensek	04/14/04@11:30	Aqueous

ANALYTE	RESULT	* R.L.	UNITS	METHOD	ANALYZED
Carbonate Alkalinity as CaCO3	Not Detected	1	mg/L	SM 2320B	04/22/04
Bicarbonate Alkalinity as CaCO3	33,000	1	mg/L	SM 2320B	04/22/04
Hydroxide Alkalinity as CaCO3	Not Detected	1	mg/L	SM 2320B	04/22/04
Total Alkalinity as CaCO3	33,000	2	mg/L	SM 2320B	04/20/04
Biochemical Oxygen Demand	1,500	3	mg/L	EPA 405.1	04/16/04
Chloride	2,900	100	mg/L	EPA 300.0	04/15/04
Electrical Conductance	16,000	1	umhos/cm	SM 2510	04/14/04
Organic Nitrogen Value	130	---	mg/L	Calculated	04/28/04
Total Nitrogen Value	250	0.1	mg/L	Calculated	
Ammonia, Total, as N	120	0.3	mg/L	EPA 350.2	04/21/04
Nitrate as N	Not Detected	1	mg/L	EPA 300.0	04/15/04
Nitrate as NO3	Not Detected	4	mg/L	EPA 300.0	04/15/04
Nitrite as N	Not Detected	1	mg/L	EPA 300.0	04/15/04
pH	8.0	0.1	units	EPA 150.1	04/14/04
Total Phosphorus as P	87	0.02	mg/L	EPA 365.2	04/21/04
Sulfate	Not Detected	5	mg/L	EPA 300.0	04/15/04
Total Dissolved Solids	14,000	10	mg/L	EPA 160.1	04/18/04
Total Kjeldahl Nitrogen	250	6	mg/L	EPA 351.3	04/22/04
Boron	1.5	0.2	mg/L	EPA 200.7	04/16/04
Calcium	200	0.2	mg/L	EPA 200.7	04/16/04
Hardness	1,000	1	mg/L CaCO3	EPA 200.7	04/16/04
Copper	Not Detected	0.2	mg/L	EPA 200.7	04/16/04
Iron	18	0.5	mg/L	EPA 200.7	04/16/04
Potassium	3,700	2	mg/L	EPA 200.7	04/20/04
Magnesium	120	0.2	mg/L	EPA 200.7	04/16/04
Manganese	2.8	0.2	mg/L	EPA 200.7	04/16/04
Sodium	890	0.2	mg/L	EPA 200.7	04/16/04
Zinc	0.82	0.2	mg/L	EPA 200.7	04/16/04

* R.L. - Reporting Limit. 'RESULTS' reported as "Not Detected" means not detected above R.L.

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Mark Vidensek
Joseph Gallo Dairies
P.O. Box 775
Atwater, CA 95326

Log Number: 04-C11161
Order: L4946
Received: 09/29/04

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	SAMPLED BY	SAMPLED DATE @ TIME	MATRIX
092904B (effluent)	Mark Vidensek	09/29/04@10:15	Aqueous

ANALYTE	RESULT	DLR	UNITS	METHOD	ANALYZED
Total Alkalinity as CaCO3	8,500	2	mg/L	SM 2320B	10/01/04
Biochemical Oxygen Demand	250	3	mg/L	EPA 405.1	10/01/04
Chloride	10,000	100	mg/L	EPA 300.0	09/29/04
Electrical Conductance	60,000	1	umhos/cm	SM 2510	09/29/04
Organic Nitrogen Value	440	---	mg/L	Calculated	10/14/04
Total Nitrogen Value	440	0.1	mg/L	Calculated	
Ammonia, Total, as N	6.9	0.3	mg/L	EPA 350.2	10/05/04
Nitrate as N	Not Detected	1	mg/L	EPA 300.0	09/29/04
Nitrate as NO3	Not Detected	4	mg/L	EPA 300.0	09/29/04
Nitrite as N	Not Detected	1	mg/L	EPA 300.0	09/29/04
pH	9.0	0.1	units	EPA 150.1	09/29/04
Total Phosphorus as P	97	2	mg/L	SM4500-P E	10/05/04
Sulfate	2,600	5	mg/L	EPA 300.0	09/29/04
Total Dissolved Solids	39,000	10	mg/L	EPA 160.1	09/30/04
Total Kjeldahl Nitrogen	440	0.5	mg/L	EPA 351.3	10/04/04
Hardness	3,200	1	mg/L CaCO3	EPA 200.7	10/19/04

DLR = Detection Limit for Reporting. Results of "Not Detected" are below DLR.

CREEK ENVIRONMENTAL LABORATORIES

Lab Manager, Mary Ann Long

RAMY R

CREEK ENVIRONMENTAL LABORATORIES, INC.
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RECEIVED

MAY 4 - 2005

Environmental Dept.
Joseph Gallo Dairies
P.O. Box 775
Atwater, CA 95326

Ans'd ....

Log Number: 05-C3897
Order: M1869
Received: 04/13/05

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	SAMPLED BY	SAMPLED DATE @ TIME	MATRIX
Pond 12A	L. Crane	04/13/05@10:40	Aqueous

ANALYTE	RESULT	DLR	UNITS	METHOD	ANALYZED
Total Alkalinity as CaCO3	3,000	2	mg/L	SM 2320B	04/22/05
Biochemical Oxygen Demand	3,000	3	mg/L	EPA 405.1	04/15/05
Chloride	2,200	100	mg/L	EPA 300.0	04/14/05
Electrical Conductance	12,000	1	umhos/cm	SM 2510	04/13/05
Organic Nitrogen Value	440	---	mg/L	Calculated	04/26/05
Total Nitrogen Value	580	0.1	mg/L	Calculated	
Ammonia, Total, as N	140	0.3	mg/L	EPA 350.2	04/20/05
Nitrate as N	Not Detected	0.1	mg/L	EPA 300.0	04/13/05
Nitrate as NO3	Not Detected	0.4	mg/L	EPA 300.0	04/13/05
Nitrite as N	Not Detected	0.1	mg/L	EPA 300.0	04/13/05
pH	7.8	0.1	units	EPA 150.1	04/13/05
Total Phosphorus as P	91	0.02	mg/L	SM4500-P E	04/20/05
Sulfate	2.6	0.5	mg/L	EPA 300.0	04/13/05
Total Dissolved Solids	8,500	10	mg/L	EPA 160.1	04/24/05
Total Kjeldahl Nitrogen	580	0.5	mg/L	EPA 351.3	04/25/05
Calcium	240	0.3	mg/L	EPA 200.7	04/15/05
Hardness	1,100	1	mg/L CaCO3	EPA 200.7	04/15/05
Copper	Not Detected	0.5	mg/L	EPA 200.7	04/15/05
Iron	36	1	mg/L	EPA 200.7	04/15/05
Potassium	2,900	1	mg/L	EPA 200.7	04/15/05
Magnesium	120	0.3	mg/L	EPA 200.7	04/15/05
Manganese	3.9	0.2	mg/L	EPA 200.7	04/15/05
Sodium	700	0.5	mg/L	EPA 200.7	04/15/05
Zinc	1.4	0.5	mg/L	EPA 200.7	04/15/05

DLR = Detection Limit for Reporting. Results of "Not Detected" are below DLR.

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Randy Riviere
Joseph Gallo Dairies
Johnson Canyon Water Sys #1
P.O. Box 775
Atwater, CA 95301

Log Number: 05-C14649
Order: M6460
Project: Semi-annual
Received: 11/30/05

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	SAMPLED BY	SAMPLED DATE @ TIME	MATRIX
Pond 12A	L. Crane	11/30/05@12:10	Aqueous

ANALYTE	RESULT	DLR	UNITS	METHOD	ANALYZED
Total Alkalinity as CaCO3	7,900	2	mg/L	SM 2320B	12/09/05
Biochemical Oxygen Demand	1,000	3	mg/L	EPA 405.1	12/02/05
Chloride 363574	5,500	100	mg/L	EPA 300.0	12/02/05
Electrical Conductance	25,000	1	umhos/cm	SM 2510	11/30/05
Total Nitrogen Value	340	0.5	mg/L	Calculated	
Ammonia, Total, as N	73	0.3	mg/L	EPA 350.2	12/02/05
Nitrate as N	Not Detected	2	mg/L	EPA 300.0	12/01/05
Nitrate as NO3	Not Detected	8	mg/L	EPA 300.0	12/01/05
Nitrite as N	Not Detected	2	mg/L	EPA 300.0	12/01/05
pH 363546	8.5	0.0	units	EPA 150.1	11/30/05
Total Phosphorus as P	140	0.02	mg/L	SM4500-P E	12/02/05
Sulfate	Not Detected	10	mg/L	EPA 300.0	12/01/05
Total Dissolved Solids 363510	26,000	10	mg/L	EPA 160.1	12/07/05
Total Kjeldahl Nitrogen	340	0.5	mg/L	EPA 351.3	12/08/05
Calcium	480	0.2	mg/L	EPA 6010	12/09/05
Hardness	2,400	1	mg/L CaCO3	EPA 6010	12/09/05
Copper	0.83	0.1	mg/L	EPA 6010	12/09/05
Iron	82	0.1	mg/L	EPA 6010	12/09/05
Potassium	7,200	10	mg/L	EPA 6010	12/09/05
Magnesium	290	0.2	mg/L	EPA 6010	12/09/05
Manganese	9.4	0.01	mg/L	EPA 6010	12/09/05
Sodium 36355	1,600	0.2	mg/L	EPA 6010	12/09/05
Zinc	2.9	0.1	mg/L	EPA 6010	12/09/05

DLR = Detection Limit for Reporting. Results of "Not Detected" are below DLR.

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Randy Riviere
Joseph Gallo Dairies
Johnson Canyon Water Sys #1
P.O. Box 775
Atwater, CA 95301

Log Number: 06-C4316
Order: N2093
Project: Semi-annual
Received: 04/12/06

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	SAMPLED BY	SAMPLED DATE @ TIME	MATRIX
Pond 12A	L. Crane	04/12/06@09:05	Aqueous

ANALYTE	RESULT	DLR	UNITS	METHOD	ANALYZED
Total Alkalinity as CaCO3	2,600	2	mg/L	SM 2320B	04/20/06
Biochemical Oxygen Demand	1,200	3	mg/L	EPA 405.1	04/14/06
Chloride	1,700	100	mg/L	EPA 300.0	04/13/06
Electrical Conductance	8,500	1	umhos/cm	SM 2510	04/12/06
Organic Nitrogen Value	140	0.5	mg/L	Calculated	
Total Nitrogen Value	280	0.5	mg/L	Calculated	
Ammonia, Total, as N	130	0.3	mg/L	EPA 350.2	04/17/06
Nitrate as N	Not Detected	1	mg/L	EPA 300.0	04/12/06
Nitrate as NO3	Not Detected	4	mg/L	EPA 300.0	
Nitrite as N	Not Detected	1	mg/L	EPA 300.0	04/12/06
pH	7.9	0.0	units	EPA 150.1	04/12/06
Total Phosphorus as P	78	0.02	mg/L	SM4500-P E	04/18/06
Sulfate	6.4	5	mg/L	EPA 300.0	04/12/06
Total Dissolved Solids	7,700	10	mg/L	EPA 160.1	04/16/06
Total Kjeldahl Nitrogen	280	0.5	mg/L	EPA 351.3	04/20/06
Calcium	200	0.03	mg/L	EPA 6010	04/27/06
Hardness	970	1	mg/L CaCO3	EPA 6010	
Copper	0.28	0.02	mg/L	EPA 6010	04/27/06
Iron	41	0.02	mg/L	EPA 6010	04/27/06
Potassium	2,300	0.1	mg/L	EPA 6010	04/27/06
Magnesium	110	0.03	mg/L	EPA 6010	04/27/06
Manganese	2.8	0.002	mg/L	EPA 6010	04/27/06
Sodium	510	0.05	mg/L	EPA 6010	04/27/06
Zinc	0.92	0.02	mg/L	EPA 6010	04/27/06

DLR = Detection Limit for Reporting. Results of "Not Detected" are below DLR.

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Randy Riviere
Joseph Gallo Dairies
Johnson Canyon Water Sys #1
P.O. Box 775
Atwater, CA 95301

Log Number: 06-C13113
Order: N5981
Project: Semi-annual
Received: 10/04/06
Printed: 10/13/06

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
Pond 12A (effluent)	Larry Crane	10/04/06@09:05	Aqueous

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Carbonate Alkalinity as CaCO3	400	1	1	mg/L	SM 2320B	10/10/06		8631
Bicarbonate Alkalinity as CaCO3	5,900	1	1	mg/L	SM 2320B	10/10/06		8631
Hydroxide Alkalinity as CaCO3	Not Detected	1	1	mg/L	SM 2320B	10/10/06		8631
Total Alkalinity as CaCO3	6,300	2	1	mg/L	SM 2320B	10/10/06		8631
Biochemical Oxygen Demand	470	3	1	mg/L	EPA 405.1	10/06/06		8752
Chloride	2,800	100	100	mg/L	EPA 300.0	10/06/06		8526
Electrical Conductance	18,000	2	2	umhos/cm	SM 2510	10/05/06		8486
Organic Nitrogen Value	110	0.5	NA	mg/L	Calculated			
Total Nitrogen Value	230	0.5	NA	mg/L	Calculated			
Ammonia, Total, as N	120	0.3	1	mg/L	EPA 350.2	10/13/06	13/13/06	8781
Nitrate as N	Not Detected	0.1	1	mg/L	EPA 300.0	10/06/06		8526
Nitrate as NO3	Not Detected	0.4	1	mg/L	EPA 300.0			
Nitrite as N	Not Detected	0.1	1	mg/L	EPA 300.0	10/06/06		8526
pH	8.4	0.1	1	pH units	EPA 150.1	10/05/06		8486
Total Phosphorus as P	51	0.02	1	mg/L	SM4500-P E	10/09/06	10/08/06	8564
Sulfate	220	0.5	1	mg/L	EPA 300.0	10/06/06		8526
Total Dissolved Solids	15,000	10	1	mg/L	EPA 160.1	10/09/06		8715
Total Kjeldahl Nitrogen	230	0.5	1	mg/L	EPA 351.3	10/13/06	10/12/06	8784
Boron	1.8	0.2	5	mg/L	EPA 200.7	10/12/06		8730
Calcium	200	0.2	5	mg/L	EPA 200.7	10/12/06		8731
Hardness	1,500	1	NA	mg/L CaCO3	EPA 200.7			
Copper	Not Detected	0.2	5	mg/L	EPA 200.7	10/12/06		8731
Iron	16	0.5	5	mg/L	EPA 200.7	10/12/06		8731
Potassium	4,100	0.5	5	mg/L	EPA 200.7	10/12/06		8731
Magnesium	250	0.2	5	mg/L	EPA 200.7	10/12/06		8731
Manganese	2.6	0.1	5	mg/L	EPA 200.7	10/12/06		8731
Sodium	940	0.2	5	mg/L	EPA 200.7	10/12/06		8731
Zinc	0.38	0.2	5	mg/L	EPA 200.7	10/12/06		8731

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Dawn Rivere
Joseph Gallo Dairies
Johnson Canyon Water Sys #1
P.O. Box 775
Atwater, CA 95301

Log Number: 07-C4638
Order: 02042
Project: Semi-Annual
Received: 04/10/07
Printed: 04/20/07

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
Pond 12A (effluent)	L. Crane	04/10/07@09:05	Aqueous

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Carbonate Alkalinity as CaCO3	Not Detected	2	1	mg/L	SM 2320B	04/18/07		3954
Bicarbonate Alkalinity as CaCO3	2,800	2	1	mg/L	SM 2320B	04/18/07		3954
Hydroxide Alkalinity as CaCO3	Not Detected	2	1	mg/L	SM 2320B	04/18/07		3954
Total Alkalinity as CaCO3	2,800	2	1	mg/L	SM 2320B	04/18/07		3954
Biochemical Oxygen Demand	1,000	3	1	mg/L	EPA 405.1	04/11/07		3907
Chloride	1,600	100	100	mg/L	EPA 300.0	04/11/07		3752
Electrical Conductance	11,000	1	1	umhos/cm	SM 2510	04/10/07		3820
Organic Nitrogen Value	Not Detected	0.5	NA	mg/L	Calculated			
Total Nitrogen Value	120	0.5	NA	mg/L	Calculated			
Ammonia, Total, as N	130	0.3	1	mg/L	EPA 350.2	04/19/07		4060
Nitrate as N	Not Detected	1	10	mg/L	EPA 300.0	04/12/07		3830
Nitrate as NO3	Not Detected	4	10	mg/L	EPA 300.0			
Nitrite as N	Not Detected	1	10	mg/L	EPA 300.0	04/12/07		3830
pH	8.1	0.1	1	pH units	EPA 150.1	04/10/07		3820
Total Phosphorus as P	4.5	0.1	5	mg/L	SM4500-P E	04/19/07	04/19/07	4042
Sulfate	Not Detected	5	10	mg/L	EPA 300.0	04/12/07		3830
Total Dissolved Solids	7,500	10	1	mg/L	EPA 160.1	04/17/07		4023
Total Kjeldahl Nitrogen	120	0.5	1	mg/L	EPA 351.3	04/19/07	4/19/07	4033
Boron	1.0	0.05	1	mg/L	EPA 200.7	04/12/07	04/12/07	3795
Calcium	160	0.03	1	mg/L	EPA 200.7	04/12/07	04/12/07	3795
Hardness	870	1	NA	mg/L CaCO3	EPA 200.7			
Copper	0.14	0.05	1	mg/L	EPA 200.7	04/12/07	04/12/07	3795
Iron	19	0.1	1	mg/L	EPA 200.7	04/12/07	04/12/07	3795
Potassium	2,500	0.1	1	mg/L	EPA 200.7	04/12/07	04/12/07	3795
Magnesium	110	0.03	1	mg/L	EPA 200.7	04/12/07	04/12/07	3795
Manganese	1.4	0.02	1	mg/L	EPA 200.7	04/12/07	04/12/07	3795
Sodium	600	0.05	1	mg/L	EPA 200.7	04/12/07	04/12/07	3795
Zinc	0.42	0.05	1	mg/L	EPA 200.7	04/12/07	04/12/07	3795

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Dawn Rivere
Joseph Gallo Dairies
Johnson Canyon Water Sys #1
P.O. Box 775
Atwater, CA 95301

Log Number: 07-C13128
Order: 05369
Project: Semi-Annual
Received: 10/10/07
Printed: 10/26/07

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
Pond 12A (Effluent)	L. Crane	10/10/07@10:10	Aqueous

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
✓Carbonate Alkalinity as CaCO3	560	2	1	mg/L	SM 2320B	10/19/07		259
✓Bicarbonate Alkalinity as CaCO3	4,600	2	1	mg/L	SM 2320B	10/19/07		259
Hydroxide Alkalinity as CaCO3	Not Detected	2	1	mg/L	SM 2320B	10/19/07		259
Total Alkalinity as CaCO3	5,200	2	1	mg/L	SM 2320B	10/19/07		259
✓Chloride	3,100	100	100	mg/L	EPA 300.0	10/11/07		9848
Electrical Conductance	18,000	1	1	umhos/cm	SM 2510 B	10/16/07		59
Organic Nitrogen Value	210	0.5	NA	mg/L	Calculated			
✓Total Nitrogen Value	230	0.5	NA	mg/L	Calculated			
✓Ammonia, Total, as N	17	0.3	1	mg/L	SM 4500-NH3 D	10/18/07		151
✓Nitrate as N	Not Detected	1	10	mg/L	EPA 300.0	10/11/07		9787
Nitrate as NO3	Not Detected	4	10	mg/L	EPA 300.0			
✓Nitrite as N	Not Detected	1	10	mg/L	EPA 300.0	10/11/07		9787
✓pH (Field)	8.7	0.1	1	pH units	SM 4500-H B	10/10/07		9783
✓Total Phosphorus as P	93	2	100	mg/L	SM4500-P E	10/19/07	10/19/07	254
✓Sulfate	38	5	10	mg/L	EPA 300.0	10/11/07		9787
✓Total Dissolved Solids	16,000	10	1	mg/L	SM 2540 C	10/17/07		293
✓Total Kjeldahl Nitrogen	230	1	2	mg/L	SM 4500-NH3 D	10/16/07	10/15/07	54
✓Boron	2.3	0.2	5	mg/L	EPA 200.7	10/22/07		305
✓Calcium	200	0.2	5	mg/L	EPA 200.7	10/22/07		305
Hardness	1,400	1	NA	mg/L CaCO3	EPA 200.7			
Copper	Not Detected	0.2	5	mg/L	EPA 200.7	10/22/07		305
Iron	13	0.1	5	mg/L	EPA 200.7	10/22/07		305
✓Potassium	4,600	5	50	mg/L	EPA 200.7	10/22/07		305
✓Magnesium	210	0.2	5	mg/L	EPA 200.7	10/22/07		305
Manganese	1.9	0.1	5	mg/L	EPA 200.7	10/22/07		305
✓Sodium	1,100	2	50	mg/L	EPA 200.7	10/22/07		305
Zinc	0.46	0.2	5	mg/L	EPA 200.7	10/22/07		305

DLR = Detection Limit for Reporting. Results of "Not Detected" are below DLR.

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Roland Perez
Joseph Gallo Farms
Johnson Canyon Water Sys #1
P.O. Box 775
Atwater, CA 95301

Log Number: 08-C5261
Order: P1961
Project: Semi-Annual
Received: 04/16/08
Printed: 04/25/08

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
Pond 12A *Effluent*	L. Crane	04/16/08@09:00	Aqueous

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Carbonate Alkalinity as CaCO3	Not Detected	2	1	mg/L	SM 2320B	04/25/08		6823
Bicarbonate Alkalinity as CaCO3	4,000	2	1	mg/L	SM 2320B	04/25/08		6823
Hydroxide Alkalinity as CaCO3	Not Detected	2	1	mg/L	SM 2320B	04/25/08		6823
Total Alkalinity as CaCO3	4,000	2	1	mg/L	SM 2320B	04/25/08		6823
✓Biochemical Oxygen Demand	3,600	3	1	mg/L	SM 5210 B	04/18/08		6669
Chloride	2,500	100	100	mg/L	EPA 300.0	04/24/08		6761
Electrical Conductance	17,000	1	1	umhos/cm	SM 2510 B	04/16/08		6663
Organic Nitrogen Value	180	0.5	NA	mg/L	Calculated			
✓Total Nitrogen Value	490	0.5	NA	mg/L	Calculated			
✓Ammonia, Total, as N	310	0.3	1	mg/L	SM 4500-NH3 D	04/25/08		6814
✓Nitrate as N	Not Detected	1	10	mg/L	EPA 300.0	04/17/08		6505
✓Nitrate as NO3	Not Detected	4	10	mg/L	EPA 300.0			
✓Nitrite as N	5.3	1	10	mg/L	EPA 300.0	04/17/08		6505
✓pH (Field)	8.0	0.1	1	pH units	SM 4500-H B	04/16/08		6485
✓Total Phosphorus as P	37	1	50	mg/L	SM4500-P E	04/21/08		6613
Sulfate	5.1	5	10	mg/L	EPA 300.0	04/17/08		6505
Total Dissolved Solids	13,000	10	1	mg/L	SM 2540C	04/23/08		6740
✓Total Kjeldahl Nitrogen	480	2	5	mg/L	SM 4500-NH3 D	04/24/08		6734
Boron	1.7	0.5	10	mg/L	EPA 200.7	04/24/08		6752
Calcium	270	0.3	10	mg/L	EPA 200.7	04/24/08		6752
Hardness as CaCO3	1,300	1	NA	mg/L	EPA 200.7			
Copper	Not Detected	0.5	10	mg/L	EPA 200.7	04/24/08		6752
Iron	22	0.2	10	mg/L	EPA 200.7	04/24/08		6752
Potassium	3,200	1	10	mg/L	EPA 200.7	04/24/08		6752
Magnesium	160	0.3	10	mg/L	EPA 200.7	04/24/08		6752
Manganese	2.8	0.2	10	mg/L	EPA 200.7	04/24/08		6752
Sodium	770	0.5	10	mg/L	EPA 200.7	04/24/08		6752
Zinc	0.80	0.5	10	mg/L	EPA 200.7	04/24/08		6752

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Ans'd..............................

Roland Perez
Joseph Gallo Farms
Johnson Canyon Water Sys #1
P.O. Box 775
Atwater, CA 95301

Log Number: 08-C15058
Order: P5659
Project: Pond 12A-Effluent Spray Irrigation
Received: 10/30/08
Printed: 11/12/08

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
Spray Irrigation Pond 12A Composite Times: 10:30, 12:00, 13:30	Roland Perez / Jao Lopes	10/28/08@00:00	Aqueous

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batc
Carbonate Alkalinity as CaCO3	Not Detected	2	1	mg/L	SM 2320B	11/10/08		302
Bicarbonate Alkalinity as CaCO3	290	2	1	mg/L	SM 2320B	11/10/08		302
Hydroxide Alkalinity as CaCO3	Not Detected	2	1	mg/L	SM 2320B	11/10/08		302
Total Alkalinity as CaCO3	290	2	1	mg/L	SM 2320B	11/10/08		302
Biochemical Oxygen Demand	8	3	1	mg/L	SM 5210B	10/30/08		277
Chloride	280	10	10	mg/L	EPA 300.0	10/30/08		266
Electrical Conductance	1,500	1	1	umhos/cm	SM 2510B	11/10/08		299
Organic Nitrogen Value	1.9	0.5	NA	mg/L	Calculated			
Total Nitrogen Value	13	0.5	NA	mg/L	Calculated			
Ammonia, Total, as N	1.9	0.3	1	mg/L	SM 4500-NH3 D	11/07/08		293
Nitrate as N	9.6	0.1	1	mg/L	EPA 300.0	10/30/08		266
Nitrate as NO3	42	0.4	1	mg/L	EPA 300.0			
Nitrite as N	Not Detected	0.1	1	mg/L	EPA 300.0	10/30/08		266
pH	8.0	0.1	1	pH units	SM 4500-H B	10/30/08		272
Total Phosphorus as P	1.8	0.1	5	mg/L	SM4500-P E	10/31/08		267
Sulfate	37	0.5	1	mg/L	EPA 300.0	10/30/08		266
Total Dissolved Solids	850	10	1	mg/L	SM 2540C	11/04/08		286
Total Kjeldahl Nitrogen	3.8	0.5	1	mg/L	SM 4500-NH3 D	11/10/08	11/07/08	302
Calcium	62	0.03	1	mg/L	EPA 200.7	11/10/08	11/07/08	304
Hardness as CaCO3	300	1	NA	mg/L	EPA 200.7			
Copper	Not Detected	0.05	1	mg/L	EPA 200.7	11/10/08	11/07/08	304
Iron	1.5	0.02	1	mg/L	EPA 200.7	11/10/08	11/07/08	304
Potassium	110	0.1	1	mg/L	EPA 200.7	11/10/08	11/07/08	304
Magnesium	35	0.03	1	mg/L	EPA 200.7	11/10/08	11/07/08	304
Manganese	0.07	0.02	1	mg/L	EPA 200.7	11/10/08	11/07/08	304
Sodium	130	0.05	1	mg/L	EPA 200.7	11/10/08	11/07/08	304
Zinc	Not Detected	0.05	1	mg/L	EPA 200.7	11/10/08	11/07/08	304

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Roland Perez
Joseph Gallo Farms
Johnson Canyon Water Sys #1
P.O. Box 775
Atwater, CA 95301

Log Number: 09-C6782
Order: Q2233
Project: April 2009 Effluent Monitoring
Received: 04/28/09
Printed: 05/15/09

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
Spray Irrigation Pond 12A Composite (#1, #2, #3)	Roland R. Perez	04/28/09@11:00	Aqueous

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Carbonate Alkalinity as CaCO3	Not Detected	2	1	mg/L	SM 2320B	04/29/09		8080
Bicarbonate Alkalinity as CaCO3	2,100	2	1	mg/L	SM 2320B	04/29/09		8080
Biochemical Oxygen Demand	2,300	3	1	mg/L	SM 5210B	04/29/09		8208
Chloride	1,300	20	20	mg/L	EPA 300.0	04/29/09		8064
Organic Nitrogen Value	32	0.5	NA	mg/L	Calculated			
Total Nitrogen Value	250	0.5	NA	mg/L	Calculated			
Ammonia, Total, as N	210	0.6	2	mg/L	SM 4500-NH3 D	04/30/09		8136
Nitrate as N	Not Detected	0.1	1	mg/L	EPA 300.0	04/28/09		8008
Nitrite as N	0.39	0.1	1	mg/L	EPA 300.0	04/28/09		8008
pH	7.7	0.1	1	pH units	SM 4500-H B	04/28/09		8044
Total Phosphorus as P	38	2	100	mg/L	SM 4500-P E	05/06/09		8303
Total Phosphorus as PO4	110	6	100	mg/L	SM4500-P E			
Sulfate	11	0.5	1	mg/L	EPA 300.0	04/28/09		8008
Total Dissolved Solids	6,590	10	1	mg/L	SM 2540C	05/01/09		8225
Total Kjeldahl Nitrogen	250	5	10	mg/L	SM 4500-NH3 D	05/05/09	05/04/09	8228
Boron	0.65	0.2	5	mg/L	EPA 200.7	05/14/09	05/04/09	8555
Calcium	240	0.6	20	mg/L	EPA 200.7	05/13/09	05/04/09	8519
Potassium	1,500	2	20	mg/L	EPA 200.7	05/13/09	05/04/09	8519
Magnesium	110	0.03	1	mg/L	EPA 200.7	05/12/09	05/04/09	8456
Sodium	450	1	20	mg/L	EPA 200.7	05/13/09	05/04/09	8519

DLR = Detection Limit for Reporting. Results of "Not Detected" are below DLR.

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Roland Perez
Joseph Gallo Farms
Johnson Canyon Water Sys #1
P.O. Box 775
Atwater, CA 95301

Log Number: 09-C16544
Order: Q6093
Project: Gonzales-Heifer City Pond 12A EFF
Received: 11/12/09
Printed: 11/30/09

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
Time Series Composite: Spray Irrigation - Pond 12A	Roland Perez, Jao Lopes	11/12/09@	Aqueous

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Carbonate Alkalinity as CaCO3	Not Detected	2	1	mg/L	SM 2320B	11/22/09		4095
Bicarbonate Alkalinity as CaCO3	590	2	1	mg/L	SM 2320B	11/22/09		4095
Hydroxide Alkalinity as CaCO3	Not Detected	2	1	mg/L	SM 2320B	11/22/09		4095
Total Alkalinity as CaCO3	590	2	1	mg/L	SM 2320B	11/22/09		4095
Biochemical Oxygen Demand	Not Detected	200	70	mg/L	SM 5210B	11/13/09		4025
Chloride	390	10	10	mg/L	EPA 300.0	11/19/09		4070
Electrical Conductance	2,460	1	1	umhos/cm	SM 2510B	11/12/09		4019
Organic Nitrogen Value	24	0.5	NA	mg/L	Calculated			
Total Nitrogen Value	24	0.5	NA	mg/L	Calculated			
Ammonia, Total, as N	Not Detected	0.3	1	mg/L	SM 4500-NH3 D	11/19/09		4031
Nitrate as N	0.15	0.1	1	mg/L	EPA 300.0	11/13/09		3940
Nitrate as NO3	0.7	0.4	1	mg/L	EPA 300.0			
Nitrite as N	Not Detected	0.1	1	mg/L	EPA 300.0	11/13/09		3940
pH	7.0	0.1	1	pH units	SM 4500-H B	11/12/09		4019
Sulfate	36	0.5	1	mg/L	EPA 300.0	11/13/09		3940
Total Dissolved Solids	1,490	10	1	mg/L	SM 2540C	11/12/09		3991
Total Kjeldahl Nitrogen	24	0.5	1	mg/L	SM 4500-NH3 D	11/19/09		4051
Calcium	83	0.03	1	mg/L	EPA 200.7	11/18/09	11/16/09	4009
Hardness as CaCO3	420	1	NA	mg/L	EPA 200.7			
Copper	Not Detected	0.05	1	mg/L	EPA 200.7	11/18/09	11/16/09	4009
Iron	16	0.02	1	mg/L	EPA 200.7	11/18/09	11/16/09	4009
Potassium	270	0.1	1	mg/L	EPA 200.7	11/18/09	11/16/09	4009
Magnesium	52	0.03	1	mg/L	EPA 200.7	11/18/09	11/16/09	4009
Manganese	0.38	0.02	1	mg/L	EPA 200.7	11/18/09	11/16/09	4009
Sodium	170	0.05	1	mg/L	EPA 200.7	11/18/09	11/16/09	4009
Zinc	Not Detected	0.05	1	mg/L	EPA 200.7	11/18/09	11/16/09	4009

DLR = Detection Limit for Reporting. Results of "Not Detected" are below DLR.

AMERICAN SCIENTIFIC LABORATORIES, LLC
Environmental Testing Services
2520 N. San Fernando Rd., Los Angeles, CA 90065 Tel: (323) 223-9700 Fax: (323) 223-9500

ANALYTICAL RESULTS

Ordered By

Creek Environmental Labs, Inc.
141 Suburban Rd Suite C-5
San Luis Obispo, CA 93401

Telephone: (805)545-9838
Attn: Orval Osborne

Page: 2

Project ID: Q6093

ASL Job Number	Submitted	Client
43773	11/17/2009	CREEK

Method: SM4500-P-B&E, Total Phosphorus

QC Batch No: 111809-1

Our Lab I.D.		244949				
Client Sample I.D.		16544 S.I.P 12A Comp				
Date Sampled		11/12/2009				
Date Prepared		11/18/2009				
Preparation Method						
Date Analyzed		11/18/2009				
Matrix		Water				
Units		mg/L				
Dilution Factor		1				
Analytes	PQL	Results				
Conventionals						
Phosphorus, Total (as P)	0.100	8.70				

QUALITY CONTROL REPORT

QC Batch No: 111809-1

Analytes	LCS % REC	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit					
Conventionals										
Phosphorus, Total (as P)	96	95	1.0	80-120	20					

EXHIBIT C

Byron Shaw
Soil and Water Consulting

9250 Shaw Drive
Amherst Junction, WI 54407
bmshaw@wi-net.com
Prof Soil Scientist #104-112
Professional Hydrologist 162-111

Steve Shimek
Monterey Coastkeeper
475 Washington Street Suite A
Monterey, CA 93940

Dear Steve:

I have reviewed the material you sent relative to the Joseph Gallo Farm. These documents included the Nutrient Management plan dated July 2009, Regional Water Quality Control Board Central Coast Region Staff Report for the Regular Meeting of February 4, 2010, and the NPDES waste discharge requirements for the Gallo Cattle Company prepared by the California Regional Water Quality Control Board Central Coast Region. The following are my comments and recommendations. My comments are based on these documents, the available scientific literature and my experience with other CAFOs.

Nutrient Management Plan comments

1. The nutrient management plan prepared by Conestoga-Rovers & Associates bases all calculations on a single sample from one manure lagoon. This is totally inadequate and in my opinion negates the entire plan. Proper protocol for sampling would involve sampling from a well-mixed lagoon during each spreading event or composite samples taken throughout the land application. I see no requirement for such sampling in the draft permit.

2. The yield data presented for the oat silage uses extremely high yield numbers with no yield data to verify if these yields are ever achieved. My review of the literature did not turn up any yield values anywhere near those claimed for this farm. There is very little data available for triple crop oat forage.

3. The runoff calculation only includes data from November to February. The calculation does not include rainfall and runoff from March and April which are nearly equal in rainfall amounts for January plus February. This omission could easily result in the lagoon capacity being exceeded.

Permit related issues and recommendations

1. There is no soil test data provided for either nitrogen or phosphorus to indicate whether there has been over-fertilization or under-fertilization of the irrigated field; this testing should be a requirement of the permit. The only soil testing required in the permit is for one grab sample per year from the 64 acre field. The permit does not require this sample to be a composite sample and does not specify the depth range for the sample. Proper sampling should include one composite sample for each 5 acres of the field to the depth of the plow layer. Additional sampling of the soil profile to determine if excessive nutrient applications have occurred in the past should also be required in the fall of each year.

2. The permit only requires two samples per year of wastewater from the lagoon. This is not adequate to determine the nutrient additions to the field as lagoon waste concentrations can change widely between weeks due to precipitation, pumping from other lagoons, biological

processes, etc. Representative composite samples should be collected and analyzed from each waste irrigation event.

3. There is no discussion of potential leaching losses and resulting groundwater contamination from the lagoons, feedlots, compost area or dead animal storage area. The Gloria sandy loam soil on the property has sufficient leaching potential to result in significant groundwater contamination if the lagoons and composting area do not have any additional barriers to leaching. The only permit requirement is for the facility to develop a groundwater monitoring system with no specific requirements on what areas to monitor, how deep the wells must be screened at, determination of groundwater flow or how often they need to be monitored. At minimum nitrogen, phosphorus and bacteria should all be included in the required groundwater monitoring with wells located down gradient of each potential contaminant source and screened to sample the top of the water table. The site water supply well has 21 mg/l nitrate N which exceeds the drinking water standard and indicates there is already significant groundwater contamination in the area.

4. The site map shows Johnson Creek to flow adjacent to the facility yet there is no monitoring requirement in the permit except when the operator reports direct discharge. There may be significant groundwater seepage from the farm into this creek on a year round basis and runoff from events the operator does not consider waste discharges. This creek should at a minimum be sampled and analyzed for nutrients on a monthly basis up gradient and down gradient of the facility whenever there is flow in the creek. This stream flows to an impaired waterway.

5. There is only one manure sample required per year from a location to be determined by the operator. For an operation of this size and the volume of manure generated this is inadequate. Composite manure samples should be collected and analyzed for all forms of nitrogen and for total and available phosphorus from each load of manure leaving the property. The receiver of the manure should be required to submit a nutrient management plan to assure that the manure is being applied in an environmentally sound manner.

6. At fully populated with 30,000 animal units, this facility would produce the waste equivalent of 600,000 people. In addition to a complete accounting of nutrient production and movement from the site, there should be an air quality evaluation as there may be a very large emission of methane, ammonia and hydrogen sulfide that can impact nearby residents and contribute large amounts of greenhouse gasses. The town of Gonzales is less than 2 miles downslope.

7. The permit language does not include any standards for nitrogen or phosphorus in surface water except for ammonia. It does state that waters shall not contain biostimulating substances in concentrations that promote aquatic growth to the extent such growth causes nuisance or adversely affects beneficial uses. This is extremely vague and provides no guidance for determining if and when a problem exists from the facility. Standards of 1 mg/l total nitrogen and .05 mg/l total phosphorus would be reasonable.

8. The permit is inconsistent in what nitrogen standard is used for groundwater. Page 14 #1 lists a 1mg/l groundwater standard for nitrogen yet page 15 # 5 states that groundwater shall not contain nitrate concentrations exceeding 10 mg/l nitrogen.

9. The monitoring requirements list many priority pollutants but does not include antibiotics and other pharmaceuticals or fly control chemicals that may be commonly used on the site.

10. The only permit requirement relative to crops is to report expected crop yields. Actual crop yield for each oat crop should be documented to determine nutrient removal from the site. As the entire nutrient management plan relies on the crop yield data and manure concentrations, both need to be documented with verifiable sampling.

If you have any additional questions or need clarification of any of the above items feel free to contact me via email or phone.

Sincerely

Byron H Shaw PhD

Emeritus Professor of Water Resources