April 12, 2013

Walnutdale Dairy CAFO

[redacted]H-5,6,7 Manure app review

[redacted]

On April 12th, we began a review on the manure application records for the H567 field to determine the nitrogen content from manure applications. The nitrogen values on the DEQ annual report were determined by putting the application rates into the Purdue Manure Management Program (MMP) that is used to track nutrient values and applications. Below I will outline a review of manure applications on this field and some of the historical data we have showing that the manure applied for the 2012 cropping season was not providing the 440lbs N/acre that was generated by the MMP program.

At the current time, Walnutdale dairy does not have a sample on the solid manure that is applied from the bottom of the lagoon storage when it is cleaned out. When this storage structure is scrapped out, a sampled will be submitted to determine the nutrient value. It is our belief that the current values being used (estimated at TKN – 25#/ton, AN-15#/T, ON-10#/ton) are over estimating the nitrogen content of that manure.

Estimated Nitrogen Value from Manure:

Ammonia Nitrogen = 15#/ton x .70 (nitrogen retention factor based on 24hour incorporation) results in 10.5#N/ton of manure applied

Organic Nitrogen = 10#/ton x .3 (mineralization factor for dairy manure) = 3.3#/ton of manure

Total Nitrogen = AN+ON = 10.5 + 3.3 = 13.8 #/Ton of manure

2010 Manure applications towards 2011 crop production:

Manure applied 11/1 to 11/15 of 2010 on this field at a rate of 19 tons/acre

Manure applied @ 19T/acre x 13.8#N/ton = 262.2# of nitrogen projected to be available for 2011 cropping season

June 13 of 2011 a PreSidedress Nitrate test was taken from the H567 field (A&L Lab report submitted as well) that shows the available nitrate in the soil solution was at 15&16 parts per million (ppm). When these values are reviewed using the A&L Labs Presidress Soil Nitrate Testing charts (provided with this information) it shows that the nitrogen in the soil solution is insufficient for crop production (175bu/acre corn) and is calling for an additional 75-150#/acre of nitrogen to meet those needs.

<u>This review shows that the projected available nitrogen number of 262.2#/acre is not accurate. The nitrogen available for crop production is far less than the estimated value.</u>

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2011 Manure Applications towards 2012 crop production:

Manure from the bottom of the storage was applied again on 12/10-18/2011 on the H567 field. Based on the number of loads, the estimated rate is 31T/acre (approx. 9,000 gallons using a 50#/cubic foot density of manure).

Manure applied @ 31T/acre x 13.8#N/ton = 427.8#N/acre projected available

On May 21 of 2012 an application of 6,400 gallons/acre of water from the catch basin was irrigated over the top of the corn crop.

Catch basin nutrient availability: AN - .9#/1,000 gallons, ON - .7#/1,000 gallons

6400 gallon/acre application rate results in the following available nitrogen:

Ammonia Nitrogen – all lost due to volatilization

Organic Nitrogen - .7#/1000 gal x .3 (mineralization factor) = .21#N/1000 gallons applied

Total Nitrogen from irrigation application is estimated at 1.34#N/acre

Based on the review from 2011 pit solid applications, the estimated available nitrogen is a significant overestimation of the nutrient value of the pit solid manure. A PSNT sample was not taken during the 2012 growing season to determine the nitrates in the soil solution during the growing season.

2013 Plans:

Walnutdale Dairy will collect a manure sample of the pit solids when the storage structure is being scraped out. This sample will be submitted to A&L Labs to establish an accurate nutrient value. Presidedress nitrogen tests will be taken to determine the nitrogen available in the soil structure during the 2013 growing season. Nitrogen will be applied (or not applied) to the H567 field based on the PSNT test results and targeted crop production.

If there are any questions on this information, or on the calculations used to determine these values, please feel free to contact me.

Respectfully,

Jason Stegink

Green Valley Agricultural Inc.

2010

Daily Manure Application Record (Permit MIG019000)

Date 11/1 to 11/15 (2010)	Field ID Behind Farm H5, H6, H7	Field size (acres) 58

Weather

Forecast less than 70% of 1/2" inch rain? ☐ yes ☐ *no (DO NOT SPREAD)*

Weather conditions during spreading*

☐ sunny ☐ partly cloudy ☐ cloudy ☐ *rain (DO NOT SPREAD)*

**If differing conditions exist within 24 hours prior-to or after application, check multiple conditions and note timing*

Field Inspection (0 to 48 hours before land application)

inspector

Tile(s) flowing **immediately** prior to spreading? ☐ yes ☐ no ☐ NA

describe flow color and odor (multiple outlets on back if necessary)

Soil cracking evident? ☐ yes ☐ no

If yes, correct (till) prior to spreading on tiled land

Describe crop maturity

Describe soil moisture ☐ dry ☐ moist ☐ *saturated (DO NOT SPREAD)*

Are conservation practices* functioning and in good condition? ☐ yes ☐ no ☐ NA

**Includes grassed waterways, buffer strips, diversions, etc. If "no" describe on back and DISCONTINUE SPREADING.*

Application Information

spreader name/ID	application method	capacity	time am pm
Slingers	Surface		

Daily Equipment Insp*: ☐ No problems with leaks, structural integrity, or proper O&M

**DO NOT SPREAD if the box above is not checked. Record any corrective actions necessary on back.*

manure source	loads
goal application rate/acre	110 - lagoon solids 319,000 gallons

actual application rate/acre	total volume or weight applied	acres covered
19 tons/Acre	1100 tons or	

Follow Up

Tile(s) flowing at end of daily spreading? ☐ yes ☐ no ☐ NA

describe flow color and odor (multiple outlets on back if necessary) Inspector:

manure incorporation date or no incorp. explanation*

*only: within 24 hrs, frozen, snow covered, or forage crop

manure incorporation method

Tile(s) flowing after first 1/2" rain w/in 30 days of application? ☐ yes ☐ no ☐ NA

date of inspection	describe flow color and odor (mulitple outlets on back if necessary) Inspector:

Report Number: F11165-0165
Account Number: 33022

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QUALITY ANALYSES FOR INFORMED DECISIONS

TO: GREEN VALLEY AGRICULTURAL
3957 108TH ST SE
CALEDONIA, MI 49316-9425

FOR: WALNUTDALE FARMS

DATE RECEIVED: 06/14/2011
DATE REPORTED: 06/15/2011
PAGE: 1

ATTN: John Christian

SAMPLE NUMBER	LAB NUMBER	NITRATE NO3-N ppm	AMMONIUM NH4-N ppm
JA4849	68500	8	
HOME5	68501	16	
JA5152	68502	15	
HOME67	68503	15	
WI22AB	68504	15	
EDSA21	68505	14	
CISASB	68506	9	

A&L-PSNT

Refer to Fact Sheet # 18 In-Season Soil Nitrate Testing for Corn for interpretive guidelines.

2010

Daily Manure Application Record (Permit MIG019000)

Date	Field ID	Field size (acres)
8-6 to 8/29/2010	H1, H2, H3, H5, H6, H7	66.58 124 total

Weather

Forecast less than 70% of 1/2" inch rain? ☐ yes ☐ no (DO NOT SPREAD)

Weather conditions during spreading*

☐ sunny ☐ partly cloudy ☐ cloudy ☐ rain (DO NOT SPREAD)

*If differing conditions exist within 24 hours prior to or after application, check multiple conditions and note timing

Field Inspection (0 to 48 hours before land application)

inspector

Tile(s) flowing **immediately** prior to spreading? ☐ yes ☐ no ☐ NA

describe flow color and odor (multiple outlets on back if necessary)

Soil cracking evident? ☐ yes ☐ no
If yes, correct (till) prior to spreading on tiled land

Describe crop maturity

Describe soil moisture ☐ dry ☐ moist ☐ saturated (DO NOT SPREAD)

Are conservation practices* functioning and in good condition? ☐ yes ☐ no ☐ NA

*Includes grassed waterways, buffer strips, diversions, etc. If "no" describe on back and DISCONTINUE SPREADING.

Application Information

spreader name/ID	application method	capacity	time am pm

Daily Equipment Insp*: ☐ No problems with leaks, structural integrity, or proper O&M

*DO NOT SPREAD if the box above is not checked. Record any corrective actions necessary on back.

manure source	loads	
Water/Lagoon	2,387,360 gallons	
goal application rate/acre		
actual application rate/acre	total volume or weight applied	acres covered
19,253		124

Follow Up

Tile(s) flowing at end of daily spreading? ☐ yes ☐ no ☐ NA

describe flow color and odor (multiple outlets on back if necessary) Inspector:

manure incorporation date or no incorp. explanation*

manure incorporation method

*only: within 24 hrs, frozen, snow covered, or forage crop

Tile(s) flowing after first 1/2" rain w/in 30 days of application? ☐ yes ☐ no ☐ NA

date of inspection	describe flow color and odor (mulitple outlets on back if necessary) Inspector:

OK

Daily Manure Application Record (Permit MIG019000)

Date	Field ID	Field size (acres)
12-10-18-2011	H5,6,7	58

Weather

Forecast less than 70% of 1/2" inch rain? [X] yes [ ] no (DO NOT SPREAD)

Weather conditions during spreading*

[ ] sunny [X] partly cloudy [ ] cloudy [ ] rain (DO NOT SPREAD)

*If differing conditions exist within 24 hours prior to or after application, check multiple conditions and note timing

Field Inspection (0 to 48 hours before land application)

inspector: AO

Tile(s) flowing **immediately** prior to spreading? [ ] yes [X] no [~~X~~] NA

describe flow color and odor (multiple outlets on back if necessary)

Soil cracking evident? [ ] yes [X] no

If yes, correct (till) prior to spreading on tiled land

Describe crop maturity

Describe soil moisture [ ] dry [X] moist [ ] saturated (DO NOT SPREAD)

Are conservation practices* functioning and in good condition? [X] yes [ ] no [ ] NA

*Includes grassed waterways, buffer strips, diversions, etc. If "no" describe on back and DISCONTINUE SPREADING.

Application Information

spreader name/ID	application method	capacity	time am pm
Slinger	Surface	2900 gallons	All day

Daily Equipment Insp*: [X] No problems with leaks, structural integrity, or proper O&M

*DO NOT SPREAD if the box above is not checked. Record any corrective actions necessary on back.

manure source	loads	
Lagoon Bottom	180 - Scooped out Bottom of lagoon	
goal application rate/acre: 9,000		
actual application rate/acre: 9,000	total volume or weight applied: 522,000	acres covered: 58

Follow Up

Tile(s) flowing at end of daily spreading? [ ] yes [X] no [~~X~~] NA

describe flow color and odor (multiple outlets on back if necessary)

Inspector: AO

manure incorporation date or no incorp. explanation*

manure incorporation method: chisseled on 12-11-11 12-22-11

*only within 24 hrs, frozen, snow covered, or forage crop

Tile(s) flowing after first 1/2" rain w/ 30 days of application? [X] yes [ ] no [ ] NA

date of inspection	describe flow color and odor (mulitple outlets on back if necessary)	Inspector
12-23-11	clean	AO

INVOICE / SALES FORM

CUSTOM MANURE IRRIGATION & BIOSOLIDS HANDLING

"By the job or by the hour"

3627 Kalamazoo Dr. • Wayland, MI 49348 • Phone/Fax: (269) 792-2854
BOB REURINK ... Cell: (616) 813-7437

We Sell: • Used Pumps • Travelers • Irrigation Hose • Main Line Hose • Manure Irrigation Equipment

Date: 7-9-12

Sold To: Walnutdale Farms - Lettinga
Address: 4309 - 14th Street
City: Wayland, MI. 49348

	QUANTITY	DESCRIPTION	PRICE	AMOUNT
1	5/6)	100 minutes x 1145 =	114,	500
2		140 minutes x 1155 =	161,	700
3				
4		(North 144th Hwy)		
5				
6				
7		276,200 Gal. x .0055		
8				
9				
10				
11				
12				
		TOTAL AMOUNT DUE:	$1,519.10	

Daily Manure Application Record (Permit MIG019000)

Date	Field ID	Field size (acres)
5-21-12	H-5	40

Weather

Forecast less than 70% of 1/2" inch rain? [X] yes [ ] *no (DO NOT SPREAD)*

Weather conditions during spreading*

[X] sunny [ ] partly cloudy [ ] cloudy [ ] *rain (DO NOT SPREAD)*

**If differing conditions exist within 24 hours prior-to or after application, check multiple conditions and note timing*

Field Inspection (0 to 48 hours before land application)

inspector KL

Tile(s) flowing **immediately** prior to spreading? [ ] yes [X] no [ ] NA

describe flow color and odor (multiple outlets on back if necessary)

Soil cracking evident? [ ] yes [X] no

If yes, correct (till) prior to spreading on tiled land

Describe crop maturity

Describe soil moisture [X] dry [ ] moist [ ] *saturated (DO NOT SPREAD)*

Are conservation practices* functioning and in good condition? [X] yes [ ] no [ ] NA

**Includes grassed waterways, buffer strips, diversions, etc. If "no" describe on back and DISCONTINUE SPREADING.*

Application Information

spreader name/ID	application method	capacity	time am pm
Irrigated	Surface		

Daily Equipment Insp*: [✓] No problems with leaks, structural integrity, or proper O&M

**DO NOT SPREAD if the box above is not checked. Record any corrective actions necessary on back.*

manure source	loads	
Lagoon N		
goal application rate/acre		
actual application rate/acre	total volume or weight applied	acres covered
6905	276,200	40

Follow Up

Tile(s) flowing at end of daily spreading? [ ] yes [X] no [ ] NA

describe flow color and odor (multiple outlets on back if necessary) Inspector:

manure incorporation date or no incorp. explanation*

**only: within 24 hrs, frozen, snow covered, or forage crop*

manure incorporation method

Tile(s) flowing after first 1/2" rain w/in 30 days of application? [ ] yes [X] no [ ] NA

date of inspection	describe flow color and odor (mulitple outlets on back if necessary)	Inspector:

REPORT NO.
F13044-6004

ACCOUNT NUMBER
33022

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QUALITY ANALYSES FOR INFORMED DECISIONS

TO: GREEN VALLEY AGRICULTURAL
3957 108TH ST SE
CALEDONIA, MI 49316-9425

FOR: WALNUTDALE FAMILY FARMS

ATTN: JOHN CHRISTIAN

LAB NUMBER: 64745
MANURE TYPE: DAIRY, LIQUID PIT (20)
SAMPLE ID: CATCH BASIN

MANURE ANALYSIS REPORT

DATE SAMPLED: 02/08/2013
DATE RECEIVED: 02/13/2013
DATE REPORTED: 02/15/2013

PARAMETER	UNIT	ANALYSIS RESULT	TOTAL POUNDS PER 1,000 GAL**	FIRST YEAR AVAILABILITY @ POUNDS PER 1,000 GAL
Moisture	%	99.54	8291.7	
Solids	%	0.46	38.3	
Nitrogen, Total (TKN)	%	0.020	1.7	1.1 *
Nitrogen, Ammonium (NH4-N)	%	0.011	0.9	0.9 *
Nitrogen, Organic (N)	%	0.009	0.7	0.2 *
Phosphorus (P)	%	0.006	1.1 (as P2O5)	1.1 (as P2O5) *
Potassium (K)	%	0.018	1.8 (as K2O)	1.8 (as K2O) *

@ Estimate of first-year availability does not account for incorporation losses. Consult MWPS-18, "Livestock Waste Facilities Handbook" for additional information.
* Source: MWPS-18, Livestock Waste Facilities Handbook, 1993
** Manure density assumed to be 8.33 lb/gallon

Table 3. Ammonium nitrogen volatilization losses for surface application of solid and semi-solid manures.[10]

Days Before Incorporation	Retention Factor (RF)	Loss Factor (LF)
0-1 day	0.70	0.30
2-3 days	0.40	0.60
4-7 days	0.20	0.80
>7 days	0.10	0.90

Table 4. Manure and manure nutrients produced by different livestock species.[11]

Animal Species	Type and Average Size[12] (lb)		Production (per day)[13]			
			Manure(ft^3)	Nutrients (lb)		
				N	P_2O_5	K_2O
Dairy Cattle		150	0.2	0.05	0.01	0.04
		250	0.32	0.08	0.02	0.07
	Heifer	750	1.0	0.23	0.07	0.22
	Lactating Cow	1,000	1.7	0.58	0.30	0.31
		1,400	2.4	0.82	0.42	0.48
	Dry Cow	1,000	1.30	0.36	0.11	0.28
		1,400	1.82	0.50	0.20	0.40
	Veal	250	0.14	0.04	0.03	0.06
Beef Cattle	Calf	450	0.42	0.14	0.10	0.11
	High Forage	750	1.0	0.41	0.14	0.25
	High Forage	1,100	1.4	0.61	0.21	0.36
	High Energy	750	0.87	0.38	0.14	0.22
	High Energy	1,100	1.26	0.54	0.21	0.32
	Cow	1,000	1.00	0.31	0.19	0.26
Swine	Nursery Pig	25	0.04	0.02	0.01	0.01
	Grow-Finish	150	0.15	0.08	0.05	0.04
	Gestating	275	0.12	0.05	0.04	0.04
	Lactating	375	0.36	0.18	0.13	0.14
	Boar	350	0.12	0.05	0.04	0.04
Sheep		100	0.06	0.04	0.02	0.04
Horse		1,000	0.8	0.28	0.11	0.23
Poultry (per 100 birds)	Chicken Layers	4	00.4	0.35	0.27	0.16
	Chicken Broilers	2	00.3	0.23	0.14	0.11
	Turkey[2]	20	01.4	1.26	1.08	0.54
	Duck	6	00.5	0.46	0.38	0.28

[10] Source: Recordkeeping System for Crop Production. *(Jacobs et al., 1992a)*

[11] Source: Manure Characteristics, MWPS-18, Table 6 (*MidWest Plan Service, 2000*).

[12] Weights represent the average size of the animal during the stage of production.

[13] Note: Values are as-produced estimations and do not reflect any treatment. Values do not include bedding. The actual characteristics of manure can vary +/- 30 percent from the table values. Increase solids and nutrients by 4 percent for each 1 percent feed wasted above 5 percent.

Source: Record keeping System for Crop Production (Jacobs ET al, 1992a) Table 3 GAAMPs for Manure Management and Utilization 2000.

TABLE 5 – MINERALIZATION FACTORS FOR ORGANIC NITROGEN AND AVERAGE NUTRIENT CONTENTS OF MANURES

Manure Type	Manure Handling	Mineral-ization Factor	Average Nutrient Content				
			NH4-N	Total N	Total P2O5	Total K2O	Units
Swine	Fresh	0.50	6	10	9	8	/ton
	Anaerobic liquid	0.35	26	36	27	22	/1000 gal
Beef	Solid without bedding	0.35	4	11	7	10	/ton
	Solid with bedding	0.25	8	21	18	26	/ton
	Anaerobic liquid	0.30	24	40	27	34	/1000 gal
Dairy	Solid without bedding	0.35	4	9	4	10	/ton
	Solid with bedding	0.25	5	9	4	10	/ton
	Anaerobic liquid	0.30	12	24	18	29	/1000 gal
Sheep	Solid with bedding	0.25	5	14	9	25	/ton
Poultry	Deep pit	0.45	44	68	64	45	/ton
	Solid without litter	0.35	26	33	48	34	/ton
	Solid with litter	0.30	36	56	45	34	/ton
Horses	Solid with bedding	0.20	4	14	4	14	/ton

Source: *MWPS-18, Livestock Waste Facilities Handbook, 2nd Edition, 1985, Manure Management Sheet #2.*

Presidedress Soil Nitrate Testing (PSNT) for Corn

FACT SHEET

A & L GREAT LAKES LABORATORIES, INC.

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Fort Wayne, IN 46808

Phone: 260-483-4759
Fax: 260-483-5274
lab@algreatlakes.com
www.algreatlakes.com

Fact Sheet No. 18
Revised 6/2010

WHY TEST?

While nitrogen is a critical nutrient for corn production, it is also a major contributor to the high cost of production. In addition, since nitrogen is mobile in the soil, it can move into surface or ground waters, which is an environmental and water quality concern. Nitrogen rates should be fine tuned to maximize economic returns and limit environmental impacts associated with inefficient uses of nitrogen fertilizer.

The behavior of nitrogen in the soil is complex. Nitrogen is plant available as either ammonium (NH_4) or nitrate (NO_3). Ammonium has a positive charge and can attach to the surface of soil particles. This prevents much of the ammonium from being removed from the soil profile by leaching. However, a number of processes in the soil naturally convert ammonium into nitrate. Nitrogen in the nitrate form has a negative charge and does not attach to soil particles. Therefore, nitrate can be lost as water moves through the soil profile. In addition to losses by leaching, nitrate can also be lost in situations where oxygen is limiting, such as in saturated soils. In this situation, nitrates are converted into gasses that are not plant available and can be lost to the atmosphere.

Since nitrogen is generally not retained by the soil in the same manner as other plant nutrients, excess nitrogen applied to a crop is generally not available to subsequent crops. However, in situations of limited rainfall, nitrate may be carried over from the previous growing season and reduce the need for nitrogen fertilizer.

Organic materials in the soil can also be a significant source of nitrogen for plant growth. Nitrogen is continually being released from organic sources such as applied manure, crop residues, and soil organic matter as these materials decompose (mineralize). Since this process is highly dependant on a number of factors, it is not possible to predict the amount of nitrogen that will be released by mineralization.

The PSNT is most beneficial in situations where manure has been applied to a field, or where a recent legume forage crop, such as alfalfa, has been grown. These practices generally provide higher levels of potentially available nitrogen to the growing crop, Since the contribution of available nitrogen from these sources is variable due to several factors, the PSNT can be a useful tool for assessing the actual nitrogen contribution from these sources.

SAMPLING

Time: Take samples in the spring when the corn is 6 -12 inches tall or at least a week before a planned sidedress application to allow adequate time for laboratory analysis and interpretation of the data.

Depth: Samples should be collected to a depth of 12 inches. All of the interpretative guidelines presented in this fact sheet are based on 12 inch sample depth. Take at least 10 to 15 cores per sample unit.

Place: Since the PSNT measures the nitrate released by mineralization of organic materials, factors that affect mineralization should be considered when determining the sampled area. Factors such as soil type and slope, as well as differences in management, including intensity of artificial drainage, rates of manure application, and cropping history, should be considered when determining sampling areas. Avoid starter bands or other unusual areas. In addition, **if high rates of nitrogen fertilizers have been applied pre-plant or at planting, PSNT values may not provide an accurate assessment of the nitrogen status of the soil.** A general guideline is that one sample should represent no more than 15 – 20 acres.

Handling: The soil from all cores should be crushed and thoroughly mixed before a 1-2 cup subsample is removed for analysis. Samples should be shipped immediately after collection so that they may be analyzed within 2 days. Samples may be refrigerated, frozen, or dried for preservation if they cannot be shipped immediately. Do not exceed a temperature of 250°F in drying.

Shipping: Ship via UPS or courier for best results. Moist samples sent Monday - Wednesday should arrive without weekend delays, which could affect results.

INTERPRETATION OF RESULTS

Not all states have recommended nitrate sampling programs. Interpretative guidelines for several states are outlined below:

ILLINOIS

For a discussion of interpreting PSNT results in Illinois, refer to the *Illinois Agronomy Handbook,* p. 119-120.

INDIANA*

Soil NO_3-N (ppm)	Corn Yield Potential (Bu/A)					
	80	100	120	140	160	180
	pounds additional fertilizer N to apply per acre					
0-10	75	100	125	145	170	200
11-15	45	75	100	125	145	170
16-20	30	55	80	110	125	150
21-25	0	10	35	55	80	110
>25	0	0	0	0	0	0

*AY-314-W, *The Presidedress Soil Nitrate Test for Improving N Management in Corn, Purdue University*

IOWA*

Corn after Soybeans and Corn after Corn:

Recommended N Rate (lb. N/acre) = (Critical N Concentration[1] - ppm NO_3-N) x 8

Manured[2] Soils and Corn after Alfalfa:

Grain and Fertilizer Prices	Soil Test Nitrate ppm NO_3-N	Recommended N Rate (lb. N/acre)	
		Excess Rainfall[3]	Normal Rainfall
Unfavorable (1 bu. Corn buys 7 lb. of N)	0-10	90	90
	11-15	0	60
	16-20	0	0 [4]
	>20	0	0
Favorable (1 bu. Corn buys 15 lb. of N)	0-10	90	90
	11-15	60	60
	16-25	0	30
	>25	0	0

* Pm-1714, *Nitrogen Fertilizer Recommendations for Corn in Iowa*, Iowa State University

[1] A critical concentration of 25 ppm NO_3-N is appropriate in absence of additional information. Reduce the critical concentration by 3-5 ppm if rainfall is more than 20% above normal amount between April 1 and time of soil sampling.

[2] A field should be considered manured if animal manures were applied with a reasonable degree of uniformity since harvest of the previous crop or in 2 of the past 4 years.

[3] Rainfall should be considered excess if rainfall in May exceeded 5 inches.

[4] Addition of 30 lb. N/acre may have no detectable effects on profits, but producers could reasonably elect to apply this rate.

MICHIGAN*		
Soil Nitrate ppm NO_3-N	Interpretation	Soil N Credit N Credit (lb. N/acre)[1]
≤10	Low	0
11-15	Medium-Low	30
16-20	Medium	60
21-25	Medium-High	90
≥26	High	**

* *Soil Nitrate Test for Corn in Michigan;* Field Crop Advisory Team Alert, Michigan State University Extension, 14 May 2009

** No additional nitrogen fertilizer is recommended.

1 N credit for corn when N recommendation is based on Maximum Return To Nitrogen (MRTN)

OHIO

For a discussion of interpreting PSNT results in Ohio, refer to the *Ohio CORN Newsletter 2008- 14,* 20 May 2008.

WISCONSIN*		
Soil Nitrate ppm NO_3-N	Soil Yield Potential[1]	
	Very High/High	Medium/Low
	N Credit (lb. N/acre)[2]	
>21	**	**
18-20	100	80
15-17	60	80
13-14	35	40
11-12	10	40
0-10	0	0

* UWEX publication A2809, *Nutrient Application Guidelines for Field, Vegetable and Fruit Crops in Wisconsin*

** No additional nitrogen fertilizer is recommended.

1 Refer to UWEX publication A2809 to determine soil yield potential. PSNT is not recommended on sandy soils (loamy sands and sands).

2 Refer to UWEX publication A2809 for a discussion of other factors that affect N guidelines.