Nutrient Management Plan

For

Ratio LLC Site

(Producer)

Hand

(County)

Nutrient Management Plan

Comprehensive Nutrient Management Plans (CNMP)

The objective of a CNMP is to provide AFO owners/operators with a plan to manage manure and organic by-products by combining conservation practices and management activities into a conservation system that, when implemented, will control soil erosion.

A CNMP is a conservation plan for an AFO that must include the production area including the animal confinement, feed and other raw materials storage areas, animal mortality facilities, and the manure handling containment or storage areas, and the land treatment area, including any land under control of the AFO owner or operator, whether it is owned, rented, or leased, and to which manure or process wastewater is, or might be, applied for crop, hay, pasture production, or other uses.

Meets Natural Resources Conservation Service (NRCS) FOTG Section III quality criteria for Water Quality (nutrients, organics, and sediments in surface and groundwater) and Soil Erosion (sheet and rill, wind, ephemeral gully, classic gully, and irrigation induced natural resource concerns on the production area and land treatment area).

Mitigates, if feasible, any excessive air emissions and/or negative impacts to air quality resource concerns that may result from practices identified in the CNMP or from existing onfarm areas/activities.

Complies with Federal, State, tribal, and local laws, regulations, and permit requirements.

Signature Page

Farmstead (Production Area)

Crop and Pasture (Land Treatment)

Nutrient Management Plan (590)

Section 1 Farmstead (Production Area)

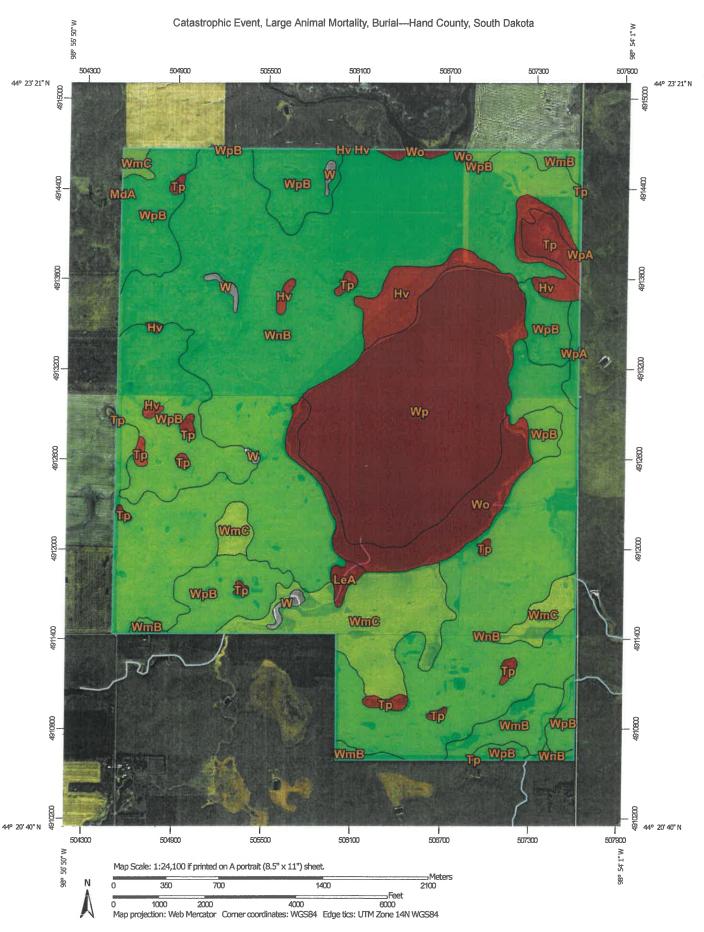
- 1.1 Maps of Farmstead, Existing and Planned Conservation Practices
- 1.2 Farmstead Conservation Practices Record of Decision
- 1.3 Farmstead Conservation Practices Implementation Requirements
- 1.4 Animal Inventory
- 1.5 Manure Storage Information
- 1.6 Planned Manure Exports
- 1.7 Planned Manure Imports
- 1.8 Planned Internal Transfers of Manure
- 1.9 Brief Description of, or Additional Information about Animal Feeding Operation (Optional)
- 1.10 Air Quality Assessment

INITIAL NUTRIENT MANAGEMENT PLAN

UNITED STATES DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE

SOUTH DAKOTA ANIMAL FEEDING OPERATIONS

Available for the crop 17,322 61,483 110,642 194,420 P_2O_5 4,171 800 (lbs.) 06-Jun-19 158,815 54,022 13,742 2,646 87,771 635 Z 83 83 83 83 83 8 Total lbs. of N and P2O5 available for the crop: 3-Yr. Mineralization Rate 4. Date: Pits beneath slatted floor Manure Handling 15. retained in 105,748 Total N field (lbs.) 3,188 16,556 65,087 14. 765 86 88 86 86 86 % Application Method N Retained 13. Injection Injection Injection Injection Injection 11,415,010 lbs/year 3. Prepared By: Ian Olson - Centrol Spring/Fall/Su mmer Time of applic-Spring/Fall/Su Spring/Fall/Su Spring/Fall/Su Spring/Fall/Su 12. mmer mmer Livestock Operation(s) application (lbs.) available for Total N 107,906 16,894 66,415 3,254 OR 781 8/ # 78 78 78 78 8 92,318 Handling/Storage N retained Liquid - anaerobic pit Hand 10. Total Nitrogen And Phosphorus Produced From 2. County: Total Manure as Excreted: N P₂O₅
Total solid/liquid Manure 17,322 61,483 110,642 4,171 800 as Excreted (Ibs.) 85,147 138,341 21,659 4,171 1,001 Days of Confinement 365 365 365 365 365 Ratio LLC weight (Ibs.) Avg. 400 170 450 400 25 1,920 5,212 1,080 800 48 No. of animals 1. Operator: Animal Type: Replacement Gilt Other Animals Gestating sow Sow and litter Nursery pig



Nati

Interstate Highways Aerial Photography Major Roads Local Roads US Routes Rails **Transportation** Background MAP LEGEND Ī Not rated or not available Not rated or not available Not rated or not available Area of Interest (AOI) Very severely limited Very severely limited Very severely limited Somewhat limited Somewhat limited Somewhat limited Severely limited Severely limited Severely limited Slightly limited Slightly limited Slightly limited Soil Rating Polygons Not limited Not limited Not limited Area of Interest (AOI) Soil Rating Points Soil Rating Lines Water Features } 10

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at

Please rely on the bar scale on each map sheet for map

measurements.
Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hand County, South Dakota Survey Area Data: Version 20, Sep 12, 2018 Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 16, 2010—Feb 6, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Streams and Canals

Catastrophic Event, Large Animal Mortality, Burial

Map unit symbol	Map unit name	Rating	Component name (percent	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
Hv	Hoven silt loam,	Very severely	Hoven (90%)	Ponding (1.00)	82.9	2.9%
	0 to 1 percent slopes	limited		Wetness (1.00)		
				Water gathering surface (0.50)		
			Tetonka, undrained	Ponding (1.00)		
			(10%)	Wetness (1.00)		
				Water gathering surface (0.50)		
LeA	Bon-Northville	Very severely limited	Bon (79%)	Wetness (1.00)	8.9	0.3%
	complex, nearly level	ilmited		Flooding (0.30)		
				Seepage (0.21)		
			Northville (20%)	Wetness (1.00)		
				Flooding (0.30)		
			Durrstein (1%)	Wetness (1.00)		
				Flooding (0.50)		
MdA	Dudley-Jerauld silt loams, 0 to	Slightly limited	Dudley (55%)	Water gathering surface (0.20)	0.1	0.0%
	2 percent slopes		Jerauld (35%)	Water gathering surface (0.20)		
Гр	Tetonka silt	Very severely limited	Tetonka,	Ponding (1.00)	54.6	1.9%
	loam, 0 to 1 percent slopes	iimitea	undrained (90%)	Wetness (1.00)		
				Water gathering surface (0.50)		
			Hoven (3%)	Ponding (1.00)		
				Wetness (1.00)		
				Water gathering surface (0.50)		
			Worthing,	Ponding (1.00)		
			undrained (2%)	Wetness (1.00)		
			1	Water gathering surface (0.50)		
			Crossplain (2%)	Wetness (1.00)		
				Flooding (0.70)		
				Water gathering surface (0.33)		
1	Water	Not rated	Water (100%)		12.9	0.5%

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AO
WmB	Glenham loam, undulating	Not limited	Glenham (99%)		67.5	2.49
WmC	Glenham loam, rolling	Slightly limited	Glenham (99%)	Slope (0.16)	202.8	7.29
WnB	Glenham- Propser loams, 1 to 6 percent slopes	Not limited	Glenham (65%)		1,393.6	49.59
Wo	Worthing silty	Very severely	Worthing,	Ponding (1.00)	107.4	3.89
	clay loam, 0 to 1 percent	limited	undrained (90%)	Wetness (1.00)		
	slopes			Water gathering surface (0.50)		
			Hoven (5%)	Ponding (1.00)		
				Wetness (1.00)		
				Water gathering surface (0.50)		
			Tetonka,	Ponding (1.00)		
			undrained (2%)	Wetness (1.00)		
				Water gathering surface (0.50)		
√p	Worthing silty	Very severely	Worthing,	Ponding (1.00)	445.1	15.8%
	clay loam, ponded, 0 to 1	limited	ponded (90%)	Wetness (1.00)		
	percent slopes			Water gathering surface (0.50)		
			Tetonka, undrained	Ponding (1.00)		
			(5%)	Wetness (1.00)		
				Water gathering surface (0.50)		
			Hoven (2%)	Ponding (1.00)		
				Wetness (1.00)		
				Water gathering surface (0.50)		
/pA	Glenham-Cavo loams, nearly level	Not limited	Glenham (50%)		12.9	0.5%
/pB	Glenham-Cavo loams, undulating	Not limited	Glenham (50%)		427.6	15.2%
otals for Area o	f Interest				2,816.2	100.0%

Rating	Acres in AOI	Percent of AOI
Not limited	1,901.5	67.5%
Very severely limited	698.9	24.8%

Rating	Acres in AOI	Percent of AOI
Slightly limited	202.9	7.2%
Null or Not Rated	12.9	0.5%
Totals for Area of Interest	2,816.2	100.0%

Description

"Catastrophic Event, Large Animal Mortality, Burial", is a method of disposing of deceased animals as a result of a large scale natural disaster such as a hurricane. The animals are disposed of by placing the carcasses in successive layers in an excavated and sloped pit. The carcasses are spread, compacted, and covered daily with a thin layer of soil that is excavated from the pit. When the pit is full, a final cover of soil material at least 2 feet thick is placed over the burial pit.

Soils are rated based on their limitation for burial of large animals following a catastrophic event. Catastrophic events include, but are not limited to, hurricanes, wildfires, flooding, and tornados. Limitations for burial of large animals during a catastrophic event are based primarily on contamination of groundwater, trafficability of excavation equipment, site selection, and site reclamation.

While some general observations may be made, onsite evaluation is required before the final site is selected. Improper site selection, design, or installation may cause contamination of ground water, seepage, and contamination of stream systems from surface drainage or floodwater. Potential contamination may be reduced or eliminated by installing systems designed to overcome or reduce the effects of the limiting soil property. The rating is for soils in their present condition and does not consider present land use.

Ratings are based on properties and qualities to the depth normally observed during soil mapping (approximately 6 or 7 feet). However, because pits may be as deep as 15 feet or more, geologic investigations are needed to determine the potential for pollution of ground water as well as to determine the design needed. These investigations, which are generally arranged by the pit developer, include the examination of stratification, rock formations, and geologic conditions that might lead to the conducting of leachates to aquifers, wells, watercourses, and other water sources. The presence of hard, nonrippable bedrock, bedrock crevices, or highly permeable strata in or immediately underlying the proposed pit bottom is undesirable because of the difficulty in excavation and the potential contamination of underground water.

Properties that influence the risk of contamination of groundwater, ease of excavation, trafficability, and revegetation are major considerations. Soils that flood or have a water table within the depth of excavation present a potential contamination hazard and are difficult to excavate. Slope is an important consideration because it affects the work involved in road construction, the performance of the roads, and the control of surface water around the pit. It may also cause difficulty in constructing pits for which the pit bottom must be kept level and oriented to follow the contour.

The ease with which the pit is dug and with which a soil can be used as daily and final covers is based largely on texture and consistence of the soil. The texture and consistence of a soil determine the degree of workability of the soil both when dry and when wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and difficult to place as a uniformly thick cover over

a layer of carcasses. The uppermost part of the final cover should be soil material that is favorable for the growth of plants. It should not contain excess sodium or salt and should not be too acid. In comparison with other horizons, the A horizon in most soils has the best workability and the highest content of organic matter. Thus, for a Large Animal Disposal, Burial operation it may be desirable to stockpile the surface layer for use in the final blanketing of the filled pit area.

Numerical ratings indicate the severity of the individual limitations. The ratings are shown in decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses.

Not limited (rating index equals 0) - The limitation for large animal disposal during a catastrophic event is insignificant. This soil is able to support standard excavation equipment, the soil has minimal contamination of groundwater, and soil reclamation using conventional processes is possible. Not limited soils have features that are very favorable for the specified use. Very good performance and very low maintenance can be expected of a properly designed and installed system.

Slightly limited (rating index greater than 0 but less than 0.30) - The limitation for large animal disposal during a catastrophic event is slightly limited. There are one or more soil properties that pose a slight limitation for contamination of groundwater, site reclamation, or excavation equipment. Slightly limited indicates the soil have features that are favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Good performance and low maintenance can be expected.

Somewhat limited (greater than 0.30 but less than 0.80) - The limitation for large animal disposal during a catastrophic event is somewhat limited. There are more than one soil properties that pose a limitation for contamination of groundwater, site reclamation, or excavation equipment. Any corrective measures taken to overcome these limitations are considered economical however, special care must be taken to overcome limitations. Somewhat limited indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected.

Severely limited (greater than 0.80 but less than 0.99) - The limitation for large animal disposal during a catastrophic event is severely limited. There are many soil properties that pose a limitation for contamination of groundwater, site reclamation, or excavation equipment. Additionally, corrective measures will be needed to overcome these limitations. Corrective measures taken may be costly to overcome limitations that pose a severely limited rating. Severely limited indicates that the soil has features that are unfavorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation however, it is costly to do so. Poor performance and high maintenance can be expected.

Very severely limited (rating index equals 1.0) - The limitation for large animal disposal during a catastrophic event is severely limited. There are one or more soil properties that pose a very severe limitation for contamination of groundwater, site reclamation, or excavation equipment. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Very poor performance and very high maintenance can be expected.

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Rating Options

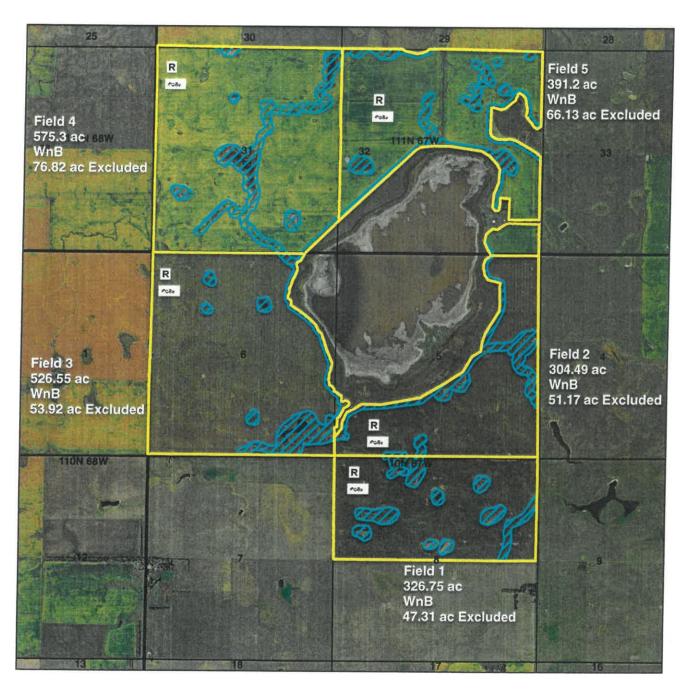
Aggregation Method: Dominant Condition Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Section 2 Crop and Pasture (Land Treatment)

- 2.1 Maps of Fields, Soils, Application Setbacks, Existing and Planned Crop and Pasture Conservation Practices
- 2.2 Crop and Pasture Conservation Practices Record of Decision
- 2.3 Crop and Pasture Conservation Practices Implementation Requirements
- 2.4 Predicted Soil Erosion

Water Quality Risk Assessment Map Aughenbaugh Site 5,6,8-110N-67W & 31,32-111N-67W



Legend



Manure Application Field

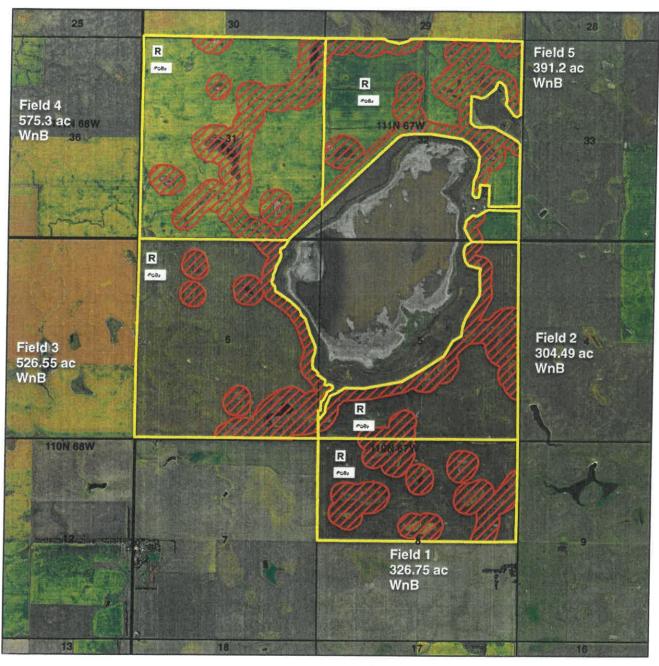
Runoff High Risk

Leaching High Risk





Water Quality Risk Assessment Map Frozen and Snow Covered Ground Aughenbaugh Site 5,6,8-110N-67W & 31,32-111N-67W

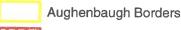


0.15 0.3

0.6

0.9

Legend



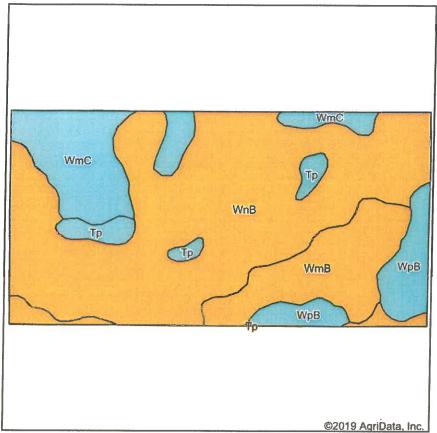
Frozen_Snow Covered Exclusions

®⇔ Manure Application Field

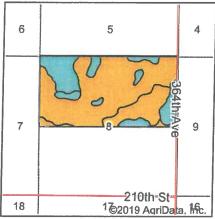
Runoff High Risk

Leaching High Risk





Field 1



State:

South Dakota

County:

Hand

Location: 8-110N-67W

Acres:

Township: Hiland

326.75

Date:

6/3/2019



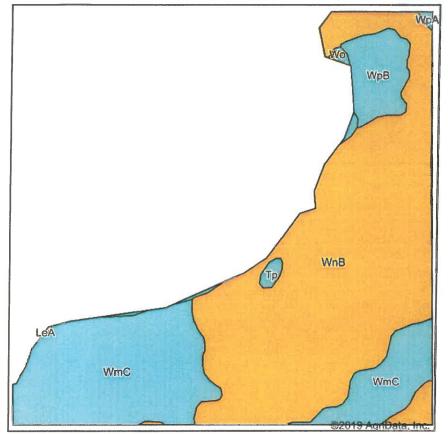




Soils data provided by USDA and NRCS.

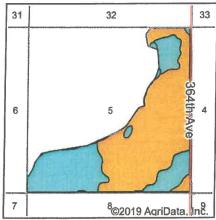
Code	Soil Description	Acres	Percent of field	PI Legend	Non-Irr Class *c	Productivity Index	*n NCCPI Soybeans
WnB	Glenham-Propser loams, 1 to 6 percent slopes	198.32	60.7%		lle	82	54
WmB	Glenham loam, undulating	47.67	14.6%		lle	82	56
WmC	Glenham loam, rolling	46.43	14.2%		lile	64	56
WpB	Glenham-Cavo loams, undulating	23.53	7.2%		lle	58	49
Тр	Tetonka silt loam, 0 to 1 percent slopes	10.80	3.3%		IVw	56	13
		76.9	*n 52.9				

^{*}n: The aggregation method is "Weighted Average using major components" *c: Using Capabilities Class Dominant Condition Aggregation Method



Soils data provided by USDA and NRCS.

Field Z



State: South Dakota

County: Hand

Location: 5-110N-67W

Township: Hiland Acres: 303.83 Date: 6/6/2019

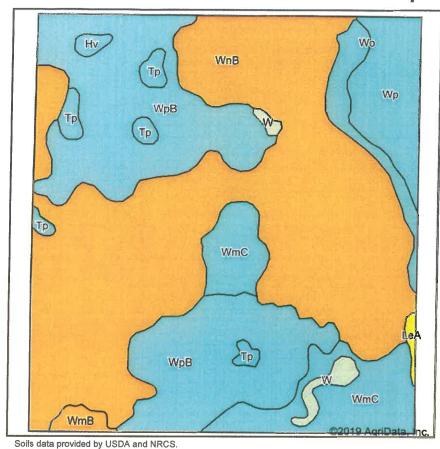




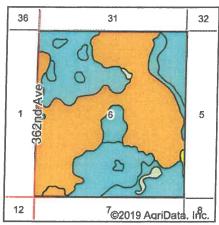


Code	Soil Description	Acres	Percent of field	PI Legend	Non-irr Class *c	Productivity Index	*n NCCPI Soybeans
WnB	Glenham-Propser loams, 1 to 6 percent slopes	188.99	62.2%		fle	82	54
WmC	Glenham loam, rolling	93.09	30.6%		IIIe	64	56
WpB	Glenham-Cavo loams, undulating	17.34	5.7%		lle	58	49
Wo	Worthing silty clay loam, 0 to 1 percent slopes	2.15	0.7%		Vw	30	2
Тр	Tetonka silt loam, 0 to 1 percent slopes	1.61	0.5%		IVw	56	13
WpA	Glenham-Cavo loams, nearly level	0.56	0.2%		lic	63	50
LeA	Bon-Northville complex, nearly level	0.09	0.0%		llc	91	54
				V	Veighted Average	74.6	*n 53.7

^{*}n: The aggregation method is "Weighted Average using major components" *c: Using Capabilities Class Dominant Condition Aggregation Method



Field 3



State:

South Dakota

County:

Hand

Location: 6-110N-67W

Acres:

Township: Hiland

576.07

Date:

6/3/2019

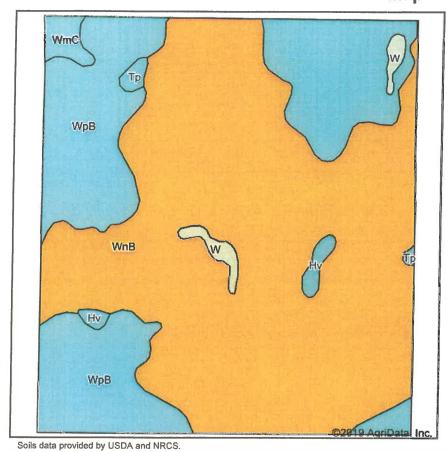




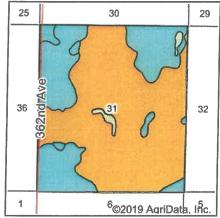


Code	Symbol: SD059, Soil Area Version: 20 Soil Description	Acres	Percent of field	PI Legend	Non-Irr Class *c	Productivity Index	*n NCCPI Soybeans
				1 - 2030.10		Troductivity much	n noon tooyboans
WnB	Glenham-Propser loams, 1 to 6 percent slopes	290.23	50.4%		lle	82	54
WpB	Glenham-Cavo loams, undulating	158.95	27.6%		lle	58	49
WmC	Glenham loam, rolling	53.39	9.3%		llle	64	56
Wp	Worthing silty clay loam, ponded, 0 to 1 percent slopes	32.89	5.7%		VIIIw	10	2
Wo	Worthing silty clay loam, 0 to 1 percent slopes	15.36	2.7%		Vw	30	2
Тр	Tetonka silt loam, 0 to 1 percent slopes	10.77	1.9%		lVw	56	13
W	Water	6.22	1.1%		VIII	0	0
WmB	Glenham loam, undulating	4.41	0.8%		lle	82	56
Hv	Hoven silt loam, 0 to 1 percent slopes	2.16	0.4%		VIs	15	4
_eA	Bon-Northville complex, nearly level	1.69	0.3%		llc	91	54
				W	eighted Average	66.6	*n 46.9

^{*}n: The aggregation method is "Weighted Average using major components" *c: Using Capabilities Class Dominant Condition Aggregation Method



Field 4



State: South Dakota

County: Hand

Location: 31-111N-67W

Township: Pearl
Acres: 583.77
Date: 6/3/2019



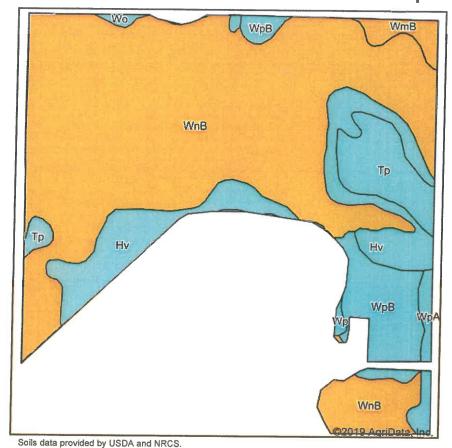




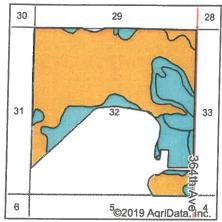
Code	Soil Description	Acres	Percent of field	PI Legend	Non-Irr Class *c	Productivity Index	*n NCCPI Soybeans
WnB	Glenham-Propser loams, 1 to 6 percent slopes	384.29	65.8%		lle	82	54
WpB	Glenham-Cavo loams, undulating	173.37	29.7%		lle	58	49
W	Water	6.64	1.1%		VIII	0.	0
WmC	Glenham loam, rolling	6.63	1.1%		lile	64	56
Hv	Hoven silt loam, 0 to 1 percent slopes	5.01	0.9%		VIs	15	4
Wp	Worthing silty clay loam, ponded, 0 to 1 percent slopes	4.87	0.8%		VIIIw	10:	2
Тр	Tetonka silt loam, 0 to 1 percent slopes	2.96	0.5%		IVw	56	13
Тр	Tetonka silt loam, 0 to 1 percent slopes	2.96	0.5%	w	IVw eighted Average	56 72.4	*n

^{*}n: The aggregation method is "Weighted Average using major components"

^{*}c: Using Capabilities Class Dominant Condition Aggregation Method



Field 5



State:

South Dakota

County:

Hand

Location: 32-111N-67W

Township: Pearl Acres:

417.75

Date:

6/3/2019







Code	Symbol: SD059, Soil Area Version: 20 Soil Description	A	D	Inu .	In a second	1	
Code	Soli Description	Acres	Percent of field	PI Legend	Non-Irr Class *c	Productivity Index	*n NCCPI Soybeans
WnB	Glenham-Propser loams, 1 to 6 percent slopes	286.92	68.7%		lle	82	54
Hv	Hoven silt loam, 0 to 1 percent slopes	55.47	13.3%		VIs	15	4
WpB	Glenham-Cavo loams, undulating	31.61	7.6%		lle	58	49
Тр	Tetonka silt loam, 0 to 1 percent slopes	25.92	6.2%		IVw	56	13
WpA	Glenham-Cavo loams, nearly level	7.29	1.7%		llc	63	50
WmB	Glenham loam, undulating	7.19	1.7%		lle	82	56
Wo	Worthing silty clay loam, 0 to 1 percent slopes	2.03	0.5%		Vw	30	2
Nρ	Worthing silty clay loam, ponded, 0 to 1 percent slopes	1.32	0.3%		VIIIw	10	2
				W	eighted Average	68.9	*n 44

^{*}n: The aggregation method is "Weighted Average using major components"

^{*}c: Using Capabilities Class Dominant Condition Aggregation Method



Info: Field 1

File: profiles\default

Inputs:

Location: USA\South Dakota\Hand County

Soil: Hand County, South Dakota\WnB Glenham-Prosper loams, undulating\Glenham Loam 64%

Slope length (horiz): 300 ft

Avg. slope steepness: 1.5 %

	_		_		_
	# viold unite #/oc	" איכות מוווט, #/מכ	0000	00.08	40 000
	Vield units	CHILD DIO!	hicholo	DUSTICIN	īĢ
	Vegetation		Vedetations/Corn grain	יפפימיים וויים	vegetations\Soybean, mw 7in rows
Manage and	Management	managements/CM/2 Od/o Othor I cool Mar Darana Cool	"" " Solve C-Solve Carlo	monogomouto (M7 OA)	managements on C. Other Local Mgt Records/Manure C-Soy

Contouring: a. rows up-and-down hill

Strips/barriers: (none)

Diversion/terrace, sediment basin: (none)

Subsurface drainage: (none) Adjust res. burial level: Normal res. burial

Outputs:

T value: 5.0 t/ac/yr

Soil loss erod. portion: 0.26 t/ac/yr

Soil loss for cons. plan: 0.26 t/ac/yr Detachment on slope: 0.26 t/ac/yr

Sediment delivery: 0.26 t/ac/yr

Surf. cover after planting: -- % Crit. slope length: 300 ft

Avg. ann. total biomass removal: 0 lb/ac

	Suff. res. cov. after on %	0/ (20 10 10 10 10 10 10 10 10 10 10 10 10 10	80	CH	35		22		22		47		- Δ		200
Vozototom	veyelalloll							Corp grain	Colli, gialli						
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Date	11/1/0	0/1/1	5/5/1		7/2/1	000	E/E/4	1/0/0	6774	1///0	10/00/4	1/02/01	4 4 /4 /4		

	60	CC		2		2]		5.		53		41		
							Southern my 7in round	CONDCAIL, HIW / III IOWS						
Dick towns limbs finishing	Disk, tandern light linishing	City of the state	Cultivator, field 6-12 in sweeps		Sprayer, pre-emergence	:	Urill or airseeder, double disk		Sprayer, post emergence		Sprayer, insecticide post emergence		Harvest, Killing crop 20pct standing stubble	
5/1/2	1 2	0/10/2	2/01/2	5/10/2	2/10/2	0/07/4	2/01/2	0,170	2///0	0/1/0	0/1/2	0/11/01	10/0/2	



Info: Field 2

File: profiles\default

Inputs:

Location: USA\South Dakota\Hand County

Soil: Hand County, South Dakota\WnB Glenham-Prosper loams, undulating\Glenham Loam 64%

Slope length (horiz): 300 ft

Avg. slope steepness: 1.5 %

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Contouring: a. rows up-and-down hill

Strips/barriers: (none)

Diversion/terrace, sediment basin: (none)

Subsurface drainage: (none)

Adjust res. burial level: Normal res. burial

Outputs:

T value: 5.0 t/ac/yr

Soil loss erod. portion: 0.26 t/ac/yr Detachment on slope: 0.26 t/ac/yr

Soil loss for cons. plan: 0.26 t/ac/yr

Sediment delivery: 0.26 t/ac/yr

Crit. slope length: 300 ft

Avg. ann. total biomass removal: 0 lb/ac Surf. cover after planting: -- %

	Suff res cov after on %	00, 00, 00, 00	80	CH	35	50	30	50	20	47		22		63
	Vegetation							Corn, grain						
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	53	51	51	100		53	41	38	00
				Soybean, mw 7in rows					
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Info: Field 3

File: profiles\default

Inputs:

Location: USA\South Dakota\Hand County

Soil: Hand County, South Dakota\WnB Glenham-Prosper loams, undulating\Glenham Loam 64%

Slope length (horiz): 300 ft

Avg. slope steepness: 1.5 %

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	Vield units	0377	hicholo	DUSTICIS	::	na
	Vegetation		Vedetations\Corn grain	and a second of the second of	Vedetations\Sovhaan mw 7in round	ישטימיים וווא יווא יוווא יווו וחשס
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Contouring: a. rows up-and-down hill

Strips/barriers: (none)

Diversion/terrace, sediment basin: (none)

Subsurface drainage: (none) Adjust res. burial level: Normal res. burial

Outputs:

T value: 5.0 t/ac/yr

Soil loss erod. portion: 0.26 t/ac/yr

Soil loss for cons. plan: 0.26 t/ac/yr Detachment on slope: 0.26 t/ac/yr

Sediment delivery: 0.26 t/ac/yr

Surf. cover after planting: -- % Crit. slope length: 300 ft

Avg. ann. total biomass removal: 0 lb/ac

	Surf. res. cov after on %	0/ (20)	080		25		22		200		47		87		CC
(citotopo)	vegelalloll							11.00	Corn, grain						
Operation		Manure Injector, low disturb 30 inch	Original and the state of the s	Cultivator, rield 6-12 in sweeps		Spraver, pre-emergence		planter, double disk oppr		Sprayer, post emergence and fert tank mix	VIII VIII VIII VIII VIII VIII VIII VII	Harvest, Killing crop 50pct standing stubble		Colse st of	: 2 : 3 (:) (:)
Date	0/1/1	0/1/1	5/5/1	5	5/5/4	200	-//	1/0/0	0774	1///0	10/00/4	10/20/1	7 7 / 7 7	1/1/11	

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Disk, tandem light finishing		Cultivator, field 6-12 in sweeps	C	Sprayer, pre-emergence		Drill or airseeder, double disk		Sprayer, post emergence		Sprayer, Insecticide post emergence		Harvest, Killing crop 20pct standing stubble	
5/1/2	E/40/0	2/01/6	5/40/0	3/10/2	0/07/2	2/101/2	0,170	2///0	0/1/0	2/1/0	0/11/0	7/2/01	



Info: Field 4

File: profiles\default

Inputs:

Location: USA\South Dakota\Hand County

Soil: Hand County, South Dakota\WnB Glenham-Prosper loams, undulating\Glenham Loam 64%

Slope length (horiz): 300 ft

Avg. slope steepness: 1.5 %

	# viole visite	# VICIO UTILIS, #/AC			00:00	0000	40.000
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000000000000000000000000000000000000000	Mariagerile	T 4.4 A	mariagements Carconier Local Mot Records/Manure (2-50v		managements/('M/ O//o Other local Mat December	יייין ואוטו	

Contouring: a. rows up-and-down hill

Strips/barriers: (none)

Diversion/terrace, sediment basin: (none)

Subsurface drainage: (none) Adjust res. burial level: Normal res. burial

Outputs: T value: 5.0 t/ac/yr

Soil loss erod. portion: 0.26 t/ac/yr

Soil loss for cons. plan: 0.26 t/ac/yr Detachment on slope: 0.26 t/ac/yr

Sediment delivery: 0.26 t/ac/yr

Crit. slope length: 300 ft

Avg. ann. total biomass removal: 0 lb/ac Surf. cover after planting: -- %

	Surf roo con other and	Sun. res. cov. aner op, %	80	CH	20		25		25		47				63
	Vegetation	Towns 6						Corp argin	Jan , Stall						
	Operation	Manure injector, low disturb 30 inch	المالين المالي	Cullivator, Held 0-12 in sweeps		Spiayer, pre-enrergence		planter, double disk opnr	-	Sprayer, post emergence and fert tank mix	VIII VIII VIII VIII VIII VIII VIII VII	Harvest, Killing Grob 50pct standing stubble		Chisel st. pt.	
0,00	Dale	11/1/0	5/5/1		5/2/1		5/2/1	5	6/7/4	17/0	10/00/4	10201	44/4/4	1/1/11	

4 1	53	51	51	-11	-0	53	41	30	00
				Sovbean, mw 7in rows					
Disk. tandem light finishing	Cultivator, field 6-12 in sweeps	Spraver, pre-emergence		Drill of alrseeder, double disk	Sprayer, post emergence	Chronophiother and American	opiayer, insecucine post emergence	Harvest, killing crop 20pct standing stubble	
5/1/2	5/10/2	5/10/2	5/10/2	3/10/2	6/7/2	8/1/2	1 L	7/2/01	



Info: Field 5

File: profiles\default

Inputs:

Location: USA\South Dakota\Hand County

Soil: Hand County, South Dakota\WnB Glenham-Prosper loams, undulating\Glenham Loam 64%

Slope length (horiz): 300 ft

Avg. slope steepness: 1.5 %

	# vield units #/ac	180.00	40.000
	Yield units	pushels	nq
	Vegetation	vegetations\Corn, grain	vegetations\Soybean, mw 7in rows
Monomont		managements/CMZ 04/c Other I coal Mat Docudaling	Service of the Child Independent of C-Soy

Contouring: a. rows up-and-down hill

Strips/barriers: (none)

Diversion/terrace, sediment basin: (none)

Subsurface drainage: (none) Adjust res. burial level: Normal res. burial

Outputs: T value: 5.0 t/ac/yr

Soil loss erod. portion: 0.26 t/ac/yr

Soil loss for cons. plan: 0.26 t/ac/yr Detachment on slope: 0.26 t/ac/yr

Sediment delivery: 0.26 t/ac/yr

Surf. cover after planting: -- % Crit. slope length: 300 ft

Avg. ann. total biomass removal: 0 lb/ac

	Crist was and the	Sun. res. cov. aner op, %	80	52		52	50	20	47	0.7	/0	63
	Vedetation						Corn, grain					
	Operation	Manure injector, low disturb 30 inch	Cultivator field 6-10 in emocra	ממשמאלים ביון אוויסומים ליוויסומים ליוויסומי	Sprayer, pre-emergence	planter double disk oppr		Sprayer, post emergence and fert, tank mix	Harvest killing oran Ednot otonding at the L	Strang older solder standing stubble	Chisel st of	
Date	0.5	0/1/1	5/5/1	5/5/1		5/2/1	6/7/4	1///0	10/20/1	7 7 / 7	1/1/1	

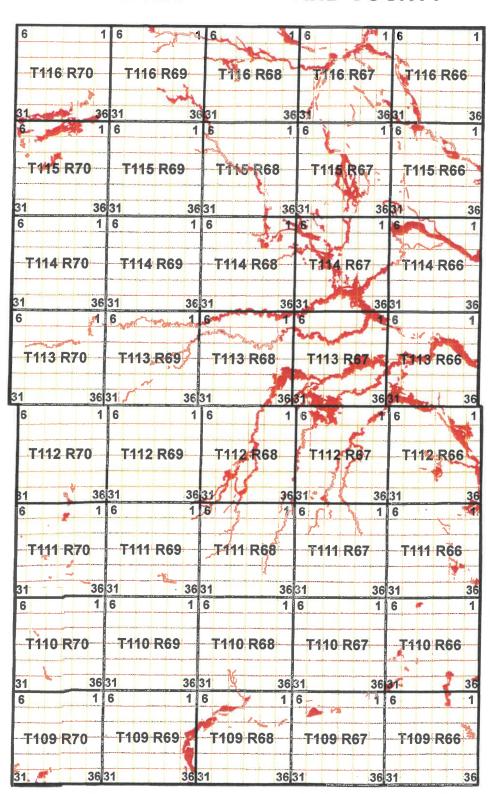
	23		51		0		51		233		41		
						Sowban my 7in rough	CONSCALL, IIIW / III IOWS						
Disk, tandem light finishing	6 2	Cultivator, field 6-12 in sweeps		Spiayer, pre-emergence		UIIII OI AIISEEGEI, GOUDIE GISK		Sprayer, bost emergence		Spraver, insecticide post emergence	001000	Harvest, Killing crop 20pct standing stubble	
5/1/2	5/40/5	3/10/2	5/10/2	7/01/0	5/10/2	2/10/2	0/1/0	2///2	0/4/0	2/1/0	10/11/0	7/0/01	

Section 3 Nutrient Management Plan (590)

- 3.1 Nitrogen and Phosphorus Risk Analysis Results
- 3.2 Manure Application Setback Distance
- 3.3 Soil Test Result Data
- 3.4 Manure Nutrient Analysis
- 3.5 3.10 Planned Crops, Fertilizer Recommendations, Nutrient Applications, Field Nutrient Balance, Manure Inventory, Fertilizer Summary, and Plan Nutrient Balance (SD-CPA-63)

SD LEACHING TOOL HAND COUNTY





Legend

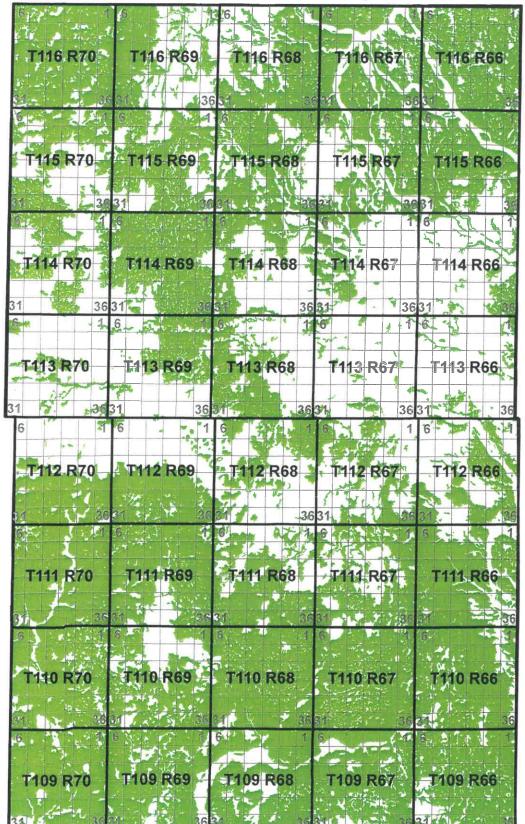
Leach_Risk High 0 3.75 7.5 15

Townships Miles

Map Produced by USDA/NRCS South Dakota State Office Geographic Information System, July 2015

N

Hand County Soils with Slopes > 4%



Legend

Slopes > 4%

Sections

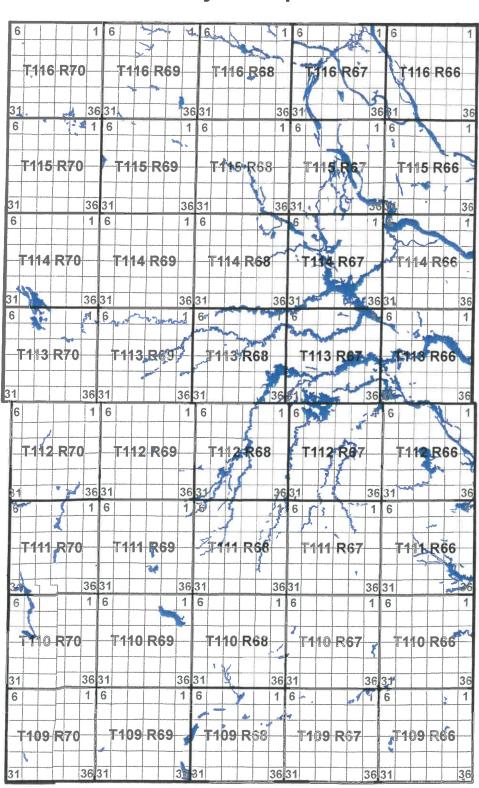
Township boundaries



Map Produced by USDA/NRCS South Dakota State Office Geographic Information System, Aug 2015

Hand County Floodplain Soils





Legend

Floodplain Soils

Township boundaries
Sections

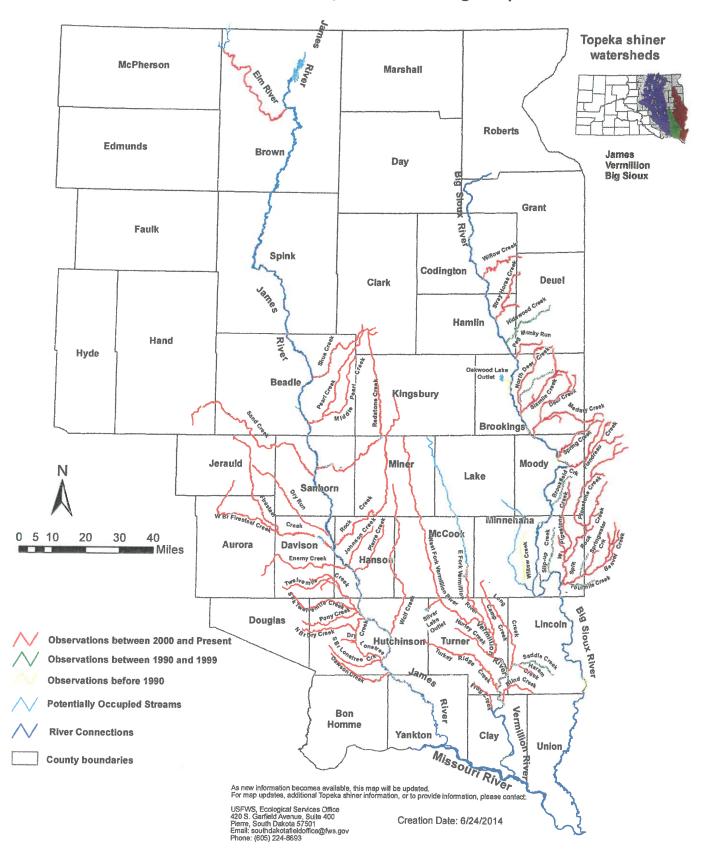
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Map Produced by USDA/NRCS South Dakota State Office Geographic Information System, Aug 2015

20

U.S. Fish and Wildlife Service

South Dakota Topeka shiner Range Map



South Dakota Phosphorus Loss Risk Assessment	Predicted annual erosion = sum of wind and water	80			no ou her her her her	Low Moderate	Moderate High	Moderate High	High No application	No application No application
sessmer	wind and		ar			Low	derate	derate	High	plication
rus Loss Risk As	erosion = sum of	8-9	tons per acre per year	100' vegetative buffer			Š	Š		No ap
					yes	Low	Low	Moderate	High	No application
Phospho	cted annual	9>	tons per acre per year	100' vegetative buffer	no	Low	Low	Moderate	High	No application
uth Dakota	Predic	V	tons per ac	100' vegeta	yes	Low	Low	Low	High	No application
20	Soil Test Phosphorus (ppm)				Bray-1	0-35	36-75	76-110	111-150	>150
					Olson	0-25	26-50	51-75	76-100	>100

Low Risk - Phosphorus can be applied at rates greater than crop phosphorus removal not to exceed the nitrogen requirement for the succeeding crop.

Moderate Risk - Phosphorus can be applied not to exceed crop phosphorus removal for up to a 5 year crop sequence. Application cannot exceed the nitrogen requirement for the succeeding crop.

succeeding crop. The following requirements must also be met: 1. A soil phosphorus drawdown strategy has been implemented. 2. A site assessment for nutrients & soil loss has been conducted to determine if mitigation practices are required to protect water quality. 3. Any deviation from these high risk High Risk - Phosphorus can be applied not to exceed one year crop phosphorus removal. Application cannot exceed the nitrogen requirement for the requirements must have the approval of the Chief of the NRCS.

Planning Considerations:

Wind erosion (WEPS) should be completed for all fields with predominate soils of 1=>134 or if a wind erosion resource concern exists.

Crop removal is the amount of phosphorus used in one crop year according to SDSU-Extra 8009, "Quantities of Nutrients Contained in Crops."

All fertilizer phosphorus sources should be placed below the soil surface. However, surface application is permitted on no-till cropland, pastureland, or hayland. In all other cropland tillage systems, phosphorus sources will be placed below the soil surface.

4. Winter manure applications are prohibited on floodplains with soils classified as frequently or occasionally flooded as listed in National Cooperative Soil Survey. 5. Applications will only application field based on fall soil test results. 3. Set back distances from surface waters or water conveyances will be 300 ft and 1,000 ft from named lakes, rivers, and perennial streams. Winter manure applications are allowed only when all of the following conditions are met: 1. When incidental amounts of manure is collected during feedlot snow removal or cleaning of be allowed on fields with slopes less than 4 % slope and be prioritized based on the water erosion prediction technology as listed in the SD tech guide. 6. Fields with lowest predicted soil feed bunks or enclosed pens to facilitate livestock feeding and handling. 2. Winter manure applications will not exceed the rate per acre calculated in the nutrient budget for the loss (water erosion) will generally have the highest priority for winter applications. 7. Manure will be uniformly spread.

Section 3.1 Inventory of Water Wells

				Req	uired
		Well		Setback Dista	nce From Well
Field	Location	Depth		For Manure A	pplication (Ft.)
ID	(Legal)	(Ft.)	Use of Well	County Rule	State Rule
NONE	No wells Currently				

County Rule

Refer to the following website:

http://sdda.sd.gov/farming-ranching-agribusiness/county-ordinances/

State Rule

DENR General Permit 1.4.3.3v of th Surface Water Protection Section(pg 22 and 23)
Wastewater and manure containment structures or the manure and wastewater application sites cannot be located closer than 1,000 feet from an existing public water well or drinking water source nor 250 feet from an existing private water well or drinking water source. Wastewater and manure containment structures and the manure and wastewater application sites shall not be located closer than 150 feet from a water well or drinking water source that is owned by the producer. These setback requirements do not apply to wastewater and manure containment structures constructed prior to August 14, 1996.

Section 3.2 Buffer and Setback Requirements

Specific buffer zone and/or setback distances applicable to land application of manure are as follows:

Alternative Chosen by Producer

Option 1



 Do not apply manure (broadcast or incorporated) within 100-feet of surface water or on either side of a conveyance.

-Or-

Option 2

 Establish and maintain a minimum 35-foot wide (quality) perennial grass filter strip next to surface water or on either side of a conveyance; an area within which manure will not be applied.

Option 3

 The livestock operator may choose to maintain or establish a minimum 100-foot wide perennial grass filter strip in select cases where the soil test phosphorus and potential soil erosion in the field are such as to allow application of manure based on multiple years of phosphorus crop removal (not to exceed N needs of crop). See Table I in the Manure Application Planning section of this plan.

Review and comply with other specific setback requirements in the current South Dakota **General Livestock Permit** regulations or your **local county zoning ordinance** when dealing with state and locally permitted facilities.

Manure Application On Frozen Ground

Liquid manure handling systems. Liquid manure is not to be applied to saturated, snow covered or frozen soil except in emergency situations, resulting from natural disaster, extraordinary weather events, or catastrophic equipment or structural failure.

Solid manure handling systems. Solid manure is not to be applied to saturated, snow covered or frozen soils, except in the following situations:

- 1. When incidental amounts of manure is collected during feedlot snow removal or cleaning of feed bunks or enclosed pens to facilitate livestock feeding and handling.
- 2. When a natural disaster or extraordinary weather (ie. excessive precipitation) prevent manure application during planned application periods.

General requirements for manure application on saturated, snow covered or frozen soil.

- a. If a permitted facility, the producer is responsible to contact SD DENR prior to applying on saturated, snow-covered, or frozen soil.
- b. The producer is required to provide documentation and updates to the existing nutrient management plan with dates, location(s), and volume of any emergency liquid manure or solid manure winter applications.
- c. Application rates cannot exceed recommended rates based on fall soil test results.
- d. Winter applications of nutrients must be set back a minimum of 300 feet from surface waters or water conveyances and a minimum of 1,000 feet from named lakes, rivers, and perennial streams.
- e. No winter nutrient applications on floodplain soils classified as frequently or occasionally flooded on National Cooperative Soil Survey.
- f. Winter applications only allowed on fields with slopes less than four percent.
- g. Fields with lowest predicted soil loss (water erosion) will generally have the highest priority for winter applications.
- h. Manure will be uniformly spread.
- i. A manure nutrient test is recommended (if not available), to determine nutrient content.

Management Considerations for Nitrogen

Groundwater Concerns

The groundwater concern comes primarily from nitrogen. If not captured by plant roots, it can move down below the root zone and may enter the groundwater. The speed at which nitrate moves depends on the amount of precipitation and soil texture. Water moves through sandy soil much more rapidly than a clay soil.

Because nitrate moves through soil with water, it is extremely important that the rate applied, either as manure or fertilizer, does not exceed that which can be used by crops. Any nitrate remaining in the soil profile at the end of the season is subject to leaching.

Water Quality Risk Assessment Maps will be labeled with the symbol "L" on fields that are Vulnerable to N leaching.

If a field is determined highly vulnerable for nitrate leaching to an aquifer, all of the following management activities will be implemented:

- 1. Prior to the application of nitrogen above starter application rates, a nitrate nitrogen test (zero to two foot and two to four foot sample) will be taken and analyzed. Or an acceptable alternative to the zero to four feet sampling method would be to take a zero to two foot sample every year within four weeks after crop harvest prior to nitrogen applications above starter rates as recommended by SDSU.
- 2. Soil samples (zero to six inches) should also be included and analyzed for P and K. Soil samples will be taken as per land grant university recommendations found on the back of the SDSU Soil Testing Laboratory Soil Sample Information Sheet, or SDSU-FS935, "Recommended Soil Sampling Methods for South Dakota."

Nitrogen Best Management Practices

- Match manure nutrient applications to crop needs.
- Apply manure as close to the time of crop utilization as possible. If fields are located on soils that have a high leaching potential then no commercial fertilizer application is allowed more than 45 days prior to planting.
- Whenever possible try to split apply nitrogen.
- Use nitrification inhibitors if applicable.
- Delay fall manure applications until soil temperatures drop below 50°F to minimize nitrate leaching and ammonia volatilization.
- Avoid applying manure on wet soils to minimize soil compaction, runoff, nitrate leaching and denitrification.
- Inject or incorporate the manure into the soil preferably within 24 hours for maximum nutrient-use efficiency and to reduce odor and runoff problems. Significant volatilization losses will occur when manure is left on the surface for several days.

Nitrogen Recommendations Using Manure

Crops can contain large amounts of nitrogen (Table 4-1). In most cases only the grain is removed and the straw is returned to the soil, supplying nitrogen through mineralization in subsequent years. Because of this and the other sources of N such as nitrate N already in soil, soil organic matter, precipitation and legumes, crop removal alone is not a good estimate of the amount of N to apply.

Table 4-1 Nitrogen Contained in Crops

	Plant Part								
Crop	Grain	Straw	Total						
		pounds N							
Corn (bu)	0.9	0.5	1.4						
Soybeans (bu)	3.7	0.8	4.5						
Wheat (bu)	1.6	0.8	2.6						
Oats (bu)	0.9	0.4	1.3						
Barley (bu)	1.1	0.4	1.5						
Sunflowers (cwt)	2.8	2.4	5.2						
Alfalfa (ton)		60 No 64 No	55						
Grass (ton)	differ state large spaler	And the section	30						

Table 4.2 Nitrogen Requirements of Crops

Crop	Unit	Nitrogen Required ^{1/}
Wheat	bu	2.5 x yield ^{2/}
Oats	bu	1.3 x yield
Barley		
malting	bu	1.5 x yield
feed	bu	1.7 x yield
Rye	bu	2.5 x yield
Flax	bu	3.0 x yield
Corn (grain)	bu	1.2 x yield
Corn (silage)	ton	10.4 x yield
Sorghum (grain)	bu	1.1 x yield
Sorghum, sudan (hay)	ton	25 x yield
Grass hay	ton	25 x yield
Sunflowers	lb	0.05 x yield
Edible beans	lb	0.05 x yield
Millet	lb	0.035 x yield
Rape	cwt	6.5 x yield
Mustard	cwt	6.5 x yield
Safflower	lb	0.05 x yield
Buckwheat	bu	2.2 x yield
Potatoes	cwt	0.4 x yield

^{1/} Available manure nitrogen or fertilizer nitrogen to apply is equal to the nitrogen requirement minus soil NO3-N to a 2-ft depth minus any legume credits.

2/ Yield goal

Management Considerations for Phosphorus

Surface Water Concerns

Surface water concerns focus primarily on Phosphorus. Phosphorus acts very differently in soils than nitrogen. It attaches tightly to soils and does not generally move down through the soil profile. This lack of movement through soils results in accumulations of phosphorus in soil if phosphorus rates, either from manure or fertilizer, are greater than crop removal.

Increases in phosphorus concentrations in soil can result in more phosphorus moving off the field either attached to soil particles lost by erosion or dissolved in the runoff water. In some situations phosphorus could move into surface waters with manure itself if the manure is applied in such a manner that it moves directly into waterways.

<u>Water Quality Risk Assessment Maps</u> will be labeled with the symbol "R" on fields that are vulnerable to Phosphorus runoff.

- 1. In no case shall manure or organic byproduct applications (broadcast or incorporated/injected) be made within 100 feet of a surface water or conveyance; 35 feet if a perennial grass filter strip is established and maintained.
- 2. A minimum of a 35-foot wide perennial grass filter strip is required in all cases on the edges of fields that border a lake, river, or intermittent/perennial stream.
- 3. In selected cases based on **SD Phosphorus Loss Risk Assessment**, depending on soil test phosphorus and estimated soil loss in a field, a perennial grass filter strip may be required within 100 feet of surface water or conveyance if manure is applied based on nitrogen needs of a crop and not crop removal of phosphorus.

Phosphorus Based Manure Application

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.

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. (See SD Phosphorus Loss Risk Assessment for additional information)

Usually fields with High soil test P and/or high runoff potential.

Phosphorus Best Management Practices

- Establish and maintain grass filter strips at the point where water leaves the field to trap sediment and nutrients.
- Control sheet and rill erosion by installing conservation practices including conservation tillage, contour farming, strip cropping, terraces and cover crops.
- Control ephemeral erosion by installing grassed waterways, diversions and sediment retention structures.
- Incorporate or inject manure and commercial fertilizer where possible while maintaining sufficient crop residue levels for erosion control.
- Grow high yielding, high phosphorus removing crops on fields with already high soil test phosphorus to reduce test levels.

How Phosphorus affects Soils Tests

Phosphorus rate recommendations are based on the phosphorus soil test. This test is an index of availability of phosphorus to plants. It is not a measure of total available phosphorus or total phosphorus in soil. However, as total phosphorus levels increase in soils, the soil test index usually increases also. These categories represent a decreasing probability of a yield response to broadcast fertilizer or manure. The probability of response is from about 80 percent at the very low soil test level to less than a 20 percent chance when soil tests are in the very high range.

Table 4.3 Soil Test Calibration Levels Used for Phosphorus and Potassium in SD

	Name of			Categories									
Nutrient	Soil Test	Very Low	Low	Medium	High	Very High							
		ppm extractable (0-6 inch sample)											
Phosphorus	Bray P-1	0 - 5	6 - 10	11 - 15	16 - 20	21+							
Phosphorus	Olsen	0-3	4 – 7	8 – 11	12 – 15	16+							
Potassium	NH₄Ac	0 - 40 41 - 80		81 – 120	121 – 160	161+							

If phosphorus is applied at rates greater than crop removal (Table 4-4), phosphorus soil test levels will increase. As a very general rule of thumb, for every 20 pounds of phosphorus (P_2O_2) applied and not removed by crops, the soil test index will increase by 1 part per million (ppm).

Following a good nitrogen application plan with manure in South Dakota can often result in a one to three ppm increase per year in the phosphorus soil test.

As the phosphorus soil test index increases, the possibility of moving significant amounts of phosphorus off the field to surface water usually increases. The movement is both phosphorus attached to soil particles lost with erosion and phosphorus dissolved in the runoff water.

From 60 to 80 percent of the phosphorus in most manure is available to plants within the first year of application. After several years of application, the amount of phosphorus available to plants from manure is equal to that applied with the manure each year.

1/ Source: Jim Gerwing, Extension Soil Specialist Ron Gelderman, Director, Soil Testing Lab, South Dakota State University

Table 4-4 Phosphorus Content of the Harvest Portion of Crops

Crop	P2O2 (lbs)
Alfalfa (per ton)	12
Buckwheat (per bu)	0.53
Canola (per cwt)	1.5
Corn Grain (per bu)	0.35
Corn Silage (per ton)	4.3
Edible Beans (per cwt)	1.25
Feed Barley (per bu)	0.41
Flax (per bu)	0.7
Forage Sorghum (per ton)	5.8
Grass (per ton)	10
Malting Barley (per bu)	0.41
Millet (per cwt)	0.83
Mustard (per cwt)	1.5
Oats (per bu)	0.25
Potatoes (per cwt)	0.09
Rapeseed (per cwt)	1.5
Rye (per bu)	0.48
Safflower (per cwt)	1.14
Sorghum (per bu)	0.27
Soybean (per bu)	0.77
Sudan Grass (per ton)	5.8
Sunflowers (per cwt)	1.14
Wheat (per bu)	0.56



SUBMITTED FOR:

SOIL TEST REPORT

FIELD ID SAMPLE ID 1E FIELD NAME 1E

COUNTY TWP

RANGE

SECTION

QTR ACRES 0

PREV. CROP

SUBMITTED BY: 0L2837

CENTROL CROP CONSULTING 351 BURLINGTON CIRCL

PO BOX 236

MARSHALL, MN

56258

Ν W E S

REF # **2591654** BOX # 193

LAB # BN7915

Date Sampled

Aughenbaugh Site

Date Received **04/25/2019**

Nutrient I	n The Soil	Interpretation	1st	Crop Choi	ce	2nd Cr	op Choi	ce	3rd	Crop C	hoice
		VLow Low Med High	7	YIELD GOAL		YIEL	D GOAL			YIELD GO	AL
			SUGGE	STED GUIDEL	INES	SUGGESTE	D GUIDELII	NES	SUGGE	STED GUI	DELINES
Nitrate			LB/ACI	RE APPLIC	ATION	LB/ACRE	APPLICA	TION	LB/ACI	RE APP	LICATIO
			N			N			N		
Olsen Phosphorus	8 ppn	******	P ₂ O ₅			P ₂ O ₅			P ₂ O ₅	-	
Potassium	451 ppn	*******************	K ₂ O			K ₂ O			K ₂ O	A company of the comp	
Chloride			CI			CI			CI		
			S			S			S		
Sulfur			В			В			В		
Boron			Zn			Zn			Zn		
ron	1.48 ppm	*****	Fe			Fe					
1anganese			7-25-11			re		_	Fe		
Copper			Mn			Mn			Mn		
lagnesium			Cu			Cu			Cu		
alcium			Mg			Mg			Mg		
odium			Lime			Lime			Lime		
rg.Matter	6.8 %	********		 							A. Production and the second
arbonate(CCE)			Soil pH	Buffer pH		n Exchange apacity	* Washington Company	h. Thin had black durately keying	AND DESCRIPTION OF THE PERSON	ypical Ra	parameter peropean
0-6"	0.18 mmho/cm	***	0-6" 6.2			apacity	% Ca	% Mg	% K	% Na	% H



SOIL TEST REPORT

FIELD ID SAMPLE ID 1W FIELD NAME 1W COUNTY

TWP SECTION RANGE

SUBMITTED BY: 0L2837

QTR ACRES 0

PREV. CROP

REF #

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2591655 BOX #

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194

E

LAB # BN7920

SUBMITTED FOR:

Aughenbaugh Site

PO BOX 236

MARSHALL, MN

CENTROL CROP CONSULTING 351 BURLINGTON CIRCL

56258

Date Sampled

Date Received **04/25/2019**

Nutrient I	n The Soil	Interpretation	1st (Crop Choi	ce	2nd Cr	op Choi	ce	3rd Crop Choice YIELD GOAL SUGGESTED GUIDELINE LB/ACRE APPLICATI N P205 K20 CI S B Zn Fe Mn Cu Mg Lime	hoice	
		VLow Low Med High	Y	TELD GOAL		YIEL	D GOAL			YIELD GOA	\L
			SUGGES	STED GUIDEL	INES	SUGGESTEL	O GUIDELI	NES	SUGGE	STED GUI	DELINES
Nitrate		A CONTRACTOR OF THE CONTRACTOR	LB/ACR	APPLIC	ATION	LB/ACRE	APPLICA	ATION	LB/ACI	RE APP	LICATIO
			N			N			N		
Olsen Phosphorus	6 ррт	******	P ₂ O ₅			P ₂ O ₅			P ₂ O ₅	and a sound	-
Potassium	394 ppm	*****	K ₂ O			K ₂ O			K ₂ O		
Chloride			CI			CI	4 1		CI		
			S			S			S		
Sulfur			В			В			B		
Boron				_		m (4) 10 10 10 100 100					
Zinc	1.12 ppm	*****	Zn			Zn			Zn		
Iron			Fe			Fe			Fe	The state of the s	
Manganese			Mn			Mn			Mn		
Copper	Carlo Walley					WATER POST POST PO					
1agnesium -			Cu			Cu			Cu		
Calcium			Mg	***************************************		Mg			Mg		
Sodium			Lime			Lime			Lime		
)rg.Matter	5.8 %	*********					Emiliania				Paramake and Administrative Supramake arms
arbonate(CCE)			Soil pH	Buffer pH	100000000000000000000000000000000000000	n Exchange				Typical Ra	1
0-6"	0.17 mmho/cm		0-6" 6.1			apacity	% Ca	% Mg	% K	% Na	% H



SOIL TEST REPORT

FIELD ID SAMPLE ID 2E FIELD NAME 2E COUNTY

TWP SECTION RANGE

QTR ACRES 0

PREV. CROP

PO BOX 236

MARSHALL, MN

CENTROL CROP CONSULTING 351 BURLINGTON CIRCL

SUBMITTED BY: OL2837

2591656 BOX #

N

E

LAB # BN7911

W

S REF #

SUBMITTED FOR:

Aughenbaugh Site

Date Sampled

Date Received 04/25/2019

56258

Nutrient Ir	The Soil	Interpretation	1st Cr	op Choice	2nd Cr	op Choice	3rd	Crop Ch	oice
And the state of t		VLow Low Med High	YIEI	D GOAL	YIEL	D GOAL	Y	TELD GOAL	
			SUGGESTE	D GUIDELINES	SUGGESTE	D GUIDELINES	SUGGES	STED GUID	ELINES
Nitrate			LB/ACRE	APPLICATION	LB/ACRE	APPLICATION	LB/ACR	E APPL	ICATION
		and the second second	N		N		N		
Olsen Phosphorus	13 ppm	*****	P ₂ O ₅		P ₂ O ₅		P ₂ O ₅		
Potassium	256 ppm	******	K ₂ O		K ₂ O		K ₂ O		
Chloride			CI		CI		CI		
			S		S		S		
Sulfur			В		В		В		
Zinc		and the second	Zn		Zn		Zn		
Iron	0.63 ppm	*****	Fe		Fe		Fe		
Manganese									
Copper			Mn /	-	Mn		Mn		
Magnesium			Cu		Cu		Cu		
Calcium			Mg		Mg		Mg	al company	
Sodium			Lime		Lime		Lime		
Org.Matter	4.8 %	******							
Carbonate(CCE)			Soil pH B	uffer pH	n Exchange Capacity	% Base Sat	LOCATION OF THE	ypical Ra % Na	nge) % H
0-6" Sol. Salts	0.18 mmho/cm		0-6" 6.7			% Ca	lg %K	% Na	-70 M



SOIL TEST REPORT

FIELD ID SAMPLE ID 2W FIELD NAME 2W COUNTY

TWP SECTION RANGE

QTR ACRES 0

PREV. CROP



Aughenbaugh Site

SUBMITTED BY: 0L2837

CENTROL CROP CONSULTING 351 BURLINGTON CIRCL

PO BOX 236

MARSHALL, MN

56258

N W E S

REF #

2591657 BOX #

193

LAB# BN7917

Date Sampled

Date Received 04/25/2019

Nutrient Ir	The Soil	Interpretation	1st (Crop Choi	ce	2nd Cro	op Choice		3rd C	rop Cl	oice
		VLow Low Med High	Y	IELD GOAL		YIELI	D GOAL		YI	ELD GOA	
			SUGGES	STED GUIDEL	INES	SUGGESTE	GUIDELINES	S	UGGES"	TED GUID	ELINES
Nitrate		DE SE LA MONTO DE COMPANION DE	LB/ACR	E APPLIC	ATION	LB/ACRE	APPLICATIO	ON L	B/ACRE	APP	LICATION
		And the state of t	N			N		N			
Olsen Phosphorus	10 ppm	******	P ₂ O ₅			P ₂ O ₅		P ₂ C	5		
Potassium	296 ppm	******	K ₂ O			K ₂ O		K ₂ ()		
C hloride			CI			СІ		CI			
			S	C 7 years of the state of the s		S		S			
Sulfur			В			В		В			
Boron										_	
Zinc	0.72 ppm	******	Zn			Zn		Zn			
ron			Fe			Fe		Fe	200		
Manganese			Mn			Мп		Mn			
Copper											
1agnesium			Cu			Cu		Cu			
Calcium			Mg			Mg		Mg			
Sodium			Lime			Lime		Lime			
org.Matter	5.0 %	*****									
Carbonate(CCE)			Soil pH	Buffer pH		n Exchange	% Base !	Saturati	on (Ty	pical Ra	nge)
0-6 "	0.22 mmho/cm	本并未未	0-6" 6.7		C	apacity	% Ca %	Mg	% K	% Na	% Н



SOIL TEST REPORT

FIELD ID 3
SAMPLE ID 3W
FIELD NAME 3W
COUNTY

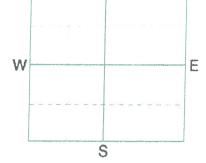
TWP SECTION RANGE

SUBMITTED BY: 0L2837

QTR

ACRES 0

PREV. CROP



N

REF #

2591658 BOX #

194

LAB # **BN7919**

SUBMITTED FOR:

Aughenbaugh Site

351 BURLINGTON CIRCL PO BOX 236

CENTROL CROP CONSULTING

MARSHALL, MN

56258

Date Sampled

Date Received **04/25/2019**

Date Reported 6/6/2019

Nutrient I	n The Soil	Interpretation	1st	Crop Choi	ce	2nd Cr	op Choi	ce	3rd	Crop C	hoice
		VLow Low Med High		YIELD GOAL		YIEL	D GOAL		Outper Commence of the Commenc	YIELD GO	AL
			SUGGE	STED GUIDEL	INES	SUGGESTE	D GUIDELI	NES	SUGGE	STED GUI	DELINES
Nitrate			LB/ACF	RE APPLICA	ATION	LB/ACRE	APPLICA	ATION	LB/AC	RE APP	PLICATION
		Control of the Contro	N	TO THE LOCK OF THE PARTY OF		N			N		
Olsen Phosphorus	11 ppm	*****	P ₂ O ₅			P ₂ O ₅			P ₂ O ₅		
Potassium	419 ppm	********	K ₂ O	The second country of		K ₂ O			K ₂ O		
Chloride			CI	and the same of th		CI			CI		
			S			S			S		
Sulfur			В			В			В		
Boron			Zn			Zn			Zn		
Zinc	2.11 ppm	*****							211	_	
Iron			Fe			Fe			Fe		
Manganese			Mn			Mn			Mn		
Copper Magnesium			Cu			Си			Си		
Calcium			Mg			Mg			Mg		
Sodium			Lime			Lime			ime		
Org.Matter	5.0 %	******									Printing Alamana, wast of the Sales and Sales
Carbonate(CCE)			Soil pH	Buffer pH		on Exchange Capacity		-	1	Typical R	
0-6" Sol. Salts	0.11 mmho/cm		0-6" 5.5	6.2		apacity	% Ca	% Mg	% K	% Na	% H

General Comments: (Reduce Lime by 1/2 for W.MN, W.IOWA and the DAKOTAS).



SOIL TEST REPORT

FIELD ID 3
SAMPLE ID 3E
FIELD NAME 3E
COUNTY

TWP

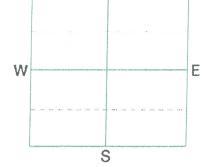
RANGE

SUBMITTED BY: 0L2837

SECTION QTR

R ACRES 0

PREV. CROP



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REF #

2591659 BOX #

194

LAB # **BN7918**

SUBMITTED FOR:

Aughenbaugh Site

CENTROL CROP CONSULTING
351 BURLINGTON CIRCL

PO BOX 236

MARSHALL, MN

MN 56258

Date Sampled

Date Received 04/25/2019

Date Reported 6/6/2019

Nutrient Ir	The Soil	Interpretation	1st (Crop Choi	ce	2nd Cro	op Choi	ce	3rd	d Crop (Choice
		vLow Low Med High	Y	TELD GOAL		YIEL	D GOAL		niconnicontespenipone	YIELD GO	DAL
SOCIAL PROPERTY AND ADDRESS OF THE PROPERTY ADDRESS OF THE PROPERTY AND ADDRESS OF THE PROPERTY ADDRESS OF THE PROPERTY AND ADDRESS OF THE PROPERTY ADDRESS OF THE PROPERT			SUGGES	STED GUIDEL	INES	SUGGESTE	O GUIDELI	NES	SUGG	ESTED GL	IIDELINES
Nitrate			LB/ACR	E APPLIC	ATION	LB/ACRE	APPLICA	ATION	LB/A	CRE A	PLICATION
			N			N			N	A COMPANIES OF THE PERSON OF T	
Phosphorus Olsen	10 ppm	***** *****	P ₂ O ₅			P ₂ O ₅			P ₂ O ₅	- Company	
Potassium	503 ppm	*****	K ₂ O			K ₂ O			K ₂ O		
Chloride			CI	TO AND THE PERSON NAMED IN COLUMN 1		CI			CI	The second secon	
			S			S			S		
Sulfur			В			В			В		
Boron							ļ				
Zinc	1.70 ppm	******	Zn			Zn	-		Zn		
Iron			Fe			Fe			Fe	The state of the s	
Manganese			Mn			Mn			Mn	do year	
Copper			Cu			Cu			Cu		
Magnesium			Ma			Man			M		
Calcium			Mg			Mg			Mg		
Sodium			Lime			Lime			Lime		
Org.Matter Carbonate(CCE)	5.4 %	*****	Soil pH	Buffer pH		n Exchange	% Ba	se Sat	uration	(Typical	Range)
0-6"	0.14 mmho/cm			Santa pit	C	Capacity	% Ca	% M	g % I	< % Na	9 % H
Sol. Salts	0.14 minio/ Cm		0-6" 5.7	6.3							

General Comments: (Reduce Lime by 1/2 for W.MN, W.IOWA and the DAKOTAS).



SOIL TEST REPORT

FIELD ID SAMPLE ID 4E FIELD NAME 4E

COUNTY TWP

RANGE

SECTION

QTR ACRES 0

PREV. CROP

W

REF # 2591661 BOX # 193 LAB # BN7916

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SUBMITTED FOR:

Aughenbaugh

SUBMITTED BY: 0L2837 **CENTROL CROP CONSULTING 351 BURLINGTON CIRCL**

PO BOX 236

MARSHALL, MN

56258

Date Sampled

Date Received 04/25/2019

Date Reported 6/6/2019

E

Nutrient In	The Soil	Interpretation	1st	Crop Choi	ce	2nd Cr	op Choi	ce	3rd	Crop Cl	noice
		VLow Low Med High		/IELD GOAL		YIEL	D GOAL		YIELD GOAL		
			SUGGES	STED GUIDEL	NES	SUGGESTE	D GUIDELI	NES	SUGGE	STED GUID	DELINES
Nitrate			LB/ACF	RE APPLICA	ATION	LB/ACRE	APPLICA	ATION	LB/ACR	E APP	LICATION
			N	offin observation of a		N			N		Programme and the second
Olsen Phosphorus	12 ppm	*************	P ₂ O ₅			P ₂ O ₅			205		
Potassium	511 ppm	***************	K ₂ O			K₂O			K ₂ O		
Chloride			CI	THE REAL PROPERTY OF THE PROPE		CI	and the same of th		CI		
			S			S			S		,
Sulfur			В			В			В		
Boron											
inc	1.36 ppm	******	Zn			Zn			Zn		
ron			Fe			Fe	And the second second second		Fe	the state of the s	
langanese			Mn			Mn			Mn		
Copper						NR. 12.0274	-			_	
lagnesium			Cu			Cu			Cu		
alcium			Mg	and the same of th		Mg			Мg		
odium			Lime			Lime			me		
rg.Matter	5.6 %	學 (10)		1		~					- COLUMNIC
arbonate(CCE)			Soil pH	Buffer pH		n Exchange apacity	PARK STREET, STATE AND ASSAULTS	Participation and the participation of	maginist was measurement.	ypical Ra	nigron ennestrante inscholos
0-6" ol. Salts	0.2 mmho/cm	*****	0-6" 6.1			epolity	% Ca	% Mg	% K	% Na	% H



SUBMITTED FOR:

SOIL TEST REPORT

FIELD ID 4
SAMPLE ID 4W
FIELD NAME 4W
COUNTY

TWP SECTION

RANGE

TION Q

PREV. CROP

QTR ACRES 0

SUBMITTED BY: 0L2837
CENTROL CROP CONSULTING
351 BURLINGTON CIRCL

PO BOX 236

MARSHALL, MN

56258

W E

REF # **2591662** BOX #

193

LAB # **BN7914**

Date Sampled

Aughenbaugh

Date Received **04/25/2019**

Nutrient I	n The Soil	Interpretation	1st C	rop Choice	2nd	Crop Choice	3rd	Crop Choice
The state of the s		VLow Low Med High	YIE	ELD GOAL		YIELD GOAL		TELD GOAL
			SUGGEST	ED GUIDELINI	ES SUGGE	STED GUIDELINES	SUGGES	STED GUIDELIN
Nitrate			LB/ACRE	APPLICAT	ION LB/ACE	RE APPLICATIO	N LB/ACR	E APPLICAT
			N		N		N	
Olsen Phosphorus	23 ppm	******	P ₂ O ₅		P ₂ O ₅		P ₂ O ₅	
Potassium	439 ppm	*********	K ₂ O		K ₂ O		K ₂ O	
Chloride			CI		CI		CI	
			S		S		S	
Sulfur			В		В		В	
Boron								
Zinc	1.31 ppm	*****	Zn		Zn		Zn	
Iron			Fe		Fe		Fe	
Manganese			Mn		Mn		Mn	
Copper								
Magnesium			Cu		Cu		Cu	
Calcium			Mg	PA Service Management	Mg		Mg	-
Godlum			Lime		Lime		Lime	
) rg.Matter	5.9 %	******						
Carbonate(CCE)			Soil pH E	uffer pH	Cation Exchange		Autorio Array and a service an	ypical Range)
0-6"	0.19 mmho/cm	常准求本	0-6" 6.3		Capacity	% Ca %	Mg % K	% Na %



SUBMITTED FOR:

SOIL TEST REPORT

FIELD ID SAMPLE ID 5E FIELD NAME 5E COUNTY

TWP SECTION

RANGE

QTR ACRES 0

PREV. CROP

W

REF # 2591663 BOX # 193 LAB# BN7912

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SUBMITTED BY: OL2837

CENTROL CROP CONSULTING **351 BURLINGTON CIRCL**

PO BOX 236

MARSHALL, MN

56258

Date Sampled

Aughenbaugh

Date Received 04/25/2019

Date Reported 6/6/2019

E

Nutrient In The So	il	Interpretation	1st C	rop Choi	ce	2nd Cr	op Choic	e	3rd	Crop C	noice
		VLow Low Med High	ΥI	ELD GOAL		YIEL	D GOAL			YIELD GOA	\L
			SUGGES	TED GUIDEL	INES	SUGGESTE	O GUIDELI	NES	SUGGE	ESTED GUI	DELINES
Nitrate			LB/ACRE	APPLIC	ATION	LB/ACRE	APPLICA	TION	LB/AC	RE APP	LICATION
and the second s		Company Conference Con	N			N			N		and the second second
Olsen: Phosphorus	15 ppm	******	P ₂ O ₅			P ₂ O ₅		10	P ₂ O ₅		
Potassium	431 ppm	*****	K ₂ O			K ₂ O			K ₂ O		
Chloride			CI	The state of the s		CI			CI	To detail on the second	
			S			S			S		
Sulfur			В			В			В		
Boron			7-			84					
Zinc	1.84 ppm	*****	Zn			Zn			Zn		
Iron			Fe			Fe			Fe	Total Paris	
Manganese			Mn			Mn			Mn		
Copper			Cu			Cu			Cu	- Version of the Control of the Cont	
Magnesium	Auginopul		Cu			Cu			Cu	- val	
Calcium			Mg	And the second s		Mg			Mg	PPP AND A STATE OF THE STATE OF	
Sodium			Lime	and a province of the second		Lime			Lime		
Org.Matter	6.1 %	**************************************									The second of th
Carbonate(CCE)			Soil pH	Buffer pH		n Exchange		and the same of the same	-	Typical Ra	1
0-6" 0.15 mr	mho/cm	***	0-6" 6.6		Dista	- Francis	% Ca	% Mg	% K	% Na	% H



SUBMITTED FOR:

SOIL TEST REPORT

FIELD ID 5
SAMPLE ID 5W
FIELD NAME 5W
COUNTY

TWP SECTION RANGE

QTF

PREV. CROP

QTR ACRES 0

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SUBMITTED BY: OL2837
CENTROL CROP CONSULTING
351 BURLINGTON CIRCL

PO BOX 236

MARSHALL, MN

56258

W E

REF # **2591664** BOX #

193

LAB # **BN7913**

Date Sampled

Aughenbaugh

Date Received 04/25/2019

Nutrient In	The Soil	Interpretation	1st	Crop Choi	ce	2nd Cr	op Choi	ce	3rd	Crop Cl	oice
		YLow Low Med High	Y	TELD GOAL		YIEL	D GOAL			TELD GOA	L
			SUGGES	STED GUIDEL	NES	SUGGESTE	O GUIDELI	NES	SUGGES	STED GUID	ELINES
Nitrate			LB/ACR	RE APPLIC	ATION	LB/ACRE	APPLICA	ATION	LB/ACR	E APP	LICATION
			N			N			N		
Olsen Phosphorus	15 ppm	****************	P ₂ O ₅			P ₂ O ₅		F	205		
Potassium	449 ppm	******	K ₂ O			K ₂ O			(20		
C hloride			CI	The state of the s		CI			CI		
			S			S			S		
Sulfur	***		В			В			В		
Boron			Zn			7-		200			
Zinc	1.86 ppm	*****	211			Zn			Zn		
Iron			Fe			Fe			Fe		
Manganese			Mn			Mn			1n		
Copper	···	Commence of the Control of	Cu			Cu			Qu .		
Magnesium	****		Cu			Cu			u		
Calcium			Mg.			Mg		ı	1g		
Sodium			Lime			Lime		Li	me		
Org.Matter	6.5 %	*****			THE SHAPE CONTRACT OF LAND AND						MARKET CONTRACTOR OF CONTRACTO
Carbonate(CCE)			Soil pH	Buffer pH		on Exchange Capacity	% Ba	se Satur % Mg	w K	ypical Ra % Na	nge) % H
0-6" 501. Salts	0.2 mmho/cm	冰寒水水水	0-6" 6.6		NEW STATE		70 Ca	70 Mg	70 K	% %0 INA	70 H

NUTRIENT MANAGEMENT PLAN FOR SOUTH DAKOTA ANIMAL FEEDING OPERATIONS

UNITED STATES DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE

		28	No-Till					I	Τ	Τ	Ι	Ι	Ι	I	Ι		Γ	Τ		T	T	Τ	Γ	T	Τ	Т	T	T	T	1
		27.	Winter Application				Ī	T	Ī	I	Ī	T	Ī	Ī	Ī	Ī	I	Ī	Ī	İ	Ī	Ī		T	T	T	T	Ť	İ	Ī
	g	26.	Irrigated					I	I	I	I	I			Ι		I		L				Γ	Τ	Ι	I	I	I	T	Ī
	Hand		Excluded acres	47.3	51.2	53.9	76.8	66.1																						
	County:		100' Vegetated Buffer																											
		24.	Control of Land	Leased	Leased	Leased	Leased	Leased																						
		23.	Predicted soil loss - Wind/Wat er (T/ac/yr)	0.3	0.3	0.3	0.3	0.3																						
			(9)	67	67	29	29	à	T	T		Γ							Ī						Ī	T	T	T		j
			Rang	, K			_	ď z	~	×	×	×.	٦	ď	я	×	×	×	×	×	×	×,	Ä,	٦	×	,	ĸ	ĸ,	ĸ,	
			Field Location: tion, Township,	110	110	027	= =																							
		22.	Loca	,T	-	-	_		Ε.	Η,	Ļ	Ť,	F.	Ę	Ļ	Ľ,	Ť	F,	Ę	Ľ,	Ė,	F.	Τ,	Ť,	Ľ,	Ļ	F	Ļ	F,	
			Field tion, '	00	-		E 8		L	- 13	i	, i		- 1					L						L	L			Ļ	
			Field Location: (1/4 Section, Township, Range)	N 1/2 Sec.	Sec.	Sec.	Sec.	Sec. Se	Sec.	Sec.	Sec.	Sec.	Sec.	Sec.	Sec.	Sec.	Sec.	Sec.	Sec.	Sec.	Sec.	Sec.	Sec.	Sec.	Sec.	Sec.	Sec.	Sec.	Sec.	
		21.	Soil map unit symbol	WnB	WnB	WnB	WnB																							
n		20.	County	Hand	Hand	Hand	Hand	Nimit.																						
Field Information	Operator: Ratio LLC	19.	Beginning acres in field	326.8	304.5	526.6	301.2																							2,124.3
Field Ir	Operator	18.	Date added to Plan	6/6/19	6/6/19	61/9/9	6/6/19																							Total: Comments:
			e maps to ation)																											
		17.	Field ID (include maps to illustrate location)	Field 1	Field 2	Field 3	Field 5																							
			# əuiJ	1	2 0	າ ⊲	50	9	7	∞	6	2	=	2	13	14	15	16	17	28	19	8	21	22	23	24	25	56	27	

SOUTH DAKOTA ANIMAL FEEDING OPERATIONS NUTRIENT MANAGEMENT PLAN FOR

UNITED STATES DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE

Field ID (Include maps to illustrate location)	N lb/ac
Field # 0-2' 2-4' 0-6"	0-2' 2-4'
7	
12	-
11	
17.5	17
15	-

UNITED STATES DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE

NUTRIENT MANAGEMENT PLAN FOR SOUTH DAKOTA ANIMAL FEEDING OPERATIONS

					Γ	Yield	Cioal	Г	Τ								Γ	Τ	Τ	Τ	T	Т	T	Т	Т	T	Т	T	T	Т	T	Т	Т	Т	
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						<i>₃</i> —	Y ield	4	44	44	146	146						L	_	1	1	1	1	1	1	1	4	1	1	_	1	4	1	1	_
					Veer	Crop		Soybean (bu)	Soybean (bu)	Soybean (bu)	Corn (bu)	Com (bu)																							
					r	Yield	Joan												T	T	T	T		T	T	T	T	T	T	T	Ī	T	T		1
		ı				PI Vield	⊣	146	146	146	44	4	1	7	_				H	t	+	+	\dagger	+	+	†	+	t	+	+	+	+	+	+	_
					Year 4			-					1						H	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
					Ye	Crop		Corn (bu)	Corn (bu)	Com (bu)	Soybean (bu)	Soybean (bu)																							
					Γ	Yield															T			T	T				T				T		
						PI	-	44	44	4	146	146	+	1								 		+	+	+	+	t	t	\dagger	+	+	t	T	
					Year 3					1	1	1	1									-		+	+	+	+	t	t		+	t	+		
	-				Ä	Crop		(pn)	(pq)	(pn)																									
								Soybean (bu)	Soybean (bu)	Soybean (bu)	Corn (bu)	Corn (bu)																							
					F	Yield Goal	i	US.	05	S		T	Ī	T	Ì								T	T	T	T	T	T	T	T	T	T	T	T]
-1						PI Y	-	146	46	146	4	4	+	+	+	+	1					-	H	+	+	+	+	+	+	+	+	+	+	-	
					Year 2	7.		1			7	4	+	+	+	+	-				-	-	-	-	-	╁	+	+	-	+	-	H	+	H	
					Yes	Crop		Corn (bu)	Corn (bu)	Com (bu)	Soybean (bu)	Soybean (bu)																							
						Yield Goal																									T				
						PI Yield		44	4	44	140	140	1	1	1	1	1								T		T						T		
				_	Year 1					+	†		+				1																		
ment		30.		Index) Service)	X	Crop		(pn)	(pn)	(ng)																									
uire				ductivity Statistic				Soybean (bu)	Soybean (bu)	Soybean (bu)	OIII (DI	Com (bu)																							
r Red				tivity (Pro pricultural	Ħ	Actual Yield	İ				T	T	Ť	T	İ	T	T	T																	
rien				il produci ds (SD Aç	ır	PI Actual Yield Yield		146	146	140	1 3	-	+	+	+	+	†	+	+																
INZ			eld Goal	red by soi	Year				1	t		t		T		+		1																	
Estimated Nutrient Requirement			O Actual or Yield Goal	Yields indexed by soil productivity (Productivity Index) County Average Yields (SD Agricultural Statistics Service)	Previous Year	Crop		Com (bu)	Corn (bu)	Sowhean (hu)	Sorboan (bu)	oolocan (on)																							
				aps to		Field #																													
		17.		Field ID (Include maps to illustrate location)			-	+	+	+	+	-		+	+	+	+	+	+											-					
				d ID (In illustrate		Name or Tract		Field 1	Field 2	Field 4	Field 5																								
						Nar			1										2			15	,5		-								15		
		Ц		# əui_	1			- (7 0	J 4	4	9	-	000	0	٤	7	= 3	12	12	14	15	16	17	18	19	20	21	22	23	24	25	26	27	

Page 3 of 4

SOUTH DAKOTA ANIMAL FEEDING OPERATIONS NUTRIENT MANAGEMENT PLAN FOR

UNITED STATES DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE

Possible Alternative Crops Included in Crop Rotation

Producer/Operation: Ratio LLC

Check if		
applicable	Crop	Yield
X	Alfalfa (T)	
X X X	Barley (bu)	7
X	Barley, Malting (bu	
	Buckwheat (bu)	1
X	Canola (cwt)	2
	Chickpea	
X	Corn (bu)	22
X	Corn Silage (ton)	3
X	Cover Crops (T)	
	Edible Beans (lbs)	
	Fallow	
	Field Pea	
	Flax (bu)	
Χ	Grass (Ton)	
Χ	Grass, Sudan (ton)	7
	Lentil	
	Melons	
Χ	Millet (lbs)	2200
	Mustard (cwt)	
Χ	Oats (bu)	100
	Potatoes (cwt)	
	Rapeseed (cwt)	
Χ	Rye (bu)	60
	Rye Forage (T)	15
	Safflower (lbs)	
X	Sorghum (bu)	100
	Sorghum, Forage (T)	10
	Soybean (bu)	50
	Sunflowers (lbs)	2600
	Triticale (T)	
	Wheat, Sp. (bu)	60
X	Wheat, W. (bu)	60

Check if		
	Crop (list others)	Yield
	,	1

Possible Alternative Manure Application Methods

Producer/Operation: Ratio LLC

Animal Type:	Dairy Cattle, Beef Cattle, Cow, Nursey Pig, Growing Pig,
(circle those that	Gestating Sow, Sow and litter, Boar, Sheep, Poultry Layer,
apply)	Poultry Broiler, Turkey, Duck, Horse

Manure Type: (circle those that apply)	Solid: daily scrape and haul, manure pack, open lot, manure stacking, deep pit poultry, liter (birds), separator system Liquid: Anaerobic pit, above-ground (covered), above-ground (uncovered), earth storage holding pond, lagoon,
	separator system

Check if		Solid (S)
applicable	Method	Liquid (L)
Χ	Injection	L
	Flood Irrigation	L
Χ	Sprinkling	L
Χ	Sprinkling (partial incorp.)	L
Х	Sprinkling (incorp. within 24 hrs.)	L
	Broadcast (no incorp.)	S
	Broadcast (incorp. within 24 hrs.)	S
	Broadcast (incorp. 1 - 5 days)	S
	Broadcast (incorp. after 5 days)	S
	Broadcast w/ partial incorporation	S

Possible Alternative Manure Application Methods

Producer/Operation: Ratio LLC

Animal Type:	Dairy Cattle, Beef Cattle, Cow, Nursey Pig, Growing Pig,
(circle those that	Gestating Sow, Sow and litter, Boar, Sheep, Poultry Layer,
apply)	Poultery Broiler, Turkey, Duck, Horse

Manure Type: (circle those that apply)	Solid: daily scrape and haul, manure pack, open lot, manure stacking, deep pit poultry, liter (birds), separator system Liquid: Anaerobic pit, above-ground (covered), above-ground (uncovered), earth storage holding pond, lagoon, separator system
--	--

		Percent
Check if		Nitrogen
applicable	applicable Method	
X	Injection	98
	Flood Irrigation	70
X	Sprinkling	70
X	Sprinkling (partial incorp.)	80
Х	Sprinkling (incorp. within 24 hrs.)	90
	Broadcast (no incorp.)	80
	Broadcast (incorp. within 24 hrs.)	90
	Broadcast (incorp. 1 - 5 days)	85
	Broadcast (incorp. after 5 days)	80
	Broadcast w/ partial incorporation	80

Field 4

	This Agreement, made and entered into this	/= Jay	of MAY	, 2019			
	DELWEER NAME OF THE PROPERTY OF THE	4	hereir	nafter			
	described as Landowner, and			hereinafter			
0	described as Tenant (Sow Farm), agree as follows:						
1	. Landowner allows the Tenant the right to sp	read solid and	d/or liquid anima	l manure on the			
Ī	following described real property situated in	YAND	County, South I	Dakota.			
	Field Location	Acres					
	(1/4 Section, Township, Range)	Available	Land 1	Use			
1	16 1/4 31-111-67	160.00	CORN-				
1	W1/431-111-67 (LOTS 1-28E/2	129.04	corn-				
S	W 14 31-111-67 (LOTE 3-4 & E1/0	12968	CORN-	BERNE			
24	E 1/4 31-111-67 A/K/A PARCE #1						
-	LEXCERT 6.92 ACRES DESCRIB	RD					
_	Total Acres (more or less) "AF	15300	COEN-	EGANG			
2							
da s	Tenant shall be allowed to spread manure on described above at such regular intervals on	the property	owned by the La	ndowner			
	described above at such regular intervals as a	re mutually a	greeable by both	parties. The			
	spreading of manure, however, shall not inter and harvesting of crops on the above describe	riere with the	productivity, pla	inting, growing			
3.	Tenant and Landowner jointly agree to apply	manure and/	or commercial fe	rtilizer at rates not			
	to exceed crop nutrient needs using current so	oil and manur	e test results.				
.1							
4.	Tenant further agrees to comply with all local	ordinances a	nd state and fede	eral environmental			
	laws in the hauling and spreading of said anin		40.4	n/			
5.	This agreement shall commence May 1, 2019	and termin	ate in 15 year	con			
	May 1, 2034. Upon expiration, this lease shall automatically renew						
	Irom year-to-year, with the same terms and conditions. Fither party can give written nation						
	to the other, on or before						
	renew this agreement.						
6	It is agreed that the Tonant listed above her so	In mode : a:					
0.	It is agreed that the Tenant listed above has so above described premises.	ie authorizati	on of spreading i	manure on the			
	add to additional promises.						
7.	This agreement is transferrable by tenant to an	other entity is	f tenant sells or c	hanges company			
	name	-					
0							
ð.	Other Conditions (Describe): PENDING APPR	EGVELS AND	OPERATING 140	SKEEMINTS 19			
LAND	OWNER The O Bushelounk	TENANT	RATIO LLC	sy Tta. O. Ruchebrul -			
	(Land,Owner)		(Sow F	ırm)			
	Printed KIRK A FUGHENGAUGH	Printed	RATIO IIC	**************************************			
	ddress: 21024 4218 DVENJE		ess: 1300 S HV				
City 31	ate Zip: <u>Tropport</u> SD <u>57353</u> Phone: <u>605. 746</u> 3485		Zip: Pipestone,				
	I HUHU.	rn	one: <u>507-825-4</u>	<u> </u>			

		This Agreement, made and entered into this	day	of 17764 ,20	19	
	t	between KIEK II HULHENIA AUGH		hereinafter		
		described as Landowner, and	A-10-2-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-		hereinafter	
	1	lescribed as Tenant (Sow Farm), agree as follo	WS:	/	. 4	
	fi fi	. Landowner allows the Tenant the right to sp ollowing described real property situated in	read solid and	or liquid animal manu	re on the	
		onowing absorbed rear property situated in	72100	County, South Dakota.		
		Field Location	Acres			
		(1/4 Section, Township, Range)	Available	Land Use		
	S	W14 32.111-67 AKAPARLEL #7				
	-	CEXILET 118, 49 ALRES DESCRIBE	- 1//			
	C. 1	PS PALCEL # 8 HAND COUNTY WA	21 41.51	CORN-BEANS		
	36	EYCETT LANGE PLACE DESCRIBED				
		AS PARLEL & HEND COUNTY WAT I	6247	CORN-BEAN		
		Total Acres (more or less)	133.58	CUICIN - 15 EF.N	<u>~</u>	
	2.	Tenant shall be allowed to spread manure on		resonad for the Tarreton		
		described above at such regular intervals as a	re mutually a	when by the Landown	er . The	
		spreading of manure, however, shall not inte	rfere with the	productivity planting	s. He orowing	
		and harvesting of crops on the above describe	ed premises.	productivity, planting,	growing	
			•			
	3.	Tenant and Landowner jointly agree to apply	manure and/o	r commercial fertilizer	at rates not	
		to exceed crop nutrient needs using current so	oil and manure	test results.		
	4.	Tenant further agrees to comply with all local	l ordinances ar	nd state and federal env	vironmental	
		laws in the hauling and spreading of said anir		10.11.		
	5.	This agreement shall commence May 1, 2015	and termina	te in -18 vears on		
	May 1 , 2034 . Upon expiration, this lease shall automatically renew					
	from year-to-year, with the same terms and conditions. Fither party can give written notice					
	to the other, on or before January 1 of any given year of an election not to					
		renew this agreement.				
	6.	It is agreed that the Tenant listed above has so above described premises.	le authorization	on of spreading manure	on the	
	7.	This agreement is transferrable by tenant to an name	other entity if	tenant sells or changes	company	
	8.	Other Conditions (Describe): <u>Pewoing Ron</u>	PRANALL AND	ADERDATINE DERE	more Hil	
		- Annual Control of the Control of t	100 (((1) 7))))	OPERCE TINE TO BICLE	inover / 1/	

T A	TATES.	ONATED # 0.0 / / /				
LA	יעייו	OWNER Tund Quepel (Land Owner)	TENANT 2	RATIO LLC RY The	1. aufulact-	
		Printed KIRK H AUGHENCANSH	Printed A	(Sow Farm)	1	
		ddress: 21024 4212 DUENUE	-	ss: 1300 S HWY 75		
Cit	y St	ate Zip: IROQUOIS SD (72 (3		Lip: Pipestone, MN 5	6164	
		Phone: 605-546-2485	Pho	ne: 507-825-4211		

Part of Field 5

,	This Agreement, made and entered into this	13 <u> </u>	of <u>MAY</u> , 20	19			
I	between KIKE H HUGHENGHUGH		hereinafter				
	described as Landowner, and			hereinafter			
1	described as Tenant (Sow Farm), agree as follows:						
1	Landowner allows the Tenant the right to sp	read solid an	d/or liquid animal manu	re on the			
I	ollowing described real property situated in	HARNO	_County, South Dakota.				
	Field Location	Acres					
	(1/4 Section, Township, Range)	Available	Land Use				
ļ	1E 14 32-111-67 AKA PAMER # 3			And the second s			
KE	YCEPT 1.55 ACRES DESCRIPTED AS						
F	PARCEL IT 4 HAND COMPATY WAST	1) 157.41	CARN- GERAN	-			
W	W14 32-111 67 AIND PARCEL # 5	·					
	LEXCEPT IN ALLES DESCRIBEDA						
	PRICEL # 6 HAND COUNTY W	44/188,	9 CORN- GERNS	-			
	Total Acres (more or less)	314,20					
2.	Tenant shall be allowed to spread manure on	the property	owned by the Landown	pr			
	described above at such regular intervals as	are mutually	greeable by both parties	s The			
	spreading of manure, however, shall not inte	rfere with the	productivity, planting	ornwing			
	and harvesting of crops on the above describ	ed premises.	because, which becomes	6.0 mg			
2							
٥.	Tenant and Landowner jointly agree to apply	manure and/	or commercial fertilizer	at rates not			
	to exceed crop nutrient needs using current se	oil and manui	e test results.				
4.	Tenant further agrees to comply with all loca	l ordinances	and state and foderal one	diameter 1			
	laws in the hauling and spreading of said anim	nal manure	and state and tederal env	ronmental			
			10 yenes Kil				
5.	2. This agreement shall commence "" , 2018 and terminate in 48 years on						
	. Upon expiration, this lease shall automatically renew						
	from year-10-year, with the same terms and conditions. Fither party can give written nation						
	to the other, on or before						
	renew this agreement.						
6.	It is agreed that the Tenant listed above has so	de authorianti	on of annualta	48			
	above described premises.	ne authorizati	on or spreading manure	on the			
	•						
7.	This agreement is transferrable by tenant to ar	other entity i	f tenant sells or changes	company			
	name	•	6-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0	· · · · · · · · · · · · · · · · · · ·			
8.	Other Conditions (Describe): PENDING RPP	ROVALS AND	OPERATING AGREE	MENTS AT			
LAND	OWNER The a Quely land	TENANT	RATIO U.C BY The	a Aut.a.			
	(Land Owner)		(Sow Farm)	- Manipole			
	Printed KIRK A MUGHENBAUGH	Printed	RATIO LLC	•			
Address: 31024 42/5 LIVENUE Address: 1300 S HWY 75							
City St	ate Zip: TRaduse St. 1775		Zip: Pipestone, MN 5	6164			
	Phone: <u>206-546-2485</u>	Ph	one: <u>507-825-4211</u>				

	Field Location	Acres			
	(1/4 Section, Township, Range)	Available	Land Use		
FURTE	V6 14 8-110-67 1W14 8-110-67	158.96	CORN-BEANS		
2 - 18	15 1/48-110-67	160,00	CORN- EFFINS		
	JE 145-110-67 (2075 1-2:5/2)	158.9	CORN-GEANE		
-	Total Acres (more or less)	477.92			
3	described above at such regular intervals as a spreading of manure, however, shall not inte and harvesting of crops on the above describ Tenant and Landowner jointly agree to apply	rfere with the ped premises.	productivity, planting, growing		
	to exceed crop nutrient needs using current se	oil and manure	test results.		
	 Tenant further agrees to comply with all local ordinances and state and federal environment laws in the hauling and spreading of said animal manure. 				
5.	This agreement shall commence May 1, 2019 and terminate in 46 years on May 1, 2034. Upon expiration, this lease shall automatically renew				
	from year-to-year, with the same terms and co to the other, on or before January 1 renew this agreement.	onditions. Eith	er party can give written notice y given year of an election not to		
6.	It is agreed that the Tenant listed above has so above described premises.	le authorization	n of spreading manure on the		
7.	This agreement is transferrable by tenant to an name	other entity if t	enant sells or changes company		
8.	Other Conditions (Describe): PENDING APE	PROVINES AND	OPERATING HARCEMENTS H		

	Inis Agreement, made and entered into this	day	of MAY ,2019	
	between KIRIC AJGHEAST DUGH		hereinafter hereinafter	
	described as Landowner, and		hereinafter	r
	described as Tenant (Sow Farm), agree as follo	ws:		
	1. Landowner allows the Tenant the right to sp	read solid and	I/or liquid animal manure on the	
_	Tonowing described real property situated in	HAND	County, South Dakota.	
	Field Location	Acres		
	(1/4 Section, Township, Range)	Available	Land Use	
Part of Rell (5w 1/4 5-110-67	160,00	LORN- BEANS	
Part L	E145-110-67	158.94	CORN-GEANS	
	16 1/4 6-110-67 (LDTS 1=2=5/2	160.00	CORN- REPNS	
1	W 14 6-110-67 (LOTS 3-4-5 ESEIR	1 130,20	CORN- GEANS	
Field3 9 5	W146-110-67/LOB6-78 E1/2	131.40	COLN- EFANS	
((E1/46-110-67	160,00	CORN. EEPNS	
	Total Acres (more or less)	900,56		
2	Tenant shall be allowed to spread manure on described above at such regular intervals as a spreading of manure, however, shall not inter and harvesting of crops on the above describe	re mutually a rfere with the	greeable by both portion. The	
3	Tenant and Landowner jointly agree to apply to exceed crop nutrient needs using current so	manure and/o	or commercial fertilizer at rates no e test results.	t
4.	Tenant further agrees to comply with all local laws in the hauling and spreading of said anim	nal manure.		1
5.	- Brotheric Grider Committee	_ and termina	ate in 46 years on	
	from year-to-year, with the same terms and co to the other, on or before January 1 renew this agreement.	nditions. Eitl	ease shall automatically renew ner party can give written notice by given year of an election not to	
6.	It is agreed that the Tenant listed above has so above described premises.	le authorizatio	on of spreading manure on the	
7.	This agreement is transferrable by tenant to an name	other entity if	tenant sells or changes company	
8.	Other Conditions (Describe): PENDING RE	PPANYALS A	NO OPERATING AGREEMENTS	ty
A	OWNER The Aufuliant (Land Owner) Printed KICK ASSET FULL address: 21024 4217 Edfant tate Zip: TRABUOIS TO TITE	PrintedAddre	(Sow Farm) (Sow Farm) (RATIO LLC) 288: 1300 S HWY 75 Cip: Pipestone, MN 56164	o Zyllma vooronima
	Phone: 105-546-2425	Pho	ne: 507-825-4211	