



# DAKOTA ENVIRONMENTAL, INC.

Engineers...Hydrogeologists...Geologists...Remedial Specialists

December 9, 2016

Robert Hill  
Brookings County Zoning & Drainage Dept.  
520 3<sup>rd</sup> Street, Suite 200  
Brookings, SD 57006

Re: Animal Waste Management System  
Old Tree Farms, Brookings County, SD  
DEC Project No. 1101

Dear Mr. Hill:

Please find included with this letter copies of information regarding a proposed expansion of the above referenced facility. These materials are provided in conjunction with the conditional use and variance applications for expansion of the existing confined animal feeding operation.

The site is currently permitted for up to 2,540 animal units. It is proposed to reconfigure the makeup of the existing and proposed herd on site, as well as to add a number of heifers and calves. The proposed configuration would consist of 1,625 head of mature cattle, 500 heifers, and 450 calves (below 400 pounds). This configuration would equal 3,155 animal units, or an expansion of 615 animal units.

Since the facility is already a Class A CAFO, no increased setbacks are required. However, variances from nearby residences and wells were required during the 2011 expansion due to proximity to these structures, and will therefore be required to be obtained again. The first setback map in Appendix VI to this letter shows the setbacks from the nearest residences and wells as defined in the ordinance (2640'). The second map shows the distances for which variances for these two setbacks have been requested. The third shows a smaller scale map of the site, including any additional applicable setbacks.

The physical modifications of the expansion would consist of extending the west end of the existing north freestall barn, and constructing an additional calf barn south of the manure storage ponds as shown on the site map in Appendix VII. The freestall barn extension would utilize a liquid manure handling system identical to the existing barns, while the calf barn would utilize a bedding pack system where manure and bedding would be handled as a solid. Storage for this mixture will be provided by the existing approved stockpiling area. The manure production calculations for the entire facility have been recalculated and are included in Appendix I. These calculations demonstrate the ability of the existing storage facilities to meet capacity requirements of the General Permit. Details of the proposed construction are also included in Appendix VII.

Since the existing site is currently permitted by both Brookings County and DENR, the data concerning placement of the site is included mainly for reference. Appendix II includes the

Brookings County Groundwater Protection Zone map, which does not show the site as located over the Big Sioux Aquifer or the contributing area. The First Occurrence map shows the site in an area where the aquifer is not present near the surface but may be located within 50 feet of the surface. Copies of soil borings completed during the initial permitting of the site are included, which encountered clay soils to a maximum depth of 50 feet, which was adequate to meet requirements of the General Permit. The FEMA flood zone map included in Appendix VI confirms the site is not located in a flood zone.

As a currently permitted site, the facility operates under an existing set of best management practices and requirements as its manure management plan. The current Operation and Maintenance guideline for the facility is included in Appendix IV. The current approved Nutrient Management Plan has also been modified to reflect the desired expansion. The revised copy included in Appendix III shows that adequate land remains available for land application of manure from the expanded facility.

The current Management Plan for Fly and Odor Control is included in Appendix V. Since the proposed expansion of the facility would consist of enlarging the housing areas instead of the manure storages, a significant increase in odor production is not expected.

We believe all information required by the Brookings County ordinance for submittal with the conditional use application is contained in the included packets. Please feel free to contact me if there are any questions, or if further information is required.

Sincerely,



Brian Friedrichsen, PE  
Senior Engineer

***APPENDIX I***

***DESIGN CALCULATIONS***

**OLD TREE FARMS AWMS  
WASTE VOLUME CALCULATIONS**

**Dairy Waste - Milking Herd, Dry Cows, and Heifers - Handled as liquid**

Number	Weight	Manure, cf/day/cow	Manure, total cf/day	Storage Period, days	Manure Volume over Storage Period
1,325	1,400	2.5	3,313	270	<b>894,375</b>
240	1,400	2.5	600	270	<b>162,000</b>
500	750	0.7	350	270	<b>94,500</b>

**Dairy Washwater & Flushwater - Milking Herd**

Number	Weight	Wash water, cf/day/1000#	Wash water, total cf/day	Storage Period, days	Wash water Volume over Storage Period
1,325	1,400	1.2	2,226	270	<b>601,020</b>

**Dairy Waste - Non-Milking Herd and Calves - Handled as solid manure to stacking pad**

Number	Weight	Manure, cf/day/cow	Manure, total cf/day	Storage Period, days	Manure Volume over Storage Period
60	1,400	1.15	69	270	<b>18,630</b>
150	100	0.12	18	270	<b>4,860</b>
150	200	0.25	38	270	<b>10,125</b>
150	300	0.37	56	270	<b>14,985</b>

**Dairy Waste - Solids separated from liquid system waste stream and stored on stacking pad**

(estimated based on tonnage/day data of current herd, from producer)

Manure solids, total cf/day	Storage Period, days	Manure Solids Volume over Storage Period
793	270	<b>214,110</b>

**Dairy Bedding - Straw - Handled as solid and stored on stacking pad**

Number	Weight	Bedding, cf/day/head	Bedding, total cf/day	Storage Period, days	Bedding Volume over Storage Period	Volume Reduction	Bedding Volume over Storage Period
2,065	No additional bedding is used by the milking herd. All bedding is recycled manure solids.						<b>0</b>
60	1,400	0.42	25	270	<b>6,804</b>	50%	<b>3,402</b>
150	100	0.72	108	270	<b>29,160</b>	50%	<b>14,580</b>
150	200	0.72	108	270	<b>29,160</b>	50%	<b>14,580</b>
150	300	0.72	108	270	<b>29,160</b>	50%	<b>14,580</b>

Annual Runoff Volume from stacking pad, cubic feet (36,000sf x 1.92' x 50%) **34,560**

Annual Runoff Volume from calf barn cleanout chute, cubic feet (385sf x 1.92' x 50%) **370**

25 year / 24 hour storm volume from stacking pad, cubic feet (36,000sf x .375') **13,500**

25 year / 24 hour storm volume from calf barn cleanout chute, cubic feet (385sf x .375') **145**

Total Volume of Liquid Manure and Wastewater to Pond, cubic feet **1,586,360**

Total Volume of Solid Manure and Bedding to Stacking Pad, cubic feet **309,852**

Existing Storage Pond Volume as Previously Approved by DENR, cubic feet **2,138,023**

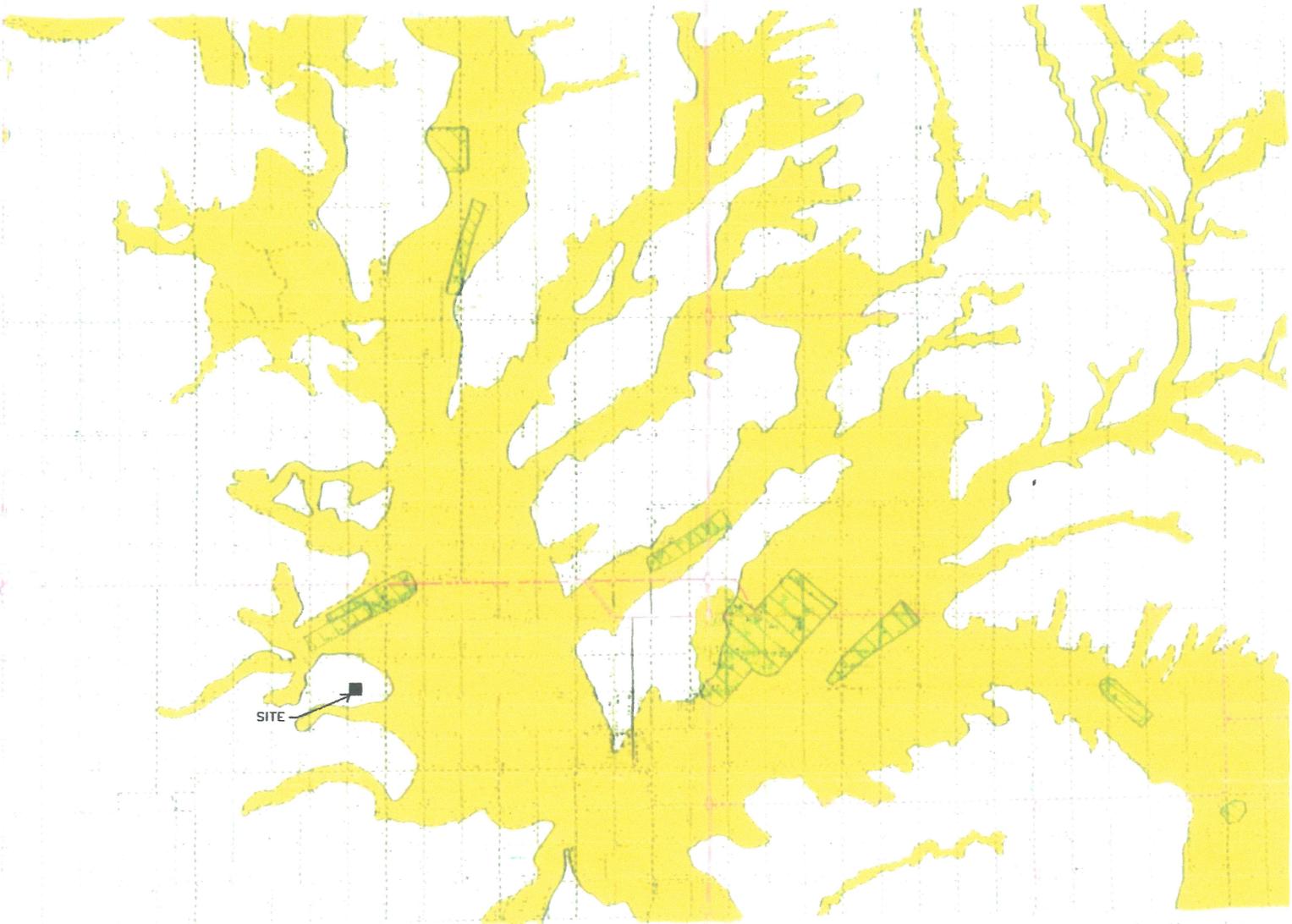
Existing Stacking Pad Volume at 98' x 358' x 12', cubic feet **358,800**



***APPENDIX II***

***GEOTECHNICAL & AQUIFER DATA***

# Brookings County Groundwater Protection Zones



- Zone A - Wellhead Protection Area
- Areas Contributing Drainage to Zone A
- Zone B - Shallow Aquifer Boundaries

- Shallow Aquifer Boundary
- 400 ft. accuracy
- 1600 ft. accuracy
- Areas Contributing Drainage to Zone A



# GE TECHNICAL BORING LOG

PROJECT TITLE: PROPOSED DAIRY: VOLGA, S.D.  
 PROJ. NUMBER: 97-3948

BORING NUMBER: 1

DEPTH IN FEET	DESCRIPTION OF MATERIAL  surface elevation:	GEOLOGIC ORIGIN	SAMPLE DATA				LABORATORY TESTS				
			WL	N	NO	TYPE	W	D	LL PL	QU	
1'	TOP SOIL: mostly silty clay, very dark brown (CL)	TOP SOIL									
	SILTY CLAY: brown, moist, weathered (CL)	FINE ALLUVIUM									
5'											
	LEAN CLAY: trace of gravel, brown, moist, weathered (CL)	GLACIAL TILL			1	BAG					
17'											
	LEAN CLAY: trace of gravel, dark brown, moist, weathered (CL)				2	BAG					
DATE: WATER TABLE MEASUREMENTS		DATE: 11-19-97									
		METHOD OF DRILLING: 3 1/4" HSA									
		CREW CHIEF: MIKE HUDSON									

# GEO TECHNICAL BORING LOG

PROJECT TITLE: PROPOSED DAIRY: VOLGA, S.D.  
 PROJ. NUMBER: 97-3948

BORING NUMBER: 1B

DEPTH IN FEET	DESCRIPTION OF MATERIAL  surface elevation:	GEOLOGIC ORIGIN	SAMPLE DATA				LABORATORY TESTS			
			WL	N	NO	TYPE	W	D	LL PL	QU
40'	LEAN CLAY: trace of gravel, gray, moist, weathered (CL)				3	BAG				
51'	END OF BORING									
DATE: WATER TABLE MEASUREMENTS		DATE: 11-19-97								
		METHOD OF DRILLING: 3 1/4" HSA								
		CREW CHIEF: MIKE HUDSON								

# GEO TECHNICAL BORING LOG

PROJECT TITLE: PROPOSED DAIRY: VOLGA, S.D.  
 PROJ. NUMBER: 97-3948

BORING NUMBER: 2

DEPTH IN FEET	DESCRIPTION OF MATERIAL  surface elevation:	GEOLOGIC ORIGIN	SAMPLE DATA				LABORATORY TESTS			
			WL	N	NO	TYPE	W	D	LL PL	QU
1'	TOP SOIL: mostly silty clay, very dark brown (CL)	TOP SOIL								
	SILTY CLAY: brown, moist, weathered (CL)	FINE ALLUVIUM								
5'	LEAN CLAY: trace of gravel, brown, moist, weathered (CL)	GLACIAL TILL								
15'	LEAN CLAY: trace of gravel, dark brown, moist, weathered (CL)									
20'	END OF BORING									
DATE:	WATER TABLE MEASUREMENTS	DATE: 11-19-97								
		METHOD OF DRILLING: 3 1/4" HSA								
		CREW CHIEF: MIKE HUDSON								

# GE TECHNICAL BORING LOG

PROJECT TITLE: PROPOSED DAIRY: VOLGA, S.D.  
 PROJ. NUMBER: 97-3948

BORING NUMBER: 3

DEPTH IN FEET	DESCRIPTION OF MATERIAL  surface elevation:	GEOLOGIC ORIGIN	SAMPLE DATA				LABORATORY TESTS			
			WL	N	NO	TYPE	W	D	LL PL	QU
1'	TOP SOIL: mostly silty clay, very dark brown (CL)	TOP SOIL								
	SILTY CLAY: brown, moist, weathered (CL)	FINE ALLUVIUM								
5'	LEAN CLAY: trace of gravel, brown, moist, weathered (CL)	GLACIAL TILL								
15'	LEAN CLAY: trace of gravel, dark brown, moist, weathered (CL)									
20'	END OF BORING									
DATE: WATER TABLE MEASUREMENTS		DATE: 11-19-97								
		METHOD OF DRILLING: 3 1/4" HSA								
		CREW CHIEF: MIKE HUDSON								

## GENERAL NOTES

DESCRIPTIVE TERMINOLOGY		RELATIVE SIZES	
Density Term	"N" Value		
Very Loose	0 - 4	Boulder	> 12"
Loose	4 - 10	Cobble	3" - 12"
Medium Dense	10 - 16	Gravel	
Dense	16 - 30	Coarse	3/4" - 3"
Very Dense	> 30	Fine	#4 - 3/4"
		Sand	
		Coarse	#4 - #10
		Medium	#10 - #40
		Fine	#40 - #200
		Silt & Clay	<#200 (PI)
Consistency Term	"N" Value	Term	Range
Very Soft	0 - 2	Trace	0 - 5%
Soft	2 - 4	A Little	5 - 15%
Medium stiff	4 - 8	Some	15 - 30%
Stiff	8 - 15	With	30 - 50%
Very stiff	15 - 30		
Hard	< 30		

### BORING AND SAMPLING SYMBOLS

SYMBOL	DEFINITION
HSA	Hollow Stem Auger - 3 1/4" ID & 4 1/4" ID
FA	Flight Auger - 4" OD
HA	Hand Auger - 1 1/2" OD
DC	Drive Casing
PD	Pipe Drill or Clean Out Tube
CS	Continuous Split Barrel Sampling
DM	Drilling Mud
JW	Jetting Water
SB	Split Barrel Sampler
TW	Thin Wall Tube Sampler
LS	Split Barrel Liner Sample
W	Wash Sample
B	Bag Sample
NSR	No Sample Retrieved
NMR	No Water Level Measurement Recorded
WL	Water Level
N	Standard Penetration Value
▼	Water Level Symbol

### LABORATORY TEST SYMBOLS

SYMBOL	DEFINITION
W	Moisture Content-Percent of Dry Weight ASTM D2216
D	Dry Density-Pound Per Cubic Foot
LL & PL	Liquid Limit and Plastic Limit ASTM D4318
Qu	Unconfined Compressive Strength Pounds Per Square Foot ASTM D2166

***APPENDIX III***

***NUTRIENT MANAGEMENT PLAN***

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**INITIAL NUTRIENT MANAGEMENT PLAN**  
**FOR**  
**SOUTH DAKOTA ANIMAL FEEDING OPERATIONS**

**Spreadsheet B1.) Field Information**

Operator: <i>OLD TREE FARMS (Volga Dairy)</i>		Date: <i>11/30/16</i>													
Spreadsheet line #	17.	18.	19.	20.	21.	22.	23.					24.			
Field ID (include maps to illustrate location)	Name or Tract	Field #	Soil map unit symbol	County	Field Location: (1/4 Section, Township, Range)	Owned	Total acres in field	Acres Excluded from Manure Application:					Total acres Excluded		
							Minimum Buffer Zones (Drainages & Wetlands)	Excluded Acres			Other				
							35' Vegetated	100' Un-vegetated	100' Vegetated	Drainages	Wetlands	Wells	Slope		
1		1	KtB	BROOKINGS	N 1/2 Sec. 3, T 109, R 51	<input type="checkbox"/>	295.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.0	<input type="checkbox"/>
2		2	KtB	BROOKINGS	SW 1/4 Sec. 34, T 110, R 51	<input type="checkbox"/>	133.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	32	<input type="checkbox"/>
3		3	DoB	BROOKINGS	SE 1/4 Sec. 28, T 110, R 51	<input type="checkbox"/>	150.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	24	<input type="checkbox"/>
4		4	KtB	BROOKINGS	NE 1/4 Sec. 33, T 110, R 51	<input type="checkbox"/>	78.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0.0	<input type="checkbox"/>
5		5	EsB	BROOKINGS	SE 1/4 Sec. 12, T 109, R 51	<input type="checkbox"/>	125.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	25	<input type="checkbox"/>
6		6	PbB	BROOKINGS	SE 1/4 Sec. 3, T 109, R 51	<input type="checkbox"/>	120.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0	<input type="checkbox"/>
7		7	PwA	BROOKINGS	SE 1/4 Sec. 33, T 110, R 51	<input type="checkbox"/>	92.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5	<input type="checkbox"/>
8		8	PwB	BROOKINGS	SW 1/4 Sec. 33, T 110, R 51	<input type="checkbox"/>	120.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0	<input type="checkbox"/>
9		9	EsA	BROOKINGS	W 1/2 Sec. 6, T 109, R 50	<input type="checkbox"/>	109.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2	<input type="checkbox"/>
10		10	PgD	BROOKINGS	SE 1/4 Sec. 5, T 109, R 51	<input type="checkbox"/>	67.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2	<input type="checkbox"/>
11		11	PbC	BROOKINGS	SE 1/4 Sec. 4, T 109, R 51	<input type="checkbox"/>	155.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	12	<input type="checkbox"/>
12		12	PbC	BROOKINGS	SW 1/4 Sec. 4, T 109, R 51	<input type="checkbox"/>	38.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3	<input type="checkbox"/>
13		13	KtB	BROOKINGS	NE 1/4 Sec. 33, T 110, R 51	<input type="checkbox"/>	76.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0	<input type="checkbox"/>
14		14	Mt	BROOKINGS	SE 1/4 Sec. 33, T 110, R 51	<input type="checkbox"/>	34.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0	<input type="checkbox"/>
15		15			Sec. , T , R	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
16		16			Sec. , T , R	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
17		17	PbC	BROOKINGS	NE 1/4 Sec. 27, T 109, R 51	<input type="checkbox"/>	156.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	52	<input type="checkbox"/>
18		18	BeA	BROOKINGS	SW 1/4 Sec. 26, T 110, R 51	<input type="checkbox"/>	132.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	12	<input type="checkbox"/>
19		19	KtB	BROOKINGS	NW 1/4 Sec. 34, T 110, R 51	<input type="checkbox"/>	17.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0	<input type="checkbox"/>
20		20	VbB	BROOKINGS	NW 1/4 Sec. 34, T 110, R 51	<input type="checkbox"/>	50.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0	<input type="checkbox"/>
21		21	VbB	BROOKINGS	NW 1/4 Sec. 34, T 110, R 51	<input type="checkbox"/>	29.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0	<input type="checkbox"/>
22		22	PwB	BROOKINGS	NW 1/4 Sec. 34, T 110, R 51	<input type="checkbox"/>	43.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0	<input type="checkbox"/>
23		23	PbB	BROOKINGS	NE 1/4 Sec. 4, T 109, R 51	<input type="checkbox"/>	139.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0	<input type="checkbox"/>
24		24	BeA	BROOKINGS	NE 1/4 Sec. 27, T 110, R 51	<input type="checkbox"/>	112.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0	<input type="checkbox"/>
25		25	EsA	BROOKINGS	N 1/2 Sec. 36, T 110, R 51	<input type="checkbox"/>	69.9	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2	<input type="checkbox"/>

**INITIAL NUTRIENT MANAGEMENT PLAN  
FOR  
SOUTH DAKOTA ANIMAL FEEDING OPERATIONS**

**Spreadsheet B2.) Estimated Nutrient Requirement**

Operator: **OLD TREE FARMS (Volga Dairy)** Date: **11/30/16**

Spreadsheet line #	Field ID (Include maps to illustrate location)	Name or Tract	Crops in Rotation and Average Yield:			Estimated Nitrogen requirements (lbs.)			Est. soil test NO <sub>3</sub> -N (lbs.)	Legume N credits (lbs.)			Additional N needed for crops: (lbs.)			Total manure N allowed per field (lbs.)			
			Prior year	Year 1	Year 2	Year 3	Year 1	Year 2		Year 3	Year 1	Year 2	Year 3	Year 1	Year 2		Year 3	Avg	
			Crop	Yield	Crop	Yield	Crop	Yield		Crop	Yield	Crop	Yield	Crop	Yield		Crop		Yield
1			Soybean (bu)	45	Corn (bu)	150	Soybean (bu)	45	180	171	180	40	40	40	100	131	100	110	32,217
2			Soybean (bu)	45	Corn (bu)	150	Soybean (bu)	45	180	171	180	40	40	40	100	131	100	110	11,144
3			Soybean (bu)	45	Corn (bu)	150	Soybean (bu)	45	180	171	180	40	40	40	100	131	100	110	13,902
4			Corn (bu)	150	Soybean (bu)	45	Corn (bu)	150	171	180	171	40	0	0	131	100	131	121	9,412
5			Soybean (bu)	45	Corn (bu)	150	Soybean (bu)	45	180	171	180	40	40	40	100	131	100	110	11,033
6			Corn (bu)	150	Soybean (bu)	45	Corn (bu)	150	171	180	171	40	0	0	131	100	131	121	14,480
7			Corn (bu)	150	Soybean (bu)	45	Corn (bu)	150	171	180	171	40	0	0	131	100	131	121	10,498
8			Soybean (bu)	45	Corn (bu)	150	Soybean (bu)	45	180	171	180	40	40	40	100	131	100	110	13,240
9			Corn (bu)	150	Soybean (bu)	45	Corn (bu)	150	171	180	171	40	0	0	131	100	131	121	12,911
10			Corn (bu)	150	Soybean (bu)	45	Corn (bu)	150	171	180	171	40	0	0	131	100	131	121	7,843
11			Corn (bu)	150	Soybean (bu)	45	Corn (bu)	150	171	180	171	40	0	0	131	100	131	121	17,255
12			Soybean (bu)	45	Corn (bu)	150	Soybean (bu)	45	180	171	180	40	40	40	100	131	100	110	3,862
13			Corn (bu)	150	Soybean (bu)	45	Corn (bu)	150	171	180	171	40	0	0	131	100	131	121	9,171
14			Soybean (bu)	45	Corn (bu)	150	Soybean (bu)	45	180	171	180	40	40	40	100	131	100	110	3,751
15																			
16																			
17			Soybean (bu)	45	Corn (bu)	150	Soybean (bu)	45	180	171	180	40	40	40	100	131	100	110	11,475
18			Corn (bu)	150	Soybean (bu)	45	Corn (bu)	150	171	180	171	40	0	0	131	100	131	121	14,480
19			Soybean (bu)	45	Corn (bu)	150	Soybean (bu)	45	180	171	180	40	40	40	100	131	100	110	1,876
20			Corn (bu)	150	Soybean (bu)	45	Corn (bu)	150	171	180	171	40	0	0	131	100	131	121	6,033
21			Corn (bu)	150	Soybean (bu)	45	Corn (bu)	150	171	180	171	40	0	0	131	100	131	121	3,499
22			Corn (bu)	150	Soybean (bu)	45	Corn (bu)	150	171	180	171	40	0	0	131	100	131	121	5,189
23			Soybean (bu)	45	Corn (bu)	150	Soybean (bu)	45	180	171	180	40	40	40	100	131	100	110	15,336
24			Corn (bu)	150	Soybean (bu)	45	Corn (bu)	150	171	180	171	40	0	0	131	100	131	121	13,515
25			Soybean (bu)	41	Corn (bu)	147	Soybean (bu)	41	177	155	177	40	40	40	97	115	97	103	6,857

**INITIAL NUTRIENT MANAGEMENT PLAN  
FOR  
SOUTH DAKOTA ANIMAL FEEDING OPERATIONS**

**Spreadsheet B3.) Phosphorus and Acreage Assessment**

Spreadsheet line #	Field ID (Include maps to illustrate location)	Name or Tract	Field #	Phosphorus Soil Test			Predicted soil loss using RUSLE2 (T/ac/yr)	Phosphorus removal estimate (lbs.)				Total/field (lbs.)	Estimated time to raise P soil test level to 50 ppm Olsen or 75 ppm Bray (years)	Manure application based on:	Initial Nutrient Mgt. Plan - N based fields (acres)	
				ppm	Olsen	Bray-1		Date (M/Y)	Year 1	Year 2	Year 3					Avg.
1			1	42	☉	○	Nov-05	1.7	53	35	53	47	13,593	4	Nitrogen need	292.0
2			2	50	☉	○	Nov-05	1.7	53	35	53	47	4,702	0	Nitrogen need	101.0
3			3	12	☉	○	Nov-05	1.5	53	35	53	47	5,865	18	Nitrogen need	126.0
4			4	22	☉	○	Nov-05	1.7	35	53	35	41	3,167	10	Nitrogen need	78.0
5			5	12	☉	○	Nov-05	1.7	53	35	53	47	4,655	18	Nitrogen need	100.0
6			6	2	☉	○	Nov-05	1.7	35	53	35	41	4,872	17	Nitrogen need	120.0
7			7	5	☉	○	Nov-05	1.7	35	53	35	41	3,532	16	Nitrogen need	87.0
8			8	3	☉	○	Aug-05	1.7	53	35	53	47	5,586	23	Nitrogen need	120.0
9			9	17	☉	○	Nov-05	1.7	35	53	35	41	4,344	12	Nitrogen need	107.0
10			10	3	☉	○	Nov-05	1.7	35	53	35	41	2,639	17	Nitrogen need	65.0
11			11	3	☉	○	Nov-05	1.7	35	53	35	41	5,806	17	Nitrogen need	143.0
12			12	1	☉	○	Nov-05	1.7	53	35	53	47	1,629	24	Nitrogen need	35.0
13			13	6	☉	○	Nov-05	1.7	35	53	35	41	3,086	16	Nitrogen need	76.0
14			14	12	☉	○	Nov-05	1.5	53	35	53	47	1,583	18	Nitrogen need	34.0
15			15		○	○										
16			16		○	○										
17			17	14	☉	○	Nov-05	1.7	53	35	53	47	4,841	17	Nitrogen need	104.0
18			18	32	☉	○	Nov-05	1.7	35	53	35	41	4,872	6	Nitrogen need	120.0
19			19	13	☉	○	Nov-05	1.7	53	35	53	47	791	18	Nitrogen need	17.0
20			20	9	☉	○	Nov-05	1.7	35	53	35	41	2,030	15	Nitrogen need	50.0
21			21	15	☉	○	Nov-05	1.7	35	53	35	41	1,177	13	Nitrogen need	29.0
22			22	8	☉	○	Nov-05	1.7	35	53	35	41	1,746	15	Nitrogen need	43.0
23			23	9	☉	○	Aug-05	1.7	53	35	53	47	6,470	20	Nitrogen need	139.0
24			24	6	☉	○	Oct-06	1.5	35	53	35	41	4,547	16	Nitrogen need	112.0
25			25	8	☉	○	Aug-07	0.82	52	31	52	45	2,991	23	Nitrogen need	66.7

Operator: OLD TREE FARMS (Volga Dairy)

Date: 11/30/16

31. 32. 33. 34. 35.

**INITIAL NUTRIENT MANAGEMENT PLAN**  
**FOR**  
**SOUTH DAKOTA ANIMAL FEEDING OPERATIONS**

**Spreadsheet B1.) Field Information**

Spreadsheet line #	Field ID (Include maps to illustrate location)	Name or Tract	Field #	Soil map unit symbol	County	Field Location: (1/4 Section, Township, Range)	Owned	Total acres in field	Acres Excluded from Manure Application:										Irrigated
									Minimum Buffer Zones (Drainages & Wetlands)			Excluded Acres			Wetlands				
									35' Vegetated	100' Un-vegetated	100' Vegetated	Drainages	Wetlands	Wells	Slope	Other			
26			26	PbC	BROOKINGS	SW 1/4 Sec. 4, T. 109, R. 51	<input type="checkbox"/>	34.4	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	6					6.0	<input type="checkbox"/>	
27			27	BeA	BROOKINGS	NW 1/4 Sec. 25, T. 110, R. 51	<input type="checkbox"/>	137.8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						0.0	<input type="checkbox"/>	
28			28	EsA	BROOKINGS	SE 1/4 Sec. 25, T. 110, R. 51	<input type="checkbox"/>	175.1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1					1.0	<input type="checkbox"/>	
29			29	PwB	BROOKINGS	SW 1/4 Sec. 15, T. 110, R. 51	<input type="checkbox"/>	74.3	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1					1.0	<input type="checkbox"/>	
30			30	BeA	BROOKINGS	SE 1/4 Sec. 22, T. 110, R. 51	<input type="checkbox"/>	119.7	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5					5.0	<input type="checkbox"/>	
31			31	PbB	BROOKINGS	NE 1/4 Sec. 13, T. 109, R. 52	<input checked="" type="checkbox"/>	140.5	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	30					30.0	<input type="checkbox"/>	
32			32	PbB	BROOKINGS	SW 1/4 Sec. 3, T. 109, R. 51	<input type="checkbox"/>	146.8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						0.0	<input type="checkbox"/>	
33			33	PbB	BROOKINGS	SW 1/4 Sec. 4, T. 109, R. 51	<input type="checkbox"/>	73.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	8					8.0	<input type="checkbox"/>	
34			34	PbB	BROOKINGS	N 1/2 Sec. 10, T. 109, R. 51	<input type="checkbox"/>	215.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	12					12.0	<input type="checkbox"/>	
35			35	PbB	BROOKINGS	SE 1/4 Sec. 3, T. 110, R. 51	<input type="checkbox"/>	139.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	15					15.0	<input type="checkbox"/>	
36			36	BeA	BROOKINGS	NW 1/4 Sec. 11, T. 110, R. 51	<input type="checkbox"/>	142.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						0.0	<input type="checkbox"/>	
37			37	BeA	BROOKINGS	S 1/2 Sec. 10, T. 110, R. 51	<input type="checkbox"/>	262.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5					5.0	<input type="checkbox"/>	
38			38	Z182B	BROOKINGS	W 1/2 Sec. 13, T. 109, R. 51	<input type="checkbox"/>	257.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	15					15.0	<input type="checkbox"/>	
39			39	PwA	BROOKINGS	E 1/2 Sec. 9, T. 109, R. 51	<input type="checkbox"/>	196.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	15					15.0	<input type="checkbox"/>	
40			40	PbC	BROOKINGS	NE 1/4 Sec. 15, T. 109, R. 51	<input type="checkbox"/>	100.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	4					4.0	<input type="checkbox"/>	
41						Sec. , T. , R. ,	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							<input type="checkbox"/>	
42						Sec. , T. , R. ,	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							<input type="checkbox"/>	
43						Sec. , T. , R. ,	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							<input type="checkbox"/>	
44						Sec. , T. , R. ,	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							<input type="checkbox"/>	
45						Sec. , T. , R. ,	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							<input type="checkbox"/>	
46						Sec. , T. , R. ,	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							<input type="checkbox"/>	
47						Sec. , T. , R. ,	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							<input type="checkbox"/>	
48						Sec. , T. , R. ,	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							<input type="checkbox"/>	
49						Sec. , T. , R. ,	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							<input type="checkbox"/>	
50						Sec. , T. , R. ,	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							<input type="checkbox"/>	
								<b>Total Acres:</b>									<b>4,552.5</b>		

**INITIAL NUTRIENT MANAGEMENT PLAN**  
**FOR**  
**SOUTH DAKOTA ANIMAL FEEDING OPERATIONS**

**Spreadsheet B2.) Estimated Nutrient Requirement**

Spreadsheet line #	Field ID (Include maps to illustrate location)	Name or Tract	Field #	25. Crops in Rotation and Average Yield:						26. Estimated Nitrogen requirements (lbs.)			27. Est. soil test NO <sub>3</sub> -N (lbs.)	28. Legume N credits (lbs.)			29. Additional N needed for crops: (lbs.)			30. Total manure N allowed per field (lbs.)			
				Prior year		Year 1		Year 2		Year 3		Year 1		Year 2	Year 3	Year 1	Year 2	Year 3	Year 1		Year 2	Year 3	Avg
				Crop	Yield	Crop	Yield	Crop	Yield	Crop	Yield	Crop		Yield	Crop	Yield	Crop	Yield	Crop		Yield	Crop	Yield
26				Soybean (bu)	41	Corn (bu)	147	Soybean (bu)	41	Corn (bu)	147	177	155	177	40	40	0	40	97	115	97	103	2,920
27				Corn (bu)	147	Soybean (bu)	41	Corn (bu)	147	Soybean (bu)	41	155	177	155	40	0	40	0	115	97	115	109	14,983
28				Soybean (bu)	41	Corn (bu)	147	Soybean (bu)	41	Corn (bu)	147	177	155	177	40	40	0	40	97	115	97	103	17,899
29				Soybean (bu)	41	Corn (bu)	147	Soybean (bu)	41	Corn (bu)	147	177	155	177	40	40	0	40	97	115	97	103	7,536
30				Soybean (bu)	41	Corn (bu)	147	Soybean (bu)	41	Corn (bu)	147	177	155	177	40	40	0	40	97	115	97	103	11,792
31				Soybean (bu)	42	Corn (bu)	153	Soybean (bu)	42	Corn (bu)	153	183	159	183	40	40	0	40	103	119	103	109	12,000
32				Wheat (bu)	62	Corn (bu)	153	Soybean (bu)	42	Wheat (bu)	62	183	159	154	40	0	0	40	143	119	74	112	16,457
33				Corn (bu)	161	Soybean (bu)	45	Corn (bu)	161	Soybean (bu)	45	171	193	171	40	0	0	40	131	113	131	125	8,129
34				Corn (bu)	161	Soybean (bu)	45	Corn (bu)	161	Soybean (bu)	45	171	193	171	40	0	0	40	131	113	131	125	25,389
35				Soybean (bu)	45	Corn (bu)	161	Soybean (bu)	45	Corn (bu)	161	193	171	193	40	40	0	40	113	131	113	119	14,773
36				Corn (bu)	161	Soybean (bu)	45	Corn (bu)	161	Soybean (bu)	45	171	193	171	40	0	0	40	131	113	131	125	17,759
37				Soybean (bu)	45	Corn (bu)	161	Soybean (bu)	45	Corn (bu)	161	193	171	193	40	0	0	40	113	131	113	119	30,617
38				Soybean (bu)	43	Corn (bu)	155	Soybean (bu)	43	Corn (bu)	155	186	163	186	40	40	0	40	106	123	106	112	27,056
39				Soybean (bu)	45	Corn (bu)	168	Soybean (bu)	45	Corn (bu)	168	202	171	202	40	40	0	40	122	131	122	125	22,577
40				Soybean (bu)	45	Corn (bu)	168	Soybean (bu)	45	Corn (bu)	168	202	171	202	40	40	0	40	122	131	122	125	11,974
41																							
42																							
43																							
44																							
45																							
46																							
47																							
48																							
49																							
50																							
													Total N recommendation:						490,841				

INITIAL NUTRIENT MANAGEMENT PLAN  
FOR  
SOUTH DAKOTA ANIMAL FEEDING OPERATIONS

Operator: <i>OLD TREE FARMS (Volga Dairy)</i>		31.		32.		33.		34.		35.		36.	
Spreadsheet line #	Field ID (Include maps to illustrate location)	Predicted soil loss using RUSLE2 (T/ac/yr)	Phosphorus Soil Test		Phosphorus removal estimate			Estimated time to raise P soil test level to 50 ppm Olsen or 75 ppm Bray (years)	Manure application based on:	Initial Nutrient Mgt. Plan - N based fields (acres)			
Name or Tract	Field #	ppm	Olsen	Bray-1	Date (M/Y)	Year 1	Year 2	Year 3	Avg.	Total/ field (lbs.)			
26		2.2	13	0	Aug-07	52	31	52	45	1,273			28.4
27		0.94	15	0	Jan-08	31	52	31	38	5,249			137.8
28		0.82	3	0	Jan-08	52	31	52	45	7,807			174.1
29		1.5	7	0	Jan-08	52	31	52	45	3,287			73.3
30		0.94	13	0	Feb-08	52	31	52	45	5,143			114.7
31		1.2	29	0	Sep-08	54	32	54	46	5,128			110.5
32		0.58	40	0	Sep-08	54	32	34	40	5,882			146.8
33		1.1	13	0	Oct-10	35	56	35	42	2,722			65.0
34		1.1	11	0	Mar-10	35	56	35	42	8,502			203.0
35		1.1	7	0	Nov-12	56	35	56	49	6,090			124.0
36		0.69	17	0	Nov-12	35	56	35	42	5,947			142.0
37		0.69	10	0	Nov-12	56	35	56	49	12,623			257.0
38		1.3	8	0	Oct-14	54	33	54	47	11,423			242.0
39		0.62	10	0	Oct-14	59	35	59	51	9,186			181.0
40		1.2	8	0	Oct-14	59	35	59	51	4,872			96.0
41				0									
42				0									
43				0									
44				0									
45				0									
46				0									
47				0									
48				0									
49				0									
50				0									
						N		P205		Total Acres		4,260.3	
						Total lbs of N and P205 available for crops:		195,455		160,016			
						Total lbs of N and P205 required by fields:		490,841		189,659			

Adequate acres are available based on Nitrogen analysis  
P205 removal exceeds, or is in balance with crop needs.

**APPENDIX IV**

**OPERATION & MAINTENANCE MANUAL**

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**©Dakota Environmental Consultants, Inc.**

P.O. Box 636 1122 - 21st Street SW Huron, SD 57350 605-352-5610 605-352-0951 1-800-888-0423

RECEIVED

WASTE MANAGEMENT SYSTEM  
OPERATION AND MAINTENANCE GUIDELINES

MAR 05 2008

SURFACE WATER PROGRAM

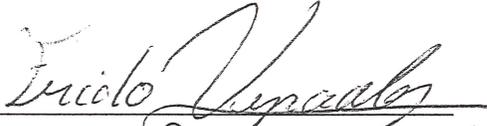
February 29, 2008

AWMS-VOLGA DAIRY  
SW 1/4 SECTION 34, T110N, R51W  
BROOKINGS COUNTY, SOUTH DAKOTA

You, as owner of the system, are responsible for its operation and maintenance. Although the systems designed by LARSON ENGINEERING are based on the best available technical knowledge, it must be recognized that the system creates some risk, and therefore needs to be properly operated and maintained, including periodic inspection. In addition, total benefits cannot be obtained unless the system is operated and maintained such that it will safely serve the purpose both as to function and time for which it was installed.

Recognizing this, these best management practices have been prepared for operating and maintaining your system.

I have reviewed the Best Management Practices for my Waste Management System.

  
Operator

3-1-08  
Date

Prepared by:

Donald R. Larson, P.E.  
LARSON ENGINEERING

RECEIVED

MAR 03 2008

BEST MANAGEMENT PRACTICES  
February 29, 2008

SURFACE WATER PROGRAM

A. LOCATION STANDARDS

1. Volga Dairy has considered the possibility of exposing the public to nuisance conditions on selecting an unsuitable or inappropriate location.
  - a.) The site is located 190 feet from 214<sup>th</sup> Street. The nearest residence is 0.7 mile away. Volga is 2.8 miles northeast.
  - b.) The prevailing wind direction is from the southeast in summer with the closest residence 0.7 mile to the west.
2. Volga Dairy has evaluated the construction and operational features of the manure management system to minimize contamination of surface or ground waters. The following has been considered:
  - a.) The soil conditions are shown in the soils report dated 11-19-97. The soil boring shows the material beneath the ponds to be clay indicating acceptable material.
  - b.) The depth to the aquifer is not known, but is not in the area shown in the "Generalized Map of Shallow Aquifers in South Dakota".
  - c.) No nearby drainage, streams, rivers, lakes, or wetlands are near the project site.
  - d.) No ground water was observed in the test borings.
  - e.) The site was selected to prevent flooding or submergence.
  - f.) The site was selected to keep windblown odors away from residences.
  - g.) The terrain slopes will contain the runoff from the area around the facility on land of Volga Dairy.
3. The wastewater containment structure is not located in a known wetland.
4. The wastewater containment facility is not located over a known shallow aquifer.

5. Volga Dairy will maintain appropriate buffer zones around the wastewater containment structure and land application areas for manure disposal.
6. The wastewater containment structure is located 0.7 miles from neighbors.

#### B. CONTAINMENT STRUCTURE DESIGN AND STORAGE

1. The freeboard is two feet. The calculations show the required storage and the design storage.
2. Markers will be maintained to show the volume required to contain a 25-year, 24 hour event.

#### C. SURFACE WATER PROTECTION

Volga Dairy will construct, manage and maintain the manure management system in a manner to prevent pollution of surface waters of the state.

1. Practices to decrease water volumes are as follows:
  - a.) Uncontaminated storm water runoff shall be diverted away from the containment structure.
  - b.) Water will be recycled in the barn flush system.
2. Practices to decrease the potential of discharging manure and process wastewater are as follows:
  - a.) Collect and evenly apply wastewater to land only during dry weather.
3. Practices to decrease the potential of discharging manure or process wastewater to surface water are as follows:
  - a.) Manure will be stockpiled in the designated containment structure if needed during cold weather.
  - b.) Manure will not be spread on land that is susceptible to excessive water erosion.
  - c.) Manure will be utilized consistent with good agricultural practices and the Nutrient Management Plan.

#### D. GROUND WATER PROTECTION

The following best management practices will be followed to ensure protection of ground water:

1. The containment structure will be constructed with 18 inch compacted clay liners with either CL or CH unified classification.
2. The containment structure is not located over a known shallow aquifer.
3. 3 soil borings were made.
4. Compaction and/or permeability tests will be made on the completed liner.
5. Permeability testing of completed liner is required. One test per acre of bottom area, minimum of 2 in the basin bottom and one test per acre of side slope area, minimum of 1 on side slopes. ASTM D5084 Measurement of Hydraulic Conductivity of Saturated Porous Materials.
6. One upgradient and three down gradient monitoring wells must be installed near the proposed holding ponds. Wells shall be monitored throughout the life of the facility. Wells shall be sampled quarterly during the first year of operation. At least one round of samples must be taken before manure is stored in the holding ponds. A sample must also be collected from the ponds during one of the ground water sampling events, and those results must also be submitted to DENR. Depending upon the results of the first year of monitoring, the monitoring schedule may be reduced to semi-annual sampling. Water levels in the wells must also be recorded on a regular basis. DENR may alter the monitoring program should on-site conditions warrant other actions. The following parameters shall be monitored: Chlorides (mg/L), Ammonia as N (mg/L), Nitrates as N (mg/L), Sulfates (mg/L), Total Dissolved Solids (mg/L), Water Levels (Nearest 0.01 foot).
7. **The concrete driving pad between buildings will be kept clean and free of debris.**

#### E. FEEDLOT MANURE UTILIZATION OR DISPOSAL BY LAND APPLICATION

Volga Dairy will be responsible for the safe utilization of manure and process wastewater generated at the dairy operation. The following items establish minimum standards to be followed:

2. Volga Dairy will dispose of solids, sludge, manure, or other pollutants in a manner to prevent pollution of surface or ground water.

3. **Volga Dairy will follow the Best Management Practices for Land Application of Manure as required in Section 1.4.4.2 of the General Permit starting on page 24.**

#### F. TRAINING AND EDUCATION

Frido Ver Paalen has participated on May 15, 2002 in an approved environmental training program pertaining to proper operation and maintenance of a manure management system and proper natural resource management.

#### G. NUTRIENT MANAGEMENT PLAN

Volga Dairy will develop, maintain and follow a nutrient management plan to ensure the safe disposal of manure and protection of surface and ground water.

#### H. SOIL AND MANURE TESTING

Volga Dairy will use the following procedure to determine the appropriate application rates of manure and process wastewater. The manure and process wastewater will be applied according to the calculated rate. The following procedure for calculating the application rate will be used:

1. **Before land applying manure, fields will be soil sampled for nitrate-nitrogen from 0 to 2 feet. For those fields identified as located over a shallow aquifer, soil samples from 0 to 2 feet AND 2 to 4 feet will be taken.**
2. A minimum of 15 soil samples will be taken from each field to determine the residual nitrogen in the field.
3. The cores that represent similar soil may be composited into one sample. All samples, either individual or composited must be analyzed for nitrate nitrogen.
4. A representative sample of the manure or process wastewater that will be land applied will be tested each year for total nitrogen and inorganic nitrogen. Organic nitrogen is equal to the total nitrogen minus the inorganic nitrogen.

5. The total nitrogen that can be applied to each field will be based on the soil testing, types of crops, expected yields, legume credits, and sampling date. The total nitrogen that can be applied will be determined using SDSU Extension Publication EC750, Fertilizer Recommendation Guide, January 1996. The manure will be applied to each field at a rate not to exceed the rate calculated based on the results of the manure testing. If the manure application is required to be based on phosphorus crop removal, the application rate shall be based on phosphorus removed in the harvested portion of the crop as listed in the most current version of SDSU Extension Publication EXEX 8009, Quantities of Plant Nutrients Contained in Crops. Application can be based on multi-year phosphorus crop removal but cannot exceed the one year nitrogen crop need, and no manure may be applied to that field again until the applied phosphorus has been removed from the field via harvest and crop removal.
6. Volga Dairy will keep the following records regarding manure application. The records will be kept for 5 years and made available to the DENR upon request or inspection.
  - 1) Initial nutrient management plan
  - 2) Expected crop yields
  - 3) Dates manure or process waste water is applied to each field
  - 4) Weather conditions at time of application and for 24 hours prior to and following application
  - 5) Test methods used to sample and analyze manure, litter or process waste water and soil
  - 6) Results from manure, litter, process waste water and soil sampling
  - 7) Explanation of the basis for determining manure application rates
  - 8) Calculations showing the total nitrogen and phosphorus to be applied to each field, including sources other than manure, litter or process waste water
  - 9) Total amount of nitrogen and phosphorus actually applied to each field, including documentation of calculations for the total amount applied
  - 10) The method used to apply the manure litter or process waste water
  - 11) Dates of manure application equipment inspection

## I. INSPECTION REQUIREMENTS

Volga Dairy will visually inspect the following:

- 1) Weekly inspections of all storm water diversion devices, runoff diversion structures and devices channeling contaminated storm water to the wastewater and manure storage and containment structure
- 2) Dairy inspection of water lines, including drinking water or cooling water lines
- 3) Weekly inspections of the manure, litter, and wastewater holding ponds. This inspection will note the level in liquid holding ponds as indicated by the pond marker
- 4) The producer or agent acting on behalf of the producer shall inspect the land application equipment, land application site and irrigation equipment, if used, on a daily basis while land application of process wastewater or manure is occurring. This inspection is to ensure that the land application equipment is not leaking and runoff from the land application site and irrigation system is not occurring. If a discharge or leaks are found where process wastewater or manure is reaching any surface waters of the state or flowing onto property not owned by the producer or not included in the nutrient management plan, the producer is responsible for taking immediate steps to stop the discharge or leaks and follow the reporting requirements. The producer shall keep documentation of these inspections so the DENR can review upon request or during an inspection.
- 5) Any deficiencies found as a result of these inspections must be corrected as soon as possible.

## J. RETENTION OF RECORDS

Volga Dairy will retain the following records:

1. Records documenting the inspections required.
2. Weekly records of the depth of the manure and process wastewater in the liquid impoundment as indicated by the depth marker.

3. Records documenting any actions taken to correct deficiencies required. Deficiencies not corrected within 30 days must be accompanied by an explanation of the factors preventing immediate correction.
4. Records of mortalities management and practices used by the concentrated animal feeding operation.
5. Records documenting the current design of any manure or litter storage structures, including volume for solids accumulation, design treatment volume, total design volume, and approximate number of days of storage capacity.
6. Records of the date, time, and estimated volume of any overflow.

K. Annual Reporting Requirements.

1. On or before March 28, the producer must submit an annual report to the Secretary on a form provided by the Secretary to the following address:

Surface Water Quality Program  
523 East Capitol Avenue  
Pierre. SD 57501-3182

2. The annual report must include for the previous calendar year:
  - a. The number and type of animals, whether in open confinement or housed under roof (beef cattle, broilers, layers, swine weighing 55 pounds or more, swine weighing less than 55 pounds, mature dairy cows, dairy heifers, veal calves, sheep and lambs, horses, ducks, turkeys, geese, other);
  - b. Estimated amount of total manure, litter and process wastewater generated by the producer (tons/gallons);
  - c. Estimated amount of total manure, litter and process wastewater transferred to other persons by the producer (tons/gallons);
  - d. Total number of acres for land application covered by the nutrient management plan developed in accordance with this Permit;
  - e. Total number of acres under control of the producer that were used for land application of manure, litter and process wastewater;
  - f. Summary of all manure, litter and process wastewater discharges from the production area that have occurred, including date, time, and approximate volume; and

- g. A statement indicating whether the current version of the permittee's nutrient management plan was developed or approved by a certified nutrient management planner.

#### L. TWENTY-FOUR HOUR REPORTING

Volga Dairy will report any discharge as soon as possible, but no later than 24 hours from the time of becoming aware of the discharge. The report will be made to the State of South Dakota at 605-773-3351 or after business hours at 605-773-3231. Steps will be taken to stop the discharge and notify anyone downstream that may be impacted by the discharge.

#### M. INSPECTION AND ENTRY

Volga Dairy will allow the DENR upon presentation of credentials to:

1. Enter the premises of the dairy operation or where records are kept.
2. Inspect any feeding operation covered under the general permit.
3. Access and copy, at reasonable times, records specified under the general permit.
4. Sample or monitor any substance or parameter, at reasonable times, to determine compliance with the permit or other requirements of the South Dakota Water Pollution Control Act.

***APPENDIX V***

***MANAGEMENT PLAN FOR FLY AND ODOR CONTROL***

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# MANAGEMENT PLAN FOR FLY AND ODOR CONTROL

*for the*

## OLD TREE FARMS DAIRY ANIMAL WASTE MANAGEMENT SYSTEM PROPOSED EXPANSION

*BROOKINGS COUNTY, SOUTH DAKOTA*

**March 14, 2011**

**DEC Project No. 1101**

**Producer:** Frido Verpaalen

**Address:** 46318 214<sup>th</sup> Street  
Volga, SD 57071

**Phone:** (605) 627-9352

**Project Location:** SW¼ Section 34, T110N R51W, Brookings County, SD

This plan is provided to describe the Best Management Practices (BMPs) that will be implemented to minimize any nuisance created by flies and odors from the expanded dairy facility. The BMPs described have been utilized at other facilities and have been reported to be useful. This plan deals with odor and fly control in the three most vital phases, which are the manure storage areas, the land application of manure, and the disposal of dead animals.

## I. Manure Storage Areas

All liquid waste produced on the site will ultimately be contained in earthen storage ponds. The cattle will be housed in freestall type buildings from which manure will be collected before being processed by a solids separator and discharged to the ponds. This will be done on a daily basis. The ponds are designed in accordance with state law to provide adequate storage capacity as well as minimize odors as much as possible. The removal of a portion of solids from the manure reporting to the ponds will aid in odor reduction, as offensive odors can be produced by digestion of solids in storage ponds.

Certain small areas of the existing facility such as the calf barn and the proposed special needs unit are bedded with straw. The manure from these areas is then handled as a solid and placed in an approved storage facility, from which runoff is drained to the pond system. The amount of straw in the mixture from the bedded barns will serve to reduce odor from this source.

The majority of the barns are bedded with recycled manure solids, which have been removed from the waste stream by a separator. In order to be used for bedding, the recycled solids must be dewatered, which greatly reduces the odor creating potential. Since not all recycled solids are required for bedding, the remaining dewatered solids are stored on the solids stockpiling area, where the same odor reducing benefit of dewatering is achieved.

The configuration of the buildings and manure collection system will also reduce odors by removing manure from the housing areas as soon as possible. It is vital to the best interests of any dairy operation to keep the animals as clean and dry as possible, which is assurance that good housekeeping practices will be maintained in the barn areas. The collection system will not contain manure for extended periods, as it is designed to transfer waste to the separator and storage ponds as efficiently and quickly as possible. Washwater used in the process of cleaning

the milking parlor and holding area will also serve to dilute the raw manure, resulting in reduced odor as well. Good ventilation of the buildings will be provided, which is also in the best interests of the animal herd and operator.

Final disposal of the manure will be by land application at rates that do not exceed the agronomic requirement of the crop to be grown and allow beneficial utilization of the manure nutrient content.

Since higher winds tend to disperse odors by agitating odors, windy days are when odors are usually noticed the least. On calm days, or days with light winds, odor is transported without being agitated. Therefore, trees, shrubs or other plantings will aid in the dispersion of airborne odors by agitation in either low or high wind conditions. Existing shelterbelts on and near the site are expected to continue to be beneficial.

Trees and vegetation also serve as habitat for species such as birds, which prey upon insects or insect larvae. For areas around the barns, pesticide, especially in powdered form, can also be used to control insects. The producer operates a tractor mounted fogger/sprayer for control of flies and insects during the appropriate season. The use of professional pest control services which utilize sprays or fogging on a periodic basis to eliminate insects is also a common practice in the dairy industry.

Rodent control will be aided by the fact that the configuration of the buildings and structures offers little shelter for these animals. Control of rodents is also in the best interests of the dairy for reasons of sanitation, biosecurity, and disease control. This is an item which is part of periodic inspections conducted on a regular basis by state dairy officials. For areas around the building walls, solid poison and baited traps are used to control rodents and keep burrowing from occurring near the concrete. The use of professional control services is also an option.

## **II. Manure Land Application**

Guidelines set forth in the South Dakota General Water Pollution Control Permit for Concentrated Animal Feeding Operations strictly regulate the land application of manure. Details of these guidelines can be found in Appendix C of the DENR approved Nutrient Management Plan for this facility. Many of these guidelines were written with the control of

odors in mind. Facilities must have adequate manure storage capacity to avoid the necessity of applying manure at inopportune times. This will not be a problem with this facility, as the ponds are sized to contain 365 days worth of manure and wastewater production from the facility. The ventilation of the barns will be reduced in the wintertime to minimize the amount of cold outside air into the barns resulting in greatly reduced odors at this time. Cold temperatures will accomplish insect control during this period as well.

Regardless of the type of manure, the times for manure land application should still be chosen carefully. Since higher winds tend to disperse odors faster, windy days are best. Days that are humid and calm, or have slight winds, should be avoided, as these conditions can result in the transport of odors over distances without dispersal. For the convenience of any neighbors, manure land application should be avoided on weekends, holidays, evenings, or any other times where people are likely to be involved in outdoor recreational or leisure activities. The Operation and Maintenance Manual for the facility outlines these best management practices (BMPs) for easy reference by the operator.

The General Permit requires liquid manure that is land applied to cropland (other than no-till) to be injected or incorporated immediately. In addition to greatly reducing the potential for surface water contamination, this practice serves to remove the source of odor by mixing it into the soil. This also will remove the source of attraction for flies and other insects. Equipment designed to inject or incorporate manure in this manner also keeps the manure totally contained between removal from the lagoon and incorporation by utilizing a pump and pipeline arrangement between the source and the field. Therefore, minimal odor will be produced during transport and land application, and the likelihood of spills will be greatly reduced. This method of application also results in much less wear of area roads, as manure can be pumped several miles.

In accordance with the Nutrient Management Plan, records must be kept regarding land application of manure. An extensive process for determining the rate of application to any field must be followed to comply with DENR requirements, and this information is required to be documented and available. The date, time, location, wind direction, temperature, and amount of manure applied should also be included whenever land application of manure takes place. These requirements were designed to eliminate over-application of manure and prevent runoff, excess

odor, or other pollution by increasing the operator's awareness of proper land application practices.

### III. Disposal of Dead Animals

Disposal of dead animals is not expected to be a major concern at this facility, since death loss is generally very low at dairy operations when compared to other animal types. The herd is generally culled on a regular basis, with animals which are not producing as desired being sold and removed. In this way, death loss is minimized by removing animals which are past their prime before they become chronically ill. A rendering service is utilized in the infrequent occurrences of mortality. This method is one of several approved by the State Animal Industry Board for removal of carcasses, and offers the most efficient option for the operator.

### Summary

The Best Management Practices that have been described above are fully expected to minimize nuisances from odors and insects at this facility. While some production of odor is inevitable, it is possible through concerted effort and careful attention to keep both the intensity and frequency of odors and insects at a level where area residents are not inconvenienced.

**APPENDIX VI**

**SETBACK AND FLOODPLAIN MAPS**

# OLD TREE FARMS

*Residential & Well 1/2 Mile Setback*



1 inch = 1,000 feet

### Legend

- Well Buffer 2640'
- Residential Buffer 2640'

# OLD TREE FARMS

## REQUESTED VARIANCE SETBACKS



Residence - 1760'  
Wells - 1675'



1 inch = 1,000 feet

### Legend

-  Well Buffer 1675'
-  Residential Buffer 1760'

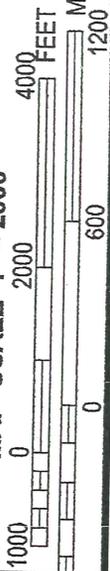
# OLD TREE FARMS



1 inch = 250 feet



MAP SCALE 1" = 2000'



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0425C

**FIRM**  
**FLOOD INSURANCE RATE MAP**  
**BROOKINGS COUNTY,**  
**SOUTH DAKOTA**  
**AND INCORPORATED AREAS**

PANEL 425 OF 700  
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)  
CONTAINS:  
COMMUNITY NUMBER PANEL SUFFIX  
BROOKINGS COUNTY 460253 0425 C

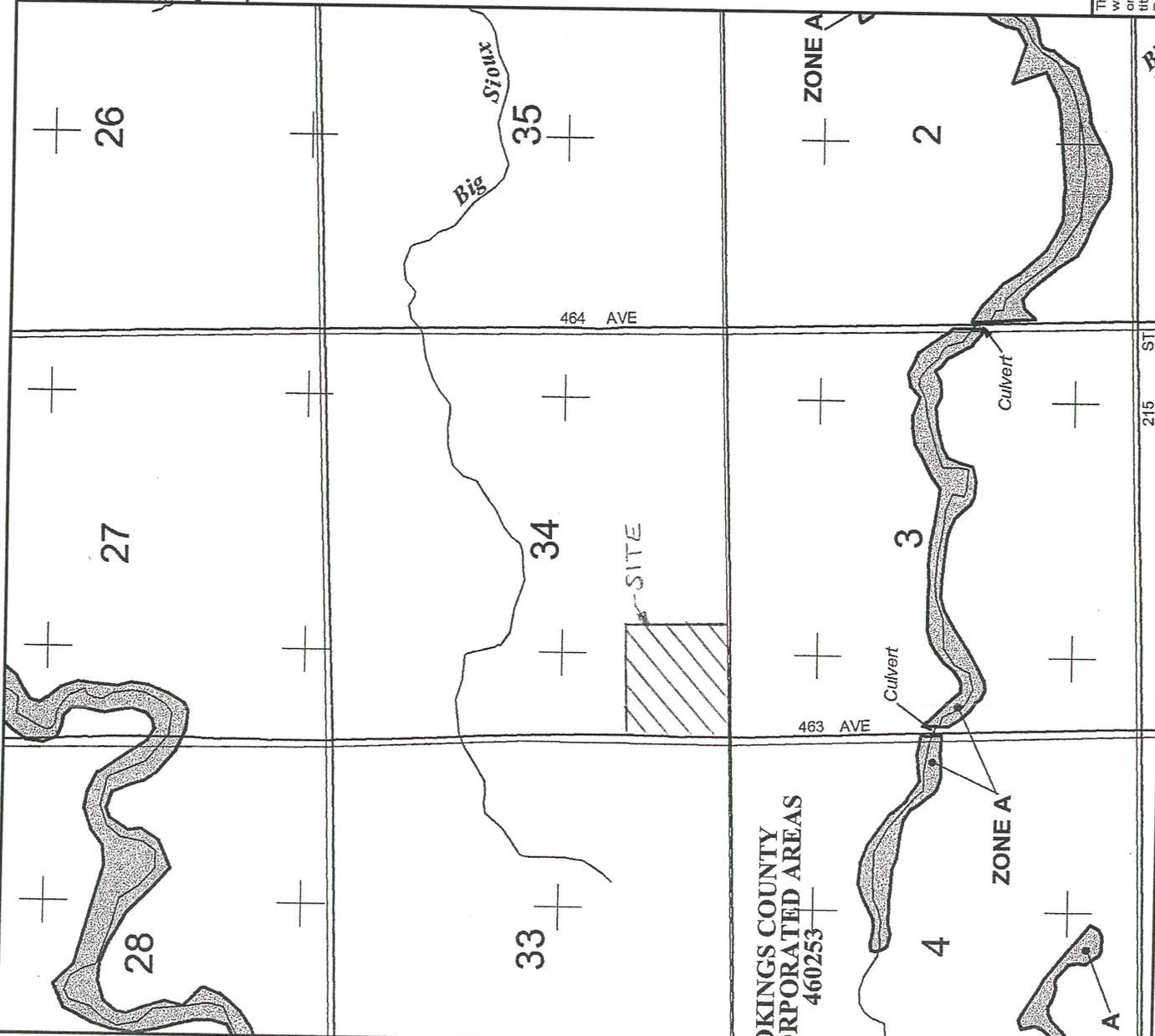
Notice to User: The Map Number shown below should be used when placing map orders: the Community Number above should be used on insurance applications for the subject community.



MAP NUMBER 46011C0425C  
EFFECTIVE DATE JULY 16, 2008

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at [www.msc.fema.gov](http://www.msc.fema.gov)



Big

215 ST

BROOKINGS COUNTY  
INCORPORATED AREAS  
460253

EA

***APPENDIX VII***

***SITE PLANS AND DRAWINGS***

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