FACILITY SIZE AND HOUSING TYPES

Current Herd Size

Age Group	Freestall No Exercise	Freestall w/ Exercise Area	Flushed Corrals	Scraped Corrals/Hutches	Total Head
Lactating		200		300	500
Dry				80	80
Heifers (15-24m)					0
Heifers (7-14m)					0
Heifers (3-6m)					0
Milk-Fed Calves (0-2m)					0

580 Mature Cows

72.0 lb/day herd annual average milk production

Months housing is flushed each year

Age Group	Freestall No Exercise	Freestall Exercise Area	Flushed Corrals
Lactating	12	12	12
Dry	12	12	12
Heifers 15-24m	12	12	12
Heifers 7-14m	12	12	12
Heifers 3-6m	12	12	12
Calves 0-2m	12	12	12

Gallons of new wastewater produced daily: 28,000 gallons

Dairy Facility Production Area (Corrals, barns, roads, feed storage, etc.) 16 acres

Breed Factor: Enter 1.00 for Holsteins; 0.71 for Jerseys; or 0.83 for Guernseys 1.00

CURRENT CROPPING INFORMATION

Area ID	Crops on fields plumbed to receive LIQUID MANURE								Total Acres
	Alfalfa	Corn	Wheat	Sorg'm	Cotton	A	B	D	
N		25	25						25
W					84				84
									0
									0
									0
									0
									0
									0
									0
									0
									0
									0
Total	0	25	25	0	84	0	0	0	109

Area ID	Crops Receiving SOLID MANURE ONLY								Total Acres
	Alfalfa	Corn	Wheat	Sorg'm	Cotton	A	B	D	
Smith		50	50						50
									0
									0
									0
									0
									0
									0
									0
									0
									0
									0
									0
									0
Total	0	50	50	0	0	0	0	0	50

COMMERCIAL FERTILIZER USE

0	lb of N fertilizer is used each year in addition to manure applications
0	lb of P fertilizer is used each year in addition to manure applications
0	lb of K fertilizer is used each year in addition to manure applications

NITROGEN HARVEST DATA

Crop	Acres (Plumbed?) (Y)	(N)	N (lb/acre)	Book Values
Alfalfa	0	0	480	480
Corn	25	50	250	250
Wheat	25	50	175	175

Note: Use book values if values from actual yields are not

Total N Harvest

Plumbed (lb)	Not Plumbed (lb)
0	0
6,250	12,500
4,375	8,750

Sorg'm	0	0	325	325	available.	0	0
Cotton	84	0	180	180		15,120	0
A	0	0				0	0
B	0	0				0	0
D	0	0				0	0
Total						25,745	21,250

PHOSPHORUS (AS P2O5) HARVEST DATA

Crop	Acres (Plumbed?) (Y)	(N)	P (lb/acre)	Book Values		Total P (lb)	Total P (lb)
Alfalfa	0	0	95	95		0	0
Corn	25	50	105	105	Note: Use book values if values	2,625	5,250
Wheat	25	50	70	70	from actual yields are **not**	1,750	3,500
Sorg'm	0	0	125	125	available.	0	0
Cotton	84	0	65	65		5,460	0
A	0	0				0	0
B	0	0				0	0
D	0	0				0	0
Total						9,835	8,750

	(DD)	(MM)	Days Stor.
Approximate date of LAST LAGOON WATER APPLICATION EACH YEAR (Enter the day next to the month.)		July	0
		August	0
	18	September	18
		October	31
		November	30
		December	31

Example:		
		May
	15	June
		July

Approximate date of FIRST LAGOON WATER APPLICATION EACH YEAR (Enter the day next to the month.)		January	31
	15	February	15
		March	0
		April	0
		May	0
		June	0

Existing Storage Design Need (days)	156
Dairy Facility Area (acres of Corrals, Roads, Lagoons, Feed Storage, Etc.)	16

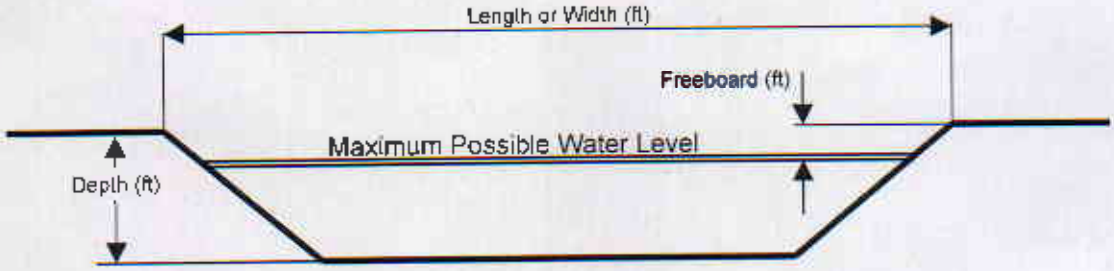
LAGOON INFORMATION

1 Treatment and Separation Basins (Typically Staying Full of Liquids or Solids)

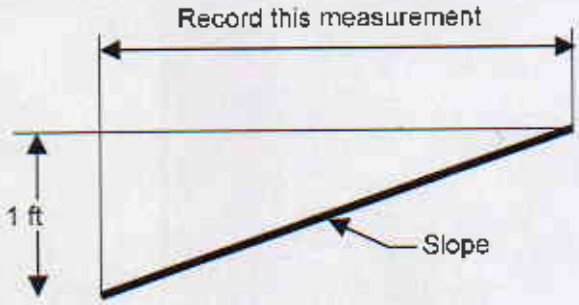
Length (ft)	Width (ft)	Depth (ft)	Slope (ft)	Freeboard	Surf. Area	Pond ID
500	100	10	0.5	1	48,506	1
					0	
					0	
					0	
					0	
					0	
					0	
					0	
					0	

2 Storage Lagoons (Filled and Emptied Each Year)

Length (ft)	Width (ft)	Depth	H:V Slope	Freeboard	Surf. Area	Pond ID
500	100	16	1.0	2	48,804	2
					0	
					0	
					0	
					0	
					0	
					0	
					0	



To determine slope: Measure side of lagoon out level to a 1 foot measurement vertical



RESULTS

Preliminary Estimate of Nitrogen Balance on an Annual Basis

Do I have enough cropland to take up the Nitrogen I have available?

Land that can receive liquid and solid manure

Liquid Manure Nitrogen Balance		
Estimated appropriate N application rate in land where lagoon water can be used	41,192	lb
Total nitrogen in lagoon water at time of use	41,308	lb
Additional Nitrogen Needed	-	lb
Excess nitrogen in liquid manure	116	lb
Solid Manure Nitrogen Balance		
Nitrogen available in solid manure	-	lb
Additional nitrogen needed in liquid manure application area	-	lb
Percentage of total solid manure that would provide this nitrogen	0%	
Remaining solid manure nitrogen available	-	lb
Approximate tons of solid manure that would provide this nitrogen at 30% moisture	-	tons
Assuming nitrogen concentration in solid manure of	-	lb N per ton
Commercial Fertilizer Nitrogen Balance		
Remaining nitrogen needs after solid and liquid manure applications have been made	-	lb
Nitrogen available in commercial fertilizers applied	-	lb
You are likely over-applying nitrogen to your crops by:	-	lb

Land that can only receive solid manure

Land Receiving Solid Manure Only:		
Estimated appropriate N application rate in land receiving solid manure only	21,250	lb
Nitrogen available in solid manure remaining after applications shown above	63,567	lb
Additional Nitrogen Needed	-	lb
Excess nitrogen in solid manure	42,317	lb

Preliminary Estimate of Phosphorus Balance on an Annual Basis

DETAILED PHOSPHORUS SUMMARY TO BE PROGRAMMED LIKE NITROGEN

Do I have enough cropland to take up the phosphorus I have available?

Total phosphorus in lagoon water at time of use	10,673	lb
Total phosphorus in solid manure at time of use	22,396	lb
Fertilizer phosphorus used	-	lb
Phosphorus that should be exported from facility in solid manure	(22,396)	lb
Appropriate crop phosphorus use	(4,292)	lb
Surplus or Deficit: **Surplus**	6,381	lb

Preliminary Estimate of Liquid Storage Capacity (Lagoons)

Are my ponds (lagoons) large enough?

storage period indicated

In your case, you have:	1,999,169 gallons of liquid storage capacity.
It appears that you need:	4,186,177 gallons of liquid storage capacity.
You should have:	2,187,008 gallons more lagoon capacity.
Or you should use:	28.0 gallons per cow per day less water

DO NOT MAKE MANUAL ENTRIES ON THIS PAGE UNLESS SITE SPECIFIC DATA ARE AVAILABLE!

AS-EXCRETED NITROGEN PRODUCTION

Lactating	75.0	lb/day herd annual average milk production (input from other sheet)
	34.01	kg/day herd annual average milk production
	0.426	kg N/hd-day
	0.940	lb N/hd-day
	343	lb N/hd-year
Dry	0.50	lb N/hd-day
	183	lb N/hd-year
Breeding Age Heifer	0.26	lb N/hd-day
	95	lb N/hd-year
Weaned Calf	0.14	lb N/hd-day
	51	lb N/hd-year
Milk-Fed Calf	0.017	lb N/hd-day
	6	lb N/hd-year

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N Excretion (lb/year)

Age Group	Freestall No Exercise	Freestall Exercise Area	Flushed Corrals	Scraped Corrals	Total Head
Lactating	343	343	343	343	343
Dry	183	183	183	183	183
Heifers 15-24m	139	139	139	139	139
Heifers 7-14m	79	79	79	79	79
Heifers 3-6m	57	57	57	57	57
Calves 0-2m	6.2	6.2	6.2	6.2	6.2

AS-EXCRETED PHOSPHORUS PRODUCTION

N Excretion (lb/year)

Age Group	Freestall No Exercise	Freestall Exercise Area	Flushed Corrals	Scraped Corrals	Total Head
Lactating	62	62	62	62	62.05
Dry	26	26	26	26	25.55
Heifers 15-24m	22	22	22	22	21.90
Heifers 7-14m	11	11	11	11	10.95
Heifers 3-6m	5	5	5	5	5.48
Calves 0-2m	0.4	0.4	0.4	0.4	0.37

AS-EXCRETED SOLIDS PRODUCTION

Lactating	70.0	lb/day herd annual average milk production (input from other sheet)
	31.75	kg/day herd annual average milk production
	8.121	kg solids/hd-day
	17.906	lb solids/hd-day
	6536	lb solids/hd-year
Dry	11.00	lb solids/hd-day
	4015	lb solids/hd-year
Breeding Age Heifer	8.20	lb solids/hd-day
	2993	lb solids/hd-year
Weaned Calf	3.20	lb solids/hd-day
	1168	lb solids/hd-year
Milk-Fed Calf	0.270	lb solids/hd-day
	99	lb solids/hd-year

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Manure Solids Production **(lb/head-year)**

Age Group	Freestall No Exercise	Freestall Exercise Area	Flushed Corrals	Scraped Corrals	Overall Average
Lactating	6,536	6,536	6,536	6,536	6,536
Dry	4,015	4,015	4,015	4,015	4,015
Heifers 15-24m	3,504	3,504	3,504	3,504	3,504
Heifers 7-14m	2,993	2,993	2,993	2,993	2,993

Heifers 3-6m	2,081	2,081	2,081	2,081	2,081
Calves 0-2m	99	99	99	99	99

Manure Solids Production **(tons/head-year)**

Age Group	Freestall No Exercise	Freestall Exercise Area	Flushed Corrals	Scraped Corrals	Overall Average
Lactating	3.268	3.268	3.268	3.268	3.268
Dry	2.008	2.008	2.008	2.008	2.008
Heifers 15-24m	1.752	1.752	1.752	1.752	1.752
Heifers 7-14m	1.497	1.497	1.497	1.497	1.497
Heifers 3-6m	1.040	1.040	1.040	1.040	1.040
Calves 0-2m	0.049	0.049	0.049	0.049	0.049

PERCENTAGE OF MANURE HANDLED AS A LIQUID

Age Group	Freestall No Exercise	Freestall Exercise Area	Flushed Corrals	Scraped Corrals
Lactating	100%	71%	35%	10%
Dry	90%	61%	25%	0%
Heifers 15-24m	90%	61%	25%	0%
Heifers 7-14m	90%	61%	25%	0%
Heifers 3-6m	90%	61%	25%	0%
Calves 0-2m	90%	61%	25%	0%

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PERCENTAGE OF NITROGEN REMAINING IN LIQUID MANURE AT TIME OF USE

Age Group	Freestall No Exercise	Freestall Exercise Area	Flushed Corrals	Scraped Corrals
Lactating	70%	70%	70%	70%
Dry	70%	70%	70%	70%
Heifers 15-24m	70%	70%	70%	70%
Heifers 7-14m	70%	70%	70%	70%
Heifers 3-6m	70%	70%	70%	70%
Calves 0-2m	70%	70%	70%	70%

PERCENTAGE OF MANURE HANDLED AS A SOLID

Age Group	Freestall No Exercise	Freestall Exercise Area	Flushed Corrals	Scraped Corrals
Lactating	0%	29%	65%	90%
Dry	10%	39%	75%	100%
Heifers 15-24m	10%	39%	75%	100%
Heifers 7-14m	10%	39%	75%	100%
Heifers 3-6m	10%	39%	75%	100%
Calves 0-2m	10%	39%	75%	100%

PERCENTAGE OF NITROGEN REMAINING IN SOLID MANURE AT TIME OF USE

Age Group	Freestall No Exercise	Freestall Exercise Area	Flushed Corrals	Scraped Corrals
Lactating	50%	50%	50%	50%
Dry	50%	50%	50%	50%
Heifers 15-24m	50%	50%	50%	50%
Heifers 7-14m	50%	50%	50%	50%
Heifers 3-6m	50%	50%	50%	50%
Calves 0-2m	50%	50%	50%	50%

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Estimated **Liquid Manure N** at Delivery to Fields (lb/year)

Age Group	Freestall No Exercise	Freestall Exercise Area	Flushed Corrals	Scraped Corrals	Category Totals
Lactating	0	34,103	0	7,205	41,308
Dry	0	0	0	0	0
Heifers 15-24m	0	0	0	0	0
Heifers 7-14m	0	0	0	0	0
Heifers 3-6m	0	0	0	0	0
Calves 0-2m	0	0	0	0	0
Category Totals	0	34,103	0	7,205	41,308

Estimated **Solid Manure N** at Delivery to Fields (lb/year)

Age Group	Freestall No Exercise	Freestall Exercise Area	Flushed Corrals	Scraped Corrals	Category Totals
Lactating	0	9,950	0	46,317	56,267
Dry	0	0	0	7,300	7,300
Heifers 15-24m	0	0	0	0	0
Heifers 7-14m	0	0	0	0	0
Heifers 3-6m	0	0	0	0	0
Calves 0-2m	0	0	0	0	0
Category Totals	0	9,950	0	53,617	63,567

Estimated **Liquid Manure P** at Delivery to Fields (lb/year)

Age Group	Freestall No Exercise	Freestall Exercise Area	Flushed Corrals	Scraped Corrals	Category Totals
Lactating	0	8,811	0	1,862	10,673
Dry	0	0	0	0	0
Heifers 15-24m	0	0	0	0	0
Heifers 7-14m	0	0	0	0	0
Heifers 3-6m	0	0	0	0	0
Calves 0-2m	0	0	0	0	0
Category Totals	0	8,811	0	1,862	10,673

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Estimated **Solid Manure P** at Delivery to Fields (lb/year)

Age Group	Freestall No Exercise	Freestall Exercise Area	Flushed Corrals	Scraped Corrals	Category Totals
Lactating	0	3,599	0	16,754	20,352
Dry	0	0	0	2,044	2,044
Heifers 15-24m	0	0	0	0	0
Heifers 7-14m	0	0	0	0	0
Heifers 3-6m	0	0	0	0	0
Calves 0-2m	0	0	0	0	0
Category Totals	0	3,599	0	18,798	22,396

Estimated **Solid Manure** at Delivery (tons/year on a **dry-matter basis**)

Age Group	Freestall No Exercise	Freestall Exercise Area	Flushed Corrals	Scraped Corrals	Category Totals
Lactating	0	457	0	686	1,144
Dry	0	0	0	112	112
Heifers 15-24m	0	0	0	0	0
Heifers 7-14m	0	0	0	0	0
Heifers 3-6m	0	0	0	0	0
Calves 0-2m	0	0	0	0	0
Category Totals	0	457	0	799	1,256

30% Moisture content [Moisture/(Moisture + Dry Matter), or "Wet Basis"]

Estimated **Solid Manure** at Delivery (tons/year on a **wet basis**)

Age Group	Freestall No Exercise	Freestall Exercise Area	Flushed Corrals	Scraped Corrals	Category Totals
Lactating	0	654	0	980	1,634
Dry	0	0	0	161	161
Heifers 15-24m	0	0	0	0	0
Heifers 7-14m	0	0	0	0	0
Heifers 3-6m	0	0	0	0	0
Calves 0-2m	0	0	0	0	0
Category Totals	0	654	0	1,141	1,795

Nutrient Content of Dry Manure (@ 30% moisture, wet basis)

35.42 **lb N per Ton of Solid Manure (@ 30% MC)**

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LAGOON VOLUME NEEDS

28,000	gallons of new wastewater produced daily
16	Acre dairy facility area
2.0	inches 25-year/24-hour rain storm rainfall (from table)
2	ac Average Total Lagoon Surface Area
3	ac Sleep, Paved, and Roofed Areas
11	ac Unpaved Areas
156	day Storage Need (for current irrigation practices)

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Q = k * I * A (where k=runoff percentage coefficient, I = rainfall intensity, A=runoff area

q = Q/A = k * I

Estimated Rainfall Runoff Rates(Not including 25-year/24-hour storm event)							Estimated Evaporation From Lagoons			Check:	Days									
Days of Storage Needed	Normal Monthly Rain (in)	150% of Normal	Runoff Coefficient (Unsurfaced)	Runoff Coefficient (Surfaced)	Unsurfaced Runoff (in)	Surfaced Runoff (in)	Reference Evaporation (Eto) (in)	Assumed Lagoon Ko	Estimated Lagoon Evap (in)	Precip. minus Evap.	Storage for Month	Days in Month	New Wastewater Storage (cu ft/month)	Unsurfaced Runoff Volume (cu ft)	Unsurfaced Runoff Storage Needed (cu ft)	Surfaced Runoff Volume (cu ft)	Surfaced Runoff Storage Needed (cu ft)	Lagoon Evaporation Volume (cu ft)	Surfaced Runoff Storage Needed (cu ft)
July	0.01	0.02	10%	24%	0	0.00	8.67	2.0	17.34	-17.33	0	31	0	60	0	35	0	140,833	0
August	0.01	0.02	10%	15%	0	0.00	7.81	2.0	15.62	-15.61	0	31	0	60	0	22	0	126,888	0
September	0.25	0.38	15%	45%	0	0.18	5.67	2.0	11.34	-10.87	18	30	57,376	2,248	1,348	1,789	1,079	81,956	53,175
October	0.44	0.66	21%	44%	0	0.29	4.01	2.0	8.02	-7.60	31	31	113,035	5,541	5,541	2,902	2,902	65,360	65,360
November	0.82	1.23	12%	48%	0	0.39	2.13	2.0	4.26	-3.05	30	30	112,282	5,801	5,801	5,801	5,801	34,545	34,545
December	1.06	1.59	20%	47%	0	0.75	1.59	2.0	3.18	-1.59	31	31	115,035	12,713	12,713	7,40	7,469	26,787	26,787
January	1.68	2.49	15%	45%	0	1.12	1.56	2.0	3.12	-0.89	31	31	113,035	14,831	14,831	11,188	11,195	28,787	25,787
February	1.60	2.40	20%	47%	0	1.13	2.20	2.0	4.40	2.00	15	28	55,148	18,189	10,280	11,273	6,039	38,680	18,116
March	1.76	2.64	15%	35%	0	0.92	3.66	2.0	7.32	-4.68	0	31	0	15,931	0	9,235	0	59,359	0
April	0.63	0.95	12%	43%	0	0.41	5.08	2.0	10.1	-9.22	0	30	0	4,533	0	4,081	0	82,389	0
May	0.26	0.39	10%	32%	0	0.12	6.63	2.0	13.26	-13.27	0	31	0	1,659	0	1,247	0	110,772	0
June	0.08	0.12	10%	32%	0	0.04	7.80	2.0	15.60	-15.48	0	30	0	480	0	364	0	128,503	0
									Design Storage Period (days)		156		553,918		50,714		34,589	825,420	225,769

553,918	104%	New Wastewater Production to Store (cu ft)
50,714	9%	Rainfall Runoff from Unsurfaced Areas During Storage Period (cu ft)
34,589	6%	Rainfall Runoff from Surfaced Areas During Storage Period (cu ft)
225,769	40%	Evaporation from Lagoon Surface Area
116,180	21%	Reserve Volume for 25-year/24-hour storm event (cu ft)
559,612		Total Lagoon Storage Needed Including Reserve Volume (cu ft)

VOLUME FORMULA

d = depth of pond
L = Length
W = width
S = Slope (H:V)

B1 = (L)(W)
B2 = [L - (d*S*2)][W - (d*S*2)]
M = [L - (S*d)][W - (S*d)]

Volume = 1/6*d*(B1 + 4M + B2)

STORAGE CAPACITY

		Length (ft)	Width (ft)	Depth (ft)	Slope (H:V)	Freeboard (ft)	B1	B2	M	Volume (ft^3)	Volume (gal)
Pond 1:	Proposed dimensions	250	100	16	1	2	25000	14824	19656	315,861	2,362,801
	With 2 ft freeboard	246	96	14	1	2	23616	14824	19024	267,251	1,999,169
Pond 2:		Length (ft)	Width (ft)	Depth (ft)	Slope (H:V)	Freeboard (ft)	B1	B2	M	Volume (ft^3)	Volume (gal)
	Proposed dimensions	0	0	0	0	0	0	0	0	0	0
	With 2 ft freeboard	0	0	-2	0	0	0	0	0	0	0
Pond 3:		Length (ft)	Width (ft)	Depth (ft)	Slope (H:V)	Freeboard (ft)	B1	B2	M	Volume (ft^3)	Volume (gal)
	Proposed dimensions	0	0	0	0	0	0	0	0	0	0
	With 2 ft freeboard	0	0	-2	0	0	0	0	0	0	0
Pond 4:		Length (ft)	Width (ft)	Depth (ft)	Slope (H:V)	Freeboard (ft)	B1	B2	M	Volume (ft^3)	Volume (gal)
	Proposed dimensions	0	0	0	0	0	0	0	0	0	0
	With 2 ft freeboard	0	0	-2	0	0	[illegible]	0	0	0	0
Pond 5:		Length (ft)	Width (ft)	Depth (ft)	[illegible]	[illegible]		B2	M	Volume (ft^3)	Volume (gal)
	Proposed dimensions	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	0	0	0
	With 2 ft freeboard	0	[illegible]	[illegible]	[illegible]	0	0	0	0	0	0
Pond 6:		Length (ft)	[illegible]	[illegible]	Slope (H:V)	Freeboard (ft)	B1	B2	M	Volume (ft^3)	Volume (gal)
	Proposed dimensions	0	[illegible]	0	0	0	0	0	0	0	0
	With 2 ft freeboard	0	0	-2	0	0	0	0	0	0	0
Pond 7:		Length (ft)	Width (ft)	Depth (ft)	Slope (H:V)	Freeboard (ft)	B1	B2	M	Volume (ft^3)	Volume (gal)
	Proposed dimensions	0	0	0	0	0	0	0	0	0	0
	With 2 ft freeboard	0	0	-2	0	0	0	0	0	0	0
Pond 8:		Length (ft)	Width (ft)	Depth (ft)	Slope (H:V)	Freeboard (ft)	B1	B2	M	Volume (ft^3)	Volume (gal)
	Proposed dimensions	0	0	0	0	0	0	0	0	0	0
	With 2 ft freeboard	0	0	-2	0	0	0	0	0	0	0

Total Storage Volume (ft^3)	267,251
Total Storage Volume (gal)	1,999,169

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ESTIMATED NITROGEN BALANCE

25,745	Estimated Annual Nitrogen Harvest From Fields Plumbed to Receive Liquid Manure (lb/year)
21,250	Estimated Annual Nitrogen Harvest From Fields Receiving Solid Manure Only (lb/year)
1.60	NIR

Fraction Description	Estimated Nitrogen Requirement (lb/year)	Available Nitrogen	Balance *(Surplus if negative)	% that may be used
Wet (on Liquid Manure Land)	41,192	41,308	(116)	99.7%
Dry (on Liquid Manure Land)	0	63,567	(63,567)	0.0%
Commercial Fertilizers	0	0	-	

100.0%	of solid manure should be exported from the cropland indicated.
1,795	of solid manure will likely need to be exported.

ESTIMATED PHOSPHORUS BALANCE

Fraction Description	Estimated Phosphorus Requirement (lb/year)	Available Phosphorus from Production Area	Balance *(Surplus if negative)	% that may be used
Wet (on Liquid Manure Land)	4,292	10,673	(6,381)	40.2%
Dry (on Liquid Manure Land)	0	22,396	(22,396)	0.0%

ESTIMATED LAGOON WATER BALANCE

583,918	New Wastewater Production to Store (cu ft)
50,714	Rainfall Runoff from Unsurfaced Areas During Storage Period (cu ft)
34,589	Rainfall Runoff from Surfaced Areas During Storage Period (cu ft)
-225,769	Evaporation from Lagoon Surface Area
116,160	Reserve Volume for 25-year/24-hour storm event (cu ft)

Need (w/ Reserves) (cu ft)	Available Volume (cu ft)	% of Requirement (+ indicates sufficient) (- indicates deficit)
559,612	267,251	47.8%

DO NOT EDIT THIS PA