

## Hydrostratigraphic Database of West-Central Wisconsin

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<b>Site:</b>	Deiss & Nugent Feed Co.
<b>Location:</b>	East Ellsworth, Pierce County Wisconsin
<b>Unit Evaluated:</b>	Ordovician Prairie du Chien Group

### *File includes excerpts from:*

Midwest Environmental Management Company, 1998, Groundwater Investigation Addendum Report, Deiss & Nugent Feed Co., 270 N. Morse Street, East Ellsworth, Wisconsin, on file at Wisconsin Department of Agriculture Trade and Consumer Protection.

- Text with discussion of hydrogeology, including karst
- Figures, including cross-sections
- Well logs

METCO, 1998, Additional Groundwater Investigation Report, Deiss & Nugent Feed Company, East Ellsworth, Wisconsin, on file at Wisconsin Department of Agriculture Trade and Consumer Protection.

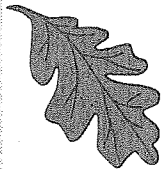
- Text with discussion of packer tests and video logging
- Figures
- Video log and packer test summary

Alpha Terra Science, Inc., 2002, Groundwater Monitoring Report for Deiss & Nugent Feed Co., East Ellsworth, Wisconsin, on file at Wisconsin Department of Agriculture Trade and Consumer Protection.

- Text: including hydrogeology discussion

Alpha Terra Science, Inc., 2002, Letter dated February 19, 2002, to DATCP re: Deiss & Nugent Feed Co., East Ellsworth, Wisconsin, on file at Wisconsin Department of Agriculture Trade and Consumer Protection.

- Boring logs (cavities noted)



Midwest Environmental  
Management Company

Rec'd 1/16/97

# GROUNDWATER INVESTIGATION ADDENDUM REPORT

Deiss & Nugent Feed Company  
270 N. Morse Street  
East Ellsworth, Wisconsin

DATCP Case 93409110301  
Project AG971038

January 13, 1998

Tim Hanson  
715 837-3773  
Water Supply Specialist

## Executive Summary

In 1993, the Wisconsin Department of Agriculture, Trade and Consumer Protection (WDATCP) initiated a groundwater investigation in the City of Ellsworth to determine the source of agrichemical contamination associated with the two municipal wells. Their investigation lead them to the Deiss & Nugent Feed Company (DNFC). Previous work conducted at DNFC included soil investigation and the construction of one monitoring well (MW-2) at DNFC.

*- what about MW-1 ?*

Based on our analyses of the local geology, we believe the Prairie Du Chien (Lower Magnesian) carbonate sequence begins at approximately 984 feet above mean sea level (MSL).

Based on our analyses of the local hydrogeology, we estimate permanent groundwater exists between 970 and 945 feet above MSL, typically within the Prairie Du Chien formation. We estimate the first water bearing unit at DNFC is the dolomite within the Prairie Du Chien. We estimate the DNFC MW-2 groundwater elevation to be approximately 969 feet above MSL. When comparing the DNFC monitoring well to the nearby creamery well it appears that a downward vertical gradient may exist in the that area.

Based on the above information it is our opinion that the monitoring well at DNFC, while not of ideal construction, does provide representative groundwater quality information. Furthermore, it is our opinion that the herbicides detected at DNFC are similar in nature to those found within the city municipal wells and the nearby public and private wells, suggesting that the herbicides in groundwater are likely from a non-point source(s).

*Based on well*

DNFC proposes to complete their soil remediation by August 1998 and move their agrichemical facilities to a new location outside of Ellsworth. The nearest point of standards to DNFC is the Ellsworth Creamery Non-Community well (~200 feet from DNFC MW-2). DNFC proposes to monitor their MW-2 and the creamery well in April and October of 1998. If concentrations of agrichemicals are below or within groundwater standards considering background concentrations, DNFC will request case closure.

Based on review of this data and an interview with UWEX Resource Agent, we have concluded the following:

1. The uppermost bedrock unit, Galena-Platteville Limestone, was seen in Super America MW-12 and Ellsworth municipal well#3 WUWN BG675. Limestone was reported in the Ellsworth Creamery Well WUWN FD902 and the Cenex (fka Ellsworth Farm Supply) well. The corresponding elevations reported for this bedrock unit do not map conformably to a specific elevation. At WUWN BG675, the Galena-Platteville is eight feet thick and is reported as talus or broken. Geotechnical borings taken at DNFC describe pieces of what appear to be Galena-Platteville at 16 feet below ground surface (Soil Exploration Company, 1967).
2. Geotechnical borings conducted for the feedmill construction at DNFC reported sandstone bedrock at 24 feet below ground surface and groundwater was not encountered. *Geotech Borings usually do not see H<sub>2</sub>O unless obvious*
3. All of the wells are either cased to or into the Prairie Du Chien formation.
4. It appears the unconformity between the St. Peters Sandstone and the Prairie Du Chien Dolomite is observed at approximately 984 feet above mean sea level (MSL), +/- 10 feet. This would explain the loss in drilling fluid during the construction of DNFC's MW-2 as that well is finished at 903 feet above MSL. *not DN well #*
5. The two municipal wells and the creamery well penetrate the deeper Trempealeau or Jordan Sandstone. *water is obtained from POC and Jordan SS*
6. The contact between the Trempealeau or Jordan formation and the overlying Prairie Du Chien exists between 745 and 700 feet above MSL.
7. The USGS topographic map depicts Isabelle Creek in the area of DNFC as permanent. Actually, the creek is intermittent until the Ellsworth wastewater treatment plant located south of DNFC. The creek was observed to be dry during a site visit on December 19, 1997.
8. Numerous sinkholes and other karst features throughout the county are believed to contribute non-point groundwater contamination (Haas, Personal Interview).

## Local Hydrogeology

Based on review of the above geological information, WGNHS Generalized Water-Table Map for Pierce County, interviews with WDNR officials and UW River Falls geology faculty, the following conclusions were made about the local hydrogeology:

1. Shallow groundwater was detected at approximately 16 feet below ground surface at the Super America Gas Station, located on HWY 10 and N. Beyl St. The shallow monitoring wells have measurable groundwater intermittently. When groundwater was measured in the shallow monitoring wells, the groundwater was predicted flow to the east northeast.
2. Regional groundwater was mapped by WGNHS (figure 5) within the Prairie Du Chien formation and generally flows to south southeast in the area of DNFC and to the west southwest in the area of Ellsworth municipal well#2 WUWN AY376.

3. Groundwater elevations range between 990 and 945 feet above MSL. Groundwater elevations appear to decrease as a function well depth which would suggest the presence of downward gradients within the Prairie Du Chien aquifer. This phenomenon can be seen when comparing the DNFC MW-2 with the Ellsworth Creamery well (WUWN FD902).
4. Ellsworth Frozen Foods well, located approximately 300 feet north of DNFC was reported as abandoned.

Of the seventeen Leaking Underground Storage Tank (LUST) sites located in the study area, only the Super America gas station and the Pierce County Courthouse sites installed monitoring wells. The Pierce County Courthouse case is closed and the Super America case is active. The Cenex Farmers Union gas station, located directly south of DNFC conducted borings to bedrock during its LUST investigation, but did not encounter groundwater (Collins, Personal Interview). Ken's Mobil Petroleum Bulk Plant, located north of DNFC, recently initiated an environmental investigation, though no investigation of groundwater has been conducted to date.

### Local Groundwater Quality

Five of the fifteen wells depicted in figure 2 have been sampled for agricultural chemicals, and all five have detected herbicides and nitrates. Figures 6 through 8 illustrate the trends in agrichemicals detected in the two municipal wells and the creamery well. The analytical data was obtained from the WDNR Groundwater Retrieval Network (GRN) and the WDATCP Groundwater database. The Cenex (fka Ellsworth Farm Supply) well was recently sampled as part of a property transfer assessment, and the DNFC MW-2 was recently sampled.

The following tables represents a summary of the agrichemical concentrations reported from each of the above mentioned five wells.

Municipal Well#2 WUWN AY376

	Atrazine ug/l	Alachlor ug/l	Cyanazine ug/l	Metolachlor ug/l	Nitrate mg/l
Highest	3.1	0.4	Ø ND	1.0	5.09
Average	2.2	0.2	Ø ND	0.6	4.7
Sample size (n)	14	11	3	7	3

Municipal Well#3 WUWN BG675

	Atrazine ug/l	Alachlor ug/l	Cyanazine ug/l	Metolachlor ug/l	Nitrate mg/l
Highest	1.3	0.1	Ø ND	0.21	4.18
Average	0.77	0.03	Ø ND	0.18	3.38
Sample size (n)	9	4	2	4	4

*metolachlor?*

## Conclusions

Due to the thin or non-existence of overlying unconsolidated material and the presence of karst features in this agricultural region, groundwater is susceptible to agrichemical impacts. Within the study area the Prairie Du Chien (Lower Magnesian) carbonate sequence begins at approximately 984 feet above mean sea level (MSL). The first water bearing unit at DNFC is the dolomite within the Prairie Du Chien, which is consistent with the WGNHS generalized water-table map of Pierce County. Groundwater elevations appear to be influenced by well depth. When comparing the DNFC MW-2 and nearby creamery well, it appears that a downward vertical gradient could exist at DNFC.

True  
may or may not be true  
NO - SS

Herbicides and nitrate groundwater concentrations are widespread throughout the City of Ellsworth and nearby areas. Herbicide concentrations in the two municipal wells and creamery well are trending downward over the last seven years, while nitrate concentrations are trending slightly upward over the same time period. These public water supply wells are currently in compliance with state and federal standards with respect to herbicides and nitrates. The Ellsworth Creamery well is the nearest point of standards application to the DNFC.

## Recommendations

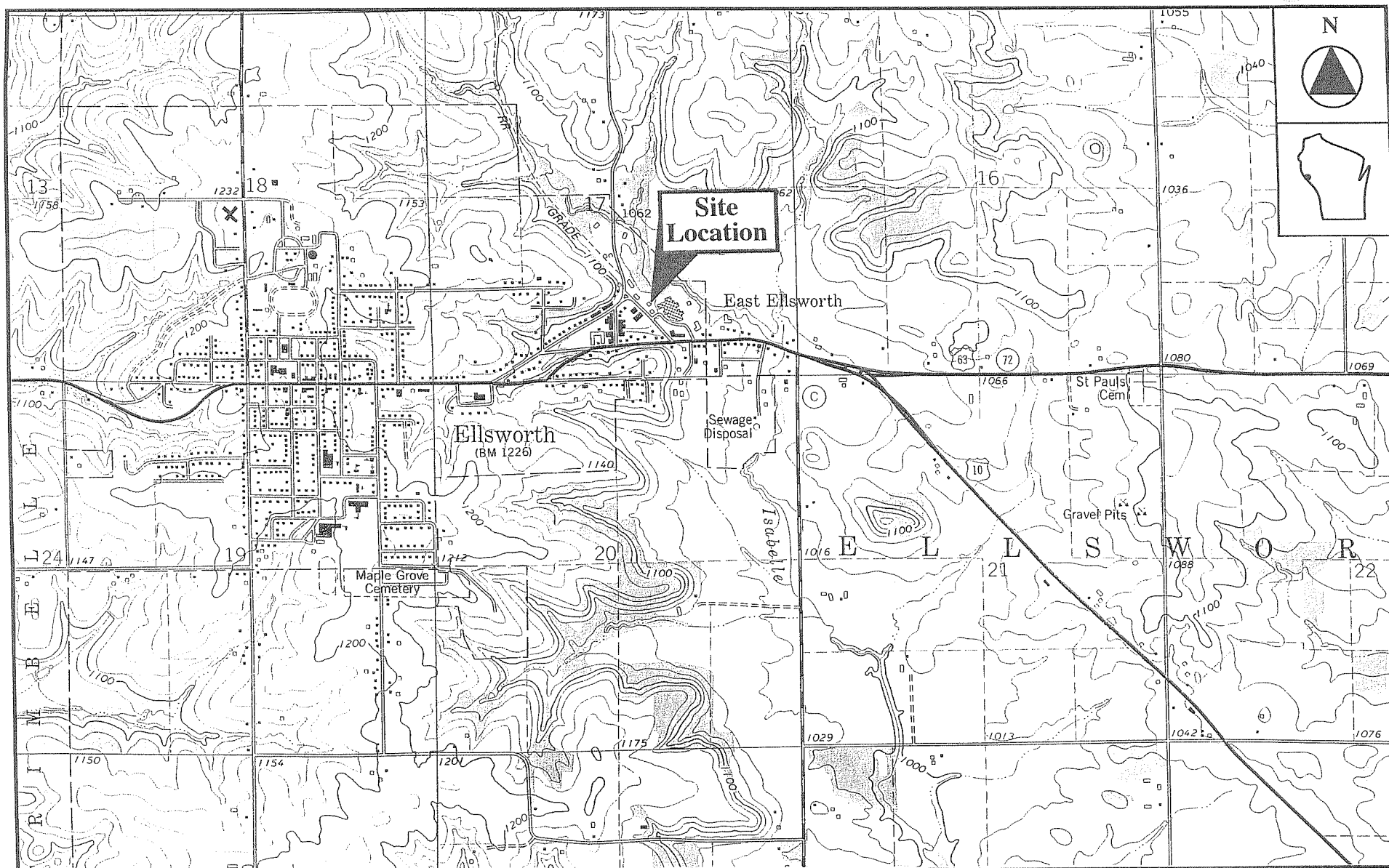
Because agrichemical concentrations are widespread throughout the area surrounding DNFC, it would be appropriate to consider those background concentrations when determining compliance with groundwater standards and determining the need for any further actions. Due to the presence of background concentrations of agrichemicals, the high cost of additional well construction (>\$12,000 per well), and the nearby creamery well testing consistently below drinking water standards, we are not recommending any additional monitoring well construction.

NO: ES's  
and ES

In an effort to lessen groundwater contamination concerns at DNFC, we propose to collect groundwater samples from MW-2 and the nearby creamery well in April and October 1998. The samples will be analyzed for atrazine, alachlor, metolachlor, and nitrate as nitrogen. Furthermore, DNFC is moving their fertilizer and chemical operations to a new facility in July 1998 and will conduct the soil remedy as previously proposed in August 1998. If after completion of the soil remedy, the groundwater concentrations are below or within groundwater standards when considering background concentrations, DNFC will request case closure.

?

1997



**Midwest Environmental  
Management Company**

**Deiss & Nugent Facility  
270 North Morse Street  
Ellsworth, Wisconsin**

## **FIGURE 1**

### **Site Location Map**

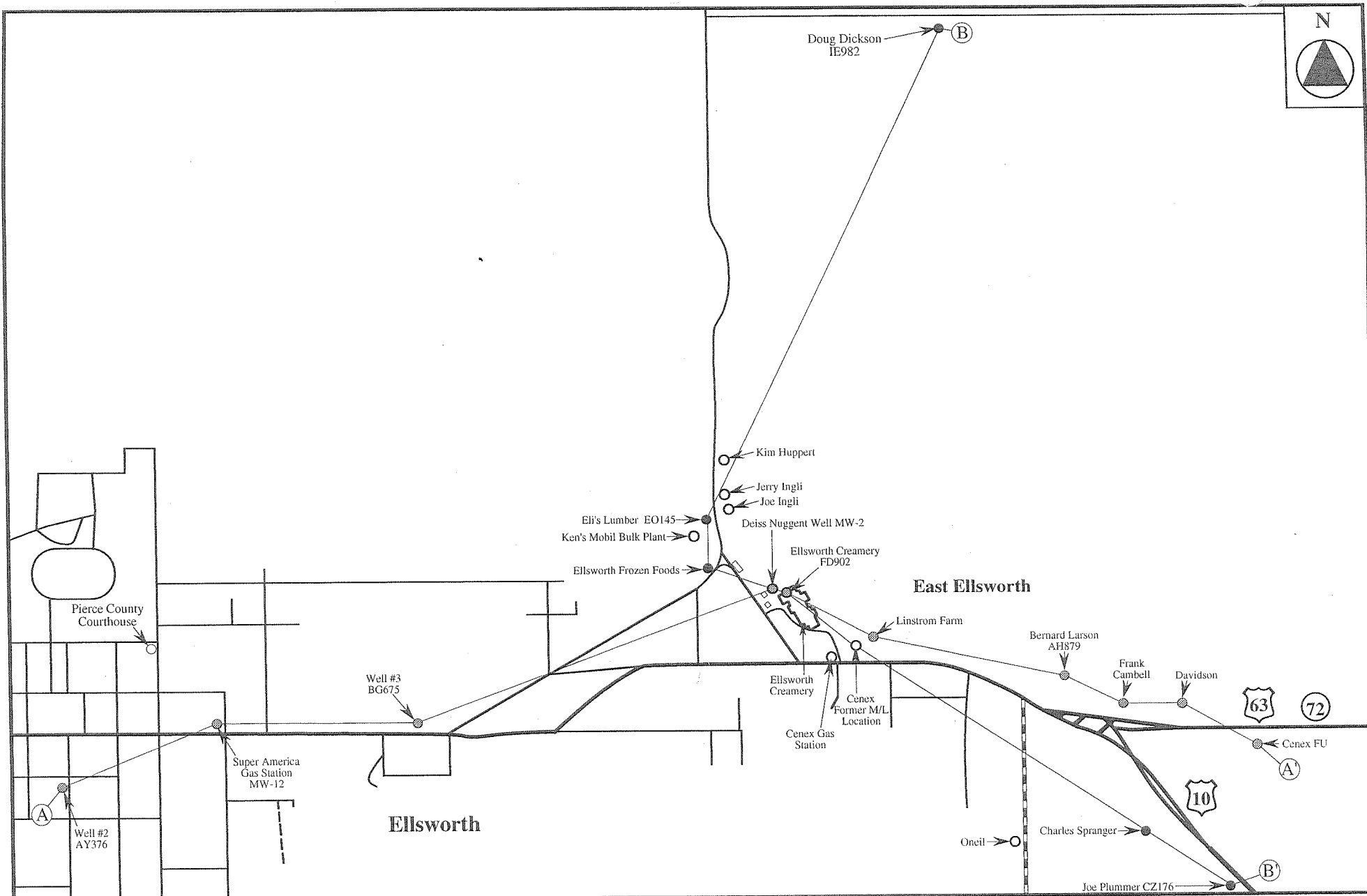
Source: USGS Ellsworth, WI 7.5' Quadrangle Map  
Scale: 1"=2,000' Contour Interval: 20 Feet

**Project Number: AG971038**

**Date: 1-6-98**

**By: RdM**





**Midwest Environmental  
Management Company**

**Deiss & Nugent Facility**  
**270 North Morse Street**  
**Ellsworth, Wisconsin**

**FIGURE 2**  
**Site Layout Map**

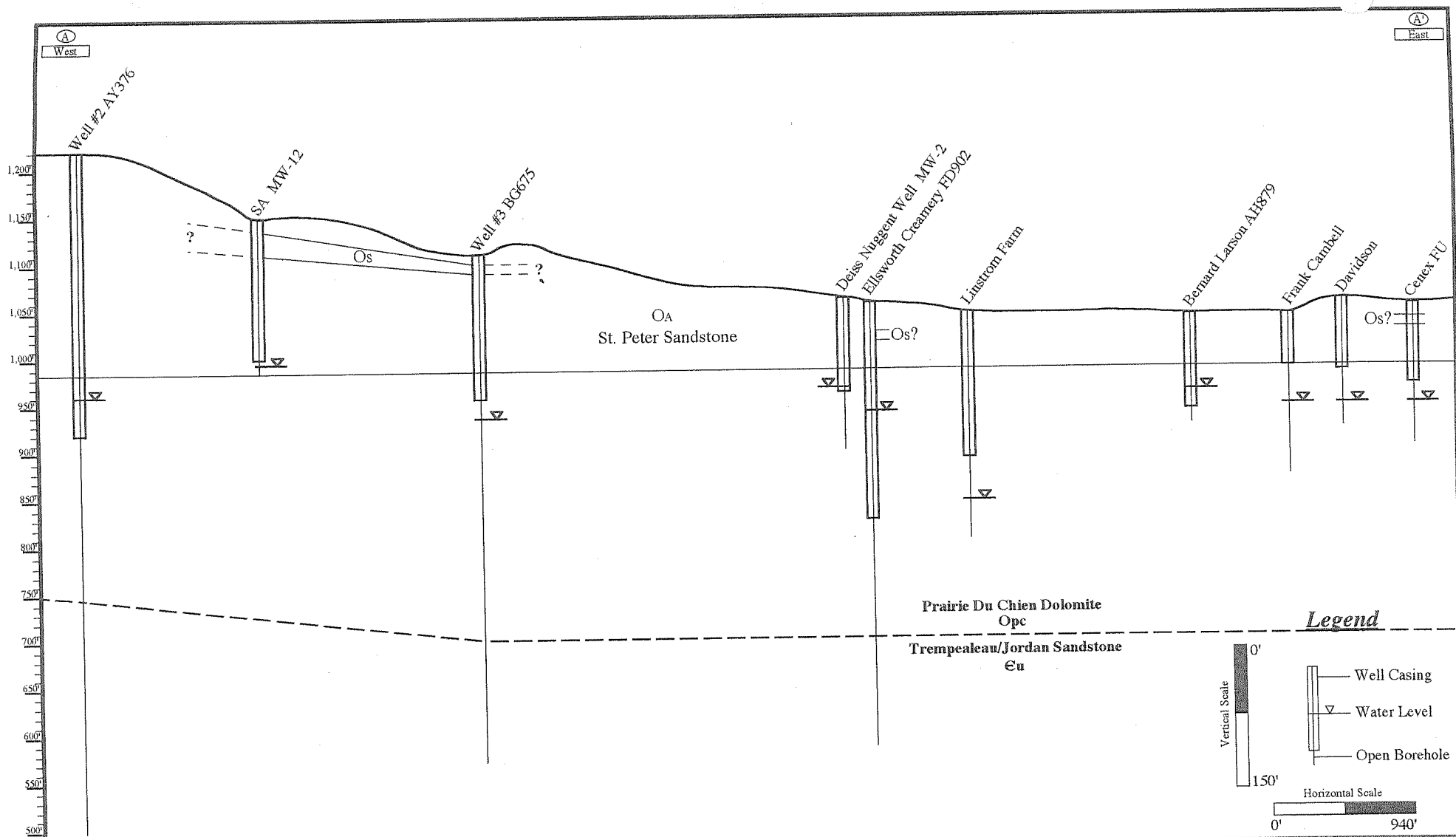
Project Number: AG971038

Date: 1-6-98

Approved By:

Prepared By: RdM





**Midwest Environmental  
Management Company**

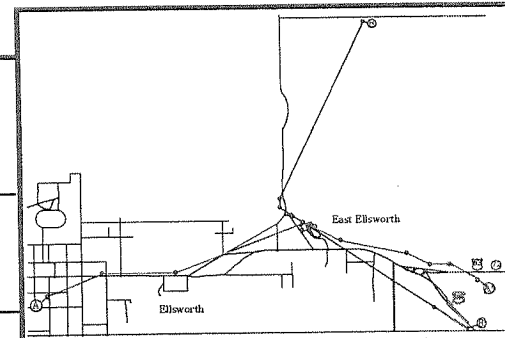
**Deiss & Nugent Feed Company, Inc.**  
270 North Morse Street  
East Ellsworth, Wisconsin

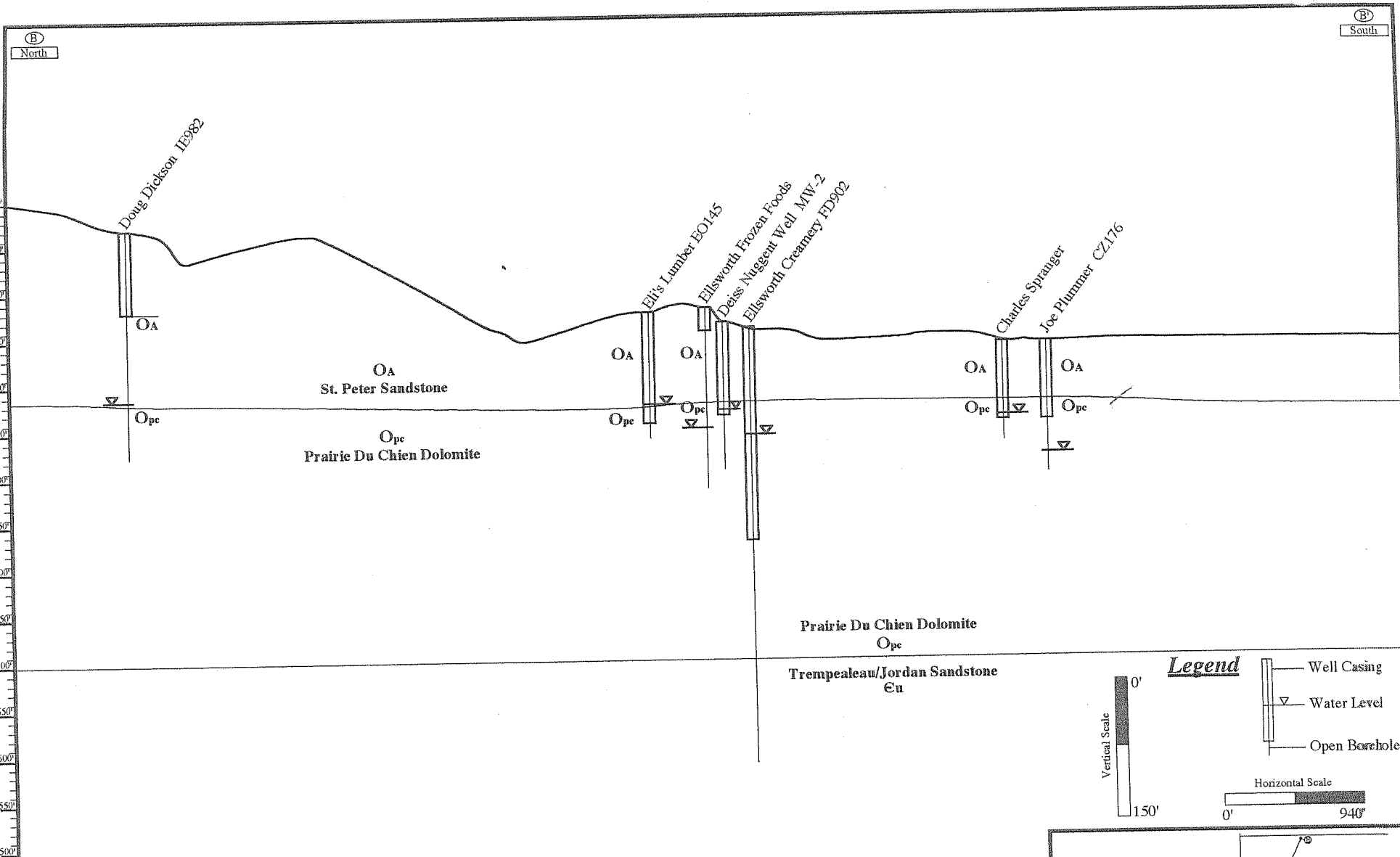
**FIGURE 3**  
**Cross Section Map A - A'**

Project Number: AG971038

Date: 12-30-97

Drawn By: RdM





**Midwest Environmental  
Management Company**

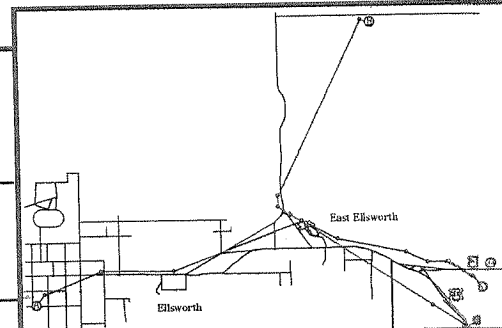
**Deiss & Nugent Feed Company, Inc.  
270 North Morse Street  
East Ellsworth, Wisconsin**

**FIGURE 4  
Cross Section Map B - B'**

Project Number: AG971038

Date: 12-30-97

Drawn By: RdM



Well Data

Well Name	Surface Elev.	GW Depth	GW Elev.	Total Depth	Depth to PDU	PDU Elev.	Status
Ellsworth Well 2 AY376	1220	-246	974	718	-225	995	Active
Ellsworth Well 3 BG675	1108	-173	935	540	-135	973	Active
Superamerica MW-12	1160	-165	995	172	-172	988	Active
Deiss & Nuggent MW-2	1062	-93	969	159	-90	972	Active
Ellsworth Frozen Foods	1090	-130	960	199	-100	990	Abandoned
Ellsworth Creamery FD902	1053	-110	943	466	-70	983	Active
Eli's Lumber EO145	1075	-103	972	135	-108	967	Active
Lindstrom (H. Campbell)	1055	-211	844	241			Unknown
Frank Campbell	1060	-113	947	172	-52	1008	Active
Bernard Larson	1040	-82	958	115	-43	997	Active
Maxine Davidson	1055	-109	946	135	-74	981	Active
Cenex (Ellsworth Farm Supply)	1050	-105	945	150	-70	980	Active
Charles Spranger	1040	-79	961	105	-62	978	Active
Doug Dickson	1175	-190	985	250	-195	980	Active
Joe Plummer CZ176	1040	-121	919	140	-62	978	Active
					Ave. PDU Elev.	983.571	
					Std. Dev.	11.0364	
Other Wells w/o const. reports							
Kim Huppert							Active
Joe Ingli							Active
Jerry Ingli							Active
O'Neil							Active

Alt ~ 1160

PROJECT NAME / LOCATION  SuperAmerica Station #4241 Ellsworth, Wisconsin	PROJECT NUMBER: 10-89-160	BORING NUMBER: MW-12	SHEET 1 OF 1
	CONTRACTOR: Mantylla Well Drilling		DRILLING METHOD: Air Rotary
	DRILLER: Bud Mantylla		DRILLING RIG: Air Rotary
	START: 9:00 AM 3-27-90		COMPLETED: 16:00 3-27-90

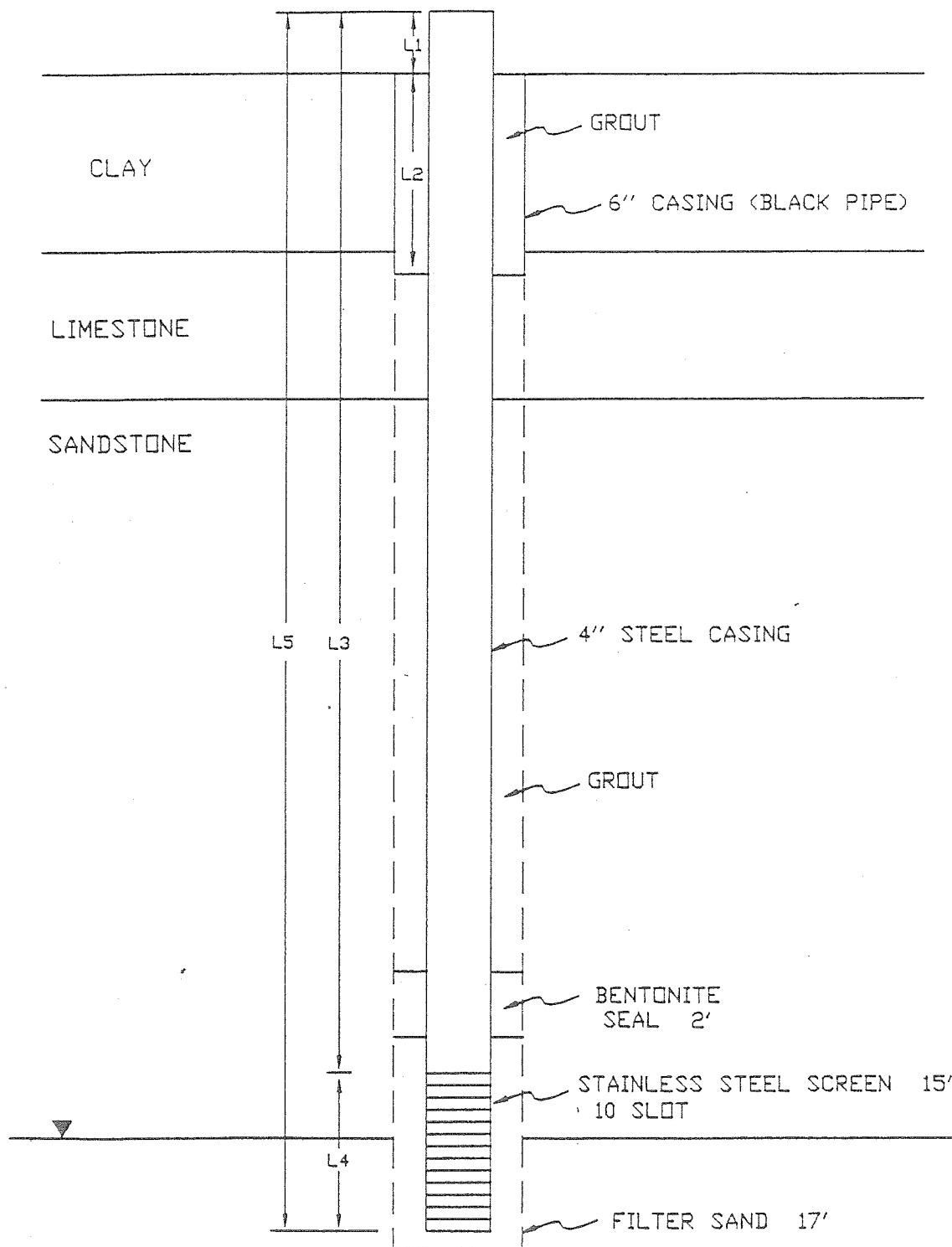
LAND OWNER: SuperAmerica Group, Inc.	SURFACE ELEVATION: 94.0 (approx.)	LOGGED BY: Scott Williams
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TYPE	S A M P L E	N U M B E R	B C L O U N T S	S I A N M T P L E (ft)	S R A E M C P O L V E (in)	DEPTH  SCALE 1"=30'	DESCRIPTIONS OF MATERIALS AND CONDITIONS	CONTAMINANT OBSERVATIONS	
								INSTRUMENT:  UNITS: None	NOTES:
				0		10	Grayish green silty clay 0-16' moist <i>Petrol odor</i>		Gasoline odor 10'-16'
				16		20	Platteville Limestone 16'-40'		
						30	Dry		
				40		40			
						50	St. Peter Sandstone 40'-162'		
						60	Tan to orange poorly cemented sandstone. Well sorted, medium grained, dry to slightly moist, 40'-166.5'		
						70			
						80	saturated at 166.5'		
						90			
						100			
						110			
						120			
						130			
						140			
						150			
						160			
				172		170			
						180	Prarie Du Chien Dolomite		
						190	End of Boring at 172'		
						200			
						210			
						220			
						230			

BOREHOLE WATER LEVEL DATA					
DATE	3-27-90	3-27-90	3-27-90		
TIME	13:30	13:45	14:00		
GWL	166.83	166.50	166.50		
CASING DEPTH	170	170	170		



Delta  
Environmental  
Consultants, Inc.



L1 = 2.5'  
 L2 = 17'  
 L3 = 155'  
 L4 = 15'  
 L5 = 170'

APPENDIX E  
 MONITORING WELL MW-12  
 CONSTRUCTION DIAGRAM  
 SUPERAMERICA #4213  
 ELLSWORTH, WISCONSIN

PROJECT NO.  
 10-89-160

PREPARED BY  
 SAW/DD

DATE  
 7/5/90

REVIEWED BY



Delta  
 Environmental  
 Consultants, Inc.

VILLAGE WELL NO. 2, ELLSWORTH, WIS.

H. T. Hagestad, Engineer

Mc Carthy Well Co., Contractors, 1940

Samples examined by F. T. Thwaites, Nos. 109707-109812

Elevation 1103

SW $\frac{1}{4}$ , SE $\frac{1}{4}$ , SW $\frac{1}{4}$ , SW $\frac{1}{4}$ , Sec 17, T26N, R17W

Alt: 1120'

S	20	0-12	12		Earth, black
		12-20	8		Dolomite, brown-gray, broken (talus)
S	115	20-125	105		Sandstone, medium to fine, light gray
		125-135	10		Sandstone, medium to fine, yel-gy; shale, gy.
		135-150	15		Dolomite, gray
L	275	150-255	105		Dolomite, light gray
		255-285	30		Dolomite, light gray and gray; chert, oolitic
		285-300	15		Dolomite, light gray
		300-305	5		Dol, lt. gy; sandstone, medium, light gray
		305-325	20		Dolomite, light gray
		325-340	15		Dolomite, gray; chert, white
		340-350	10		Dolomite, light gray
		350-395	45		Dolomite, gray
		395-410	15		Dolomite, gray sandy; shale, green
		410-415	5		Sandstone, coarse to fine, lt. gray; shale, gn
T	130	415-420	5		Sandstone, coarse to fine, lt. gray
		420-430	10		Sandstone, coarse to fine, lt. gray, dolomitic
		430-465	35		Sandstone, coarse to fine, white
		465-470	5		Sandstone, fine, light gray
		470-500	30		Siltstone, light gray, dolomitic
		500-505	5		No sample
		505-510	5		Siltstone, light gray, dolomitic
		510-540	30		Siltstone, gray, dolomitic
		540-553	13		Siltstone, green-gray, dolomitic, glauconitic

Pi-1  
New Well #3  
BEIGIS

150 E. 11th

18" pipe

17" hole

12" g.w.  
pipe  
cement

151

173 water

12" hole

Formations: Surface (drift, talus, filling); St. Peter; Lower Magnesian (Prairie du Chien or Onecota-Shakopee); Trempealeau (includes Jordan); Franconia

Tested 2 1/4 hours at 448 g.p.m. specific capacity 53.5 g.p.m.  
later struck at 132 cemented off

- ☐ Solid Waste ☐ Haz. Waste  
☐ Emergency Response ☐ Underground Tanks  
☐ Wastewater ☐ Water Resources  
☒ Other DATCP

Facility/Project Name <u>Deiss &amp; Nugent Leach Co.</u>		License/Permit/Monitoring Number		Boring Number	
Boring Drilled By (Firm name and name of crew chief) <u>Donnyl Trout Hydro-Tech</u>		Date Drilling Started <u>03/04/97</u> M M D D Y Y		Date Drilling Completed <u>03/19/97</u> M M D D Y Y	
DNR Facility Well No. <u>WI Unique Well No.</u>		Common Well Name <u>MW-2</u>		Final Static Water Level ____ Feet MSL	
				Surface Elevation ____ Feet MSL	
				Borehole Diameter <u>8 1/4</u> inches	
Boring Location State Plane _____ N. _____ E S/C/N _____ Lat _____		Local Grid Location (If applicable) _____ Feet _____ Feet		_____ N _____ E _____ S _____ W	
SW 1/4 of SE 1/4 of Section <u>17</u> , T <u>26</u> N, R <u>17</u> E/W _____		County <u>PIERCE</u>		DNR County Code <u>48</u> Civil Town/City/ or Village <u>Ellsworth</u>	

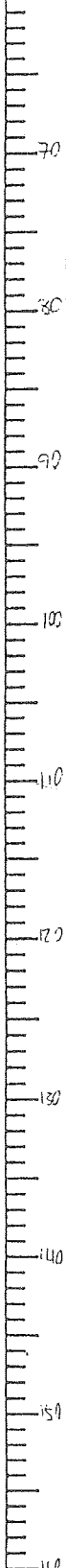
Sample		Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					ROD/ Comments
Number	Length Recovered (in)								Standard Penetration	Moisture Content	Liquid Limit	Plastic Limit	P 200	
			5	Brown silty clay, firm, plastic, moist										
			10	clayey silt, brown, friable, slightly damp										
				same as above less silt though										
				same as above										
				Brown to grey moist silty clay										
				Silty clay brown										
				same as above										
			20	Sandstone Bedrock										
				St. Peter sandstone										
				loosely cemented										
			30											
			40											
			50											
			60											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature [Signature] Firm CEDAR CORPORATION

This form is authorized by Chapters 144.147 and 162, Wis. Stats. Completion of this report is mandatory. Penalties: Forfeit not less than \$10 nor more than \$5,000 for each violation. Fined not less than \$10 or more than \$100 or imprisoned not less than 30 days, or both for each violation. Each day of continued violation is a separate offense, pursuant to ss 144.99 and 162.06, Wis. Stats.



Sample		Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments
Number	Length Recovered (in)								Standard Penetration	Moisture Content	Liquid Limit	Plastic Limit	P 200	
				<p>Bentonite Slurry</p> <p>Well Cemented</p> <p>Drillers were going to change over to mud rotary to add sidewalls from collapsing when they reached 106.00'.</p> <p>Switched over to mud rotary. Drillers lost two - 1,000 gallon batches of mud through formation without drilling past 97.0'.</p> <p>Drillers had tried to plug voids in formation with 4 bags of 3/4" chipped bentonite to no avail.</p> <p>3/14/92 Drillers set 4 inch steel casing into bedrock at 109.0' Then drilled with 4 inch trimcone with aim to lift cuttings. Drillers completed hole to 159.0 feet bss</p> <p>E.O. 3 @ 159.0'</p>			<p>4" (1 1/4" METR) STEEL CASING</p> <p>3/4" inch chipped bentonite</p> <p>OPEN BORE HOLE</p>							

Facility/Project Name <u>DeSS &amp; August Feed Co.</u>	Local Grid Location of Well _____ ft. <input type="checkbox"/> N _____ ft. <input type="checkbox"/> E _____ ft. <input type="checkbox"/> S _____ ft. <input type="checkbox"/> W	Well Name <u>MW-2</u>
Utility License, Permit or Monitoring Number _____	Grid Origin Location Lat. _____ Long. _____ or _____	Wis. Unique Well Number _____ DNR Well Number _____
Type of Well Water Table Observation Well <input checked="" type="checkbox"/> 11 Piezometer <input type="checkbox"/> 12	Section Location of Waste/Source SW 1/4 of SE 1/4 of Sec. 17, T. 26 N, R. 17 <input checked="" type="checkbox"/> E. W.	Date Well Installed <u>3</u> / <u>19</u> / <u>97</u> m m d d y y
Distance Well Is From Waste/Source Boundary _____ ft.	Location of Well Relative to Waste/Source u <input type="checkbox"/> Upgradient s <input type="checkbox"/> Sidegradient d <input type="checkbox"/> Downgradient n <input checked="" type="checkbox"/> Not Known	Well Installed By: (Person's Name and Firm) <u>Danny I</u> <u>TRAUT HYDRO-TECH</u>
Is Well A Point of Enforcement Std. Application? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

A. Protective pipe, top elevation _____ ft. MSL	1. Cap and lock? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
B. Well casing, top elevation _____ ft. MSL	2. Protective cover pipe: a. Inside diameter: _____ in. b. Length: _____ ft. c. Material: Steel <input checked="" type="checkbox"/> 0.4 Other <input type="checkbox"/> _____
C. Land surface elevation _____ ft. MSL	d. Additional protection? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes, describe: <u>2 Bumper Posts</u>
D. Surface seal, bottom _____ ft. MSL or <u>5.0</u> ft.	3. Surface seal: Bentonite <input checked="" type="checkbox"/> 3.0 Concrete <input type="checkbox"/> 0.1 Other <input type="checkbox"/> _____
12. USCS classification of soil near screen: GP <input type="checkbox"/> GM <input type="checkbox"/> GC <input type="checkbox"/> GW <input type="checkbox"/> SW <input type="checkbox"/> SP <input type="checkbox"/> SM <input type="checkbox"/> SC <input type="checkbox"/> ML <input type="checkbox"/> MH <input type="checkbox"/> CL <input type="checkbox"/> CH <input type="checkbox"/> Bedrock <input checked="" type="checkbox"/>	4. Material between well casing and protective pipe: Bentonite <input type="checkbox"/> 3.0 Annular space seal <input type="checkbox"/> _____ Other <input type="checkbox"/> <u>NONE</u>
13. Sieve analysis attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	5. Annular space seal: a. Granular Bentonite <input type="checkbox"/> 3.3 b. _____ Lbs/gal mud weight ... Bentonite-sand slurry <input type="checkbox"/> 3.5 c. <u>9</u> Lbs/gal mud weight ... Bentonite slurry <input checked="" type="checkbox"/> 3.1 d. _____ % Bentonite ... Bentonite-cement grout <input type="checkbox"/> 5.0 e. <u>21</u> Ft <sup>3</sup> volume added for any of the above
14. Drilling method used: Rotary <input checked="" type="checkbox"/> 5.0 Hollow Stem Auger <input type="checkbox"/> 4.1 Other <input type="checkbox"/> _____	f. How installed: Tremie <input type="checkbox"/> 0.1 Tremie pumped <input checked="" type="checkbox"/> 0.2 Gravity <input type="checkbox"/> 0.8
15. Drilling fluid used: Water <input type="checkbox"/> 0.2 Air <input checked="" type="checkbox"/> 0.1 Drilling Mud <input checked="" type="checkbox"/> 0.3 None <input type="checkbox"/> 9.9	6. Bentonite seal: a. Bentonite granules <input type="checkbox"/> 3.3 b. <input type="checkbox"/> 1/4 in. <input checked="" type="checkbox"/> 3/8 in. <input type="checkbox"/> 1/2 in. Bentonite pellets <input type="checkbox"/> 3.2 c. _____ Other <input type="checkbox"/> _____
16. Drilling additives used? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Describe _____	7. Fine sand material: Manufacturer, product name & mesh size a. _____ b. Volume added _____ ft <sup>3</sup>
17. Source of water (attach analysis): <u>City of Ellsworth</u>	8. Filter pack material: Manufacturer, product name and mesh size a. _____ b. Volume added _____ ft <sup>3</sup>
E. Bentonite seal, top _____ ft. MSL or <u>85.0</u> ft.	9. Well casing: Flush threaded PVC schedule 40 <input type="checkbox"/> 2.3 Flush threaded PVC schedule 80 <input type="checkbox"/> 2.4 <u>4" welded steel</u> Other <input checked="" type="checkbox"/> _____
F. Fine sand, top _____ ft. MSL or <u>N/A</u> ft.	10. Screen material: <u>open borehole</u> a. Screen type: Factory cut <input type="checkbox"/> 1.1 Continuous slot <input type="checkbox"/> 0.1 Other <input type="checkbox"/> _____
G. Filter pack, top _____ ft. MSL or <u>N/A</u> ft.	b. Manufacturer _____ c. Slot size: _____ in. d. Slotted length: _____ ft.
H. Screen joint, top _____ ft. MSL or <u>N/A</u> ft.	11. Backfill material (below filter pack): None <input type="checkbox"/> 1.4 Other <input type="checkbox"/> _____
I. Well bottom _____ ft. MSL or <u>N/A</u> ft.	
J. Filter pack, bottom _____ ft. MSL or <u>N/A</u> ft.	
K. Borehole, bottom _____ ft. MSL or <u>159.0</u> ft.	
L. Borehole, diameter <u>8.0</u> in.	
M. O.D. well casing <u>4.50</u> in.	
I.D. well casing <u>4.03</u> in.	

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature [Signature] Firm CEDAR CORPORATION

T. 26 N., R. 17 W.

SECT. 17  
NW, SE, SE

PIERCE

Pi-46  
USGS

Well at Ellsworth Cooperative Creamery, Ellsworth, Wis.

McCarthy Well Co., 1944 Copy from State Board of Health

Well is about 55 ft. lower than city well of 1940

Thickness Depth

Blue clay	15	15
Sandrock	20	35
Limerock	10	45
Sandrock	20	65
Limerock	3	68
Sa ndrock	7	75
Limerock	45	120
Lime and sandrock	40	160
Limerock	145	305
Sandrock	95	400
Limerock	25	425
Sandrock	15	440
Limerock	25	465
Shale	1	466

Tested 3 hours at 200 g.p.m. Static level 110 ft. Pumping level 114 ft.  
Specific capacity = 50 g.p.m.

20" hole to 95 filled with cement 12" pipe to 95, 12" hole below

Additional Groundwater Investigation Report

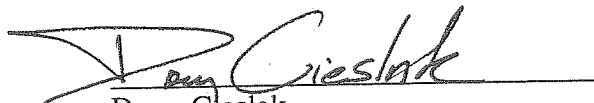
Deiss & Nugent Feed Company  
East Ellsworth, Wisconsin

December 3, 1998  
By METCO


Job #R-98-483  
WDATCP File Reference: DATCP Case #93409110301



This document was prepared by:

  
Doug Cieslak  
Hydrogeologist



  
Ronald J. Anderson, P.G.  
Senior Hydrogeologist/Project Manager

Equipment Sales, Service, Design and Installation of Fuel Equipment  
Environmental Consulting

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# Additional Groundwater Investigation Report Deiss & Nugent Feed Company

## INTRODUCTION

### Purpose

An Agricultural Chemical Investigation is required by the Wisconsin Department of Agriculture, Trade and Consumer Protection (WDATCP) by authority of Section 94.73 of the Wisconsin Statutes.

This work was conducted in accordance with a workplan approved by WDATCP on March 26, 1998, and implemented on April 20 and July 10, 1998.

This report presents interpretations of data collected from the video logging, packer tests, and shallow monitoring well construction conducted at the Deiss & Nugent Feed Company site. The purpose of this work was to: 1) Determine the vertical distribution of agricultural chemicals in the bedrock aquifer beneath the site and 2) determine if groundwater existed above the bedrock interface.

### Scope of Services

The work scope performed by METCO for this project included the following:

- 1) Collected and review site background information.
- 2) Review and interpret data collected from video logging and packer test project.
- 3) Observe and document the installation of one shallow monitoring well (MW-3).
- 4) Prepared a report summarizing the above activities.

The work conducted by METCO did not include any long-term environmental monitoring, produce hazardous discharges, or cause any potential contamination to our knowledge.

### Subcontractors

Katalyst Analytical Technologies, Inc.  
8901 N. Industrial Rd.  
Peoria, IL 61615-1581  
(309) 589-8000

Boart Longyear  
P.O. Box 109  
101 Alderson Street  
Schofield, WI 54476  
(715) 359-7090

Bergerson Caswell, Inc.  
5115 Industrial Street  
Maple Plain, MN 55359  
(612) 479-3121

METCO

La Crosse, WI (608)781-8879 Hillsboro, WI (608)489-2198

**Additional Groundwater Investigation Report  
Deiss & Nugent Feed Company**

**GENERAL AND BACKGROUND INFORMATION**

**Client/Contact**

Mr. Mike Lansing, President  
Deiss & Nugent Feed Company  
P.O. Box 69  
270 North Morse Street  
East Ellsworth, WI 54010  
(715) 273-5066

**Site Location**

270 North Morse Street  
East Ellsworth, WI 54010  
Village of Ellsworth

Latitude and longitude:  
44 44' 8" N and 92 27' 53" W

Township/Range:  
SW 1/4, SE 1/4, Section 17, Township 26 North, Range 17 West, Pierce County

**Site Background**

The property has been used as a retail agribusiness since the 1950's, supplying crop protection and agricultural feed services to the surrounding agricultural community.

The facility has bulk storage of liquid and dry fertilizer, non-bulk and bulk pesticides.

In 1993, a Groundwater Investigation was conducted by the WDATCP to determine the source of agricultural chemical impacts in the two Village of Ellsworth Municipal wells. On November 15, 1993, soil samples were collected by WDATCP in the area of fertilizer and pesticide storage areas. The highest concentrations of agricultural chemicals detected were 44.8 mg/kg Nitrate + Nitrite-N, 1.61 mg/kg Atrazine, 4.4 mg/kg Alachlor, 11.4 mg/kg Metolachlor, and 4.2 mg/kg Pendimethalin. Based on this information, the WDATCP required an Agricultural Chemical Investigation to be conducted at this site.

There appears to be several unrelated former or existing agricultural chemical mixing and loading sites within one mile to the Deiss & Nugent facility. According to a November 3, 1993, WDATCP Groundwater Investigation form, an old mix/load site maybe located near the Ellsworth Farmers Union Coop Feedmill located on State Highway 10 approximately 750 feet south of the Deiss & Nugent facility. Ellsworth Farmers Union operates a mix/load facility approximately 2/3 of a mile east of the Deiss & Nugent facility on State Highway 63. We are not aware of environmental status of these sites.

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# Additional Groundwater Investigation Report Deiss & Nugent Feed Company

## Topography and Regional Setting

According to the USGS Hydrologic Atlas, the Deiss & Nugent Feed Company is located in the south-central portion of the St. Croix River Basin. This area lies between the Rush and Trimble Rivers and contains numerous closed depression karst features.

The elevation of the site is approximately 1,060 feet above Mean Sea Level (MSL). See Appendix A for site location.

## Soil/Bedrock

Soil/Bedrock samples were described by METCO field personnel. Assisting literature included the Soil Survey of Pierce County and Hydrologic Atlas of the St. Croix River Basin.

Soils in the area have been classified at Fayeete silt loam benches, 0-6% slopes. This soil is described as being deep, well drained, and friable. The subsurface unconsolidated materials in this area most likely have a glacial ground moraine or loess origin. It is also possible that the existing unconsolidated material could be an in-situ remnant of weathered sandstone and/or limestone.

Since only one boring was conducted during this scope of work, the following is a general summary of area associated with MW-3:

- From surface to approximately 20 feet below ground surface exists a brown, very fine to coarse grained, clayey silt to silty clay till. The origin of this till was reportedly brought in from the Ellsworth County Courthouse during a construction event at the courthouse.
- From approximately 20-25 feet below ground surface exists a brown to orange silty sand with some concrete debris.
- From approximately 25- 29 feet below ground surface exists brown to yellow to white sand with some silt seams and larger clasts of chert and quartz believed to be weathered sandstone.

No other characteristics concerning the local sediments such as structures, voids, layering, lenses, or secondary permeability were observed during the construction of MW-3.

Please note that this is a generalization of the existing stratigraphy and may not be consistent throughout the entire site area.

## Hydrology

The nearest surface water to the subject property is a local ephemeral stream, Isabelle Creek, located approximately 100 feet to the east of MW-3.

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# Additional Groundwater Investigation Report

## Deiss & Nugent Feed Company

### Hydrogeology

According to data collected from MW-2, groundwater exists approximately 91 feet below ground surface.

MW-3 was installed to determine the presence or absence of perched groundwater in that area. At the time of installation, MW-3 was dry. The well was checked again on September 29, 1998, and the well was dry. Based on this information, it would appear that perched groundwater does not exist in the area of MW-3.

### ANALYTICAL RESULTS

#### Packer Test Project

On April 20, 1998, four groundwater samples were collected and analyzed for nitrate+nitrite as nitrogen, ammonia, atrazine, alachlor, cyanazine and metolachlor. Three samples were collected from MW-2 and one sample was collected from the Ellsworth Creamery well (WUWN FD902).

MW-2 Test #1 was collected over open portion of the borehole between 103 to 117 feet below ground surface. MW-2 Test #2 was collected over the open portion of the borehole between 122 to 135 feet below ground surface. MW-2 Test #3 was collected over the open portion of the borehole between 139 to 159 feet below ground surface.

Groundwater samples exceeded the NR140 Groundwater Enforcement Standards (ES) in Test #1 (5.0 ug/l atrazine, 24.7 mg/l nitrate+nitrite as N), Test #2 (14.1 mg/l nitrate+nitrite as N), and Test #3 (3.1 ug/l atrazine, 19.5 mg/l nitrate+nitrite as N). While concentrations of agrichemicals slightly decreased with depth, the data does not support any obvious vertical pattern or distribution of contaminants.

Other laboratory detections that exceed the NR140 Preventative Action Limit (PAL) were found in groundwater samples from Test #1 (alachlor 0.91 ug/l, metolachlor 3.5 ug/l), Test #2 (atrazine 1.0 ug/l), and Test #3 (0.57 ug/l alachlor, 2.6 ug/l metolachlor). The Ellsworth Creamery Well (WUWN FD902) had detection of nitrate+nitrite as N, though did not exceed an NR140 PAL or ES. *Good!*

Groundwater analytical data is presented in tabular form in Appendix D.

### SAMPLING METHODS AND PROCEDURES

#### Video Logging Project

On April 20, 1998, a down-hole black and white video camera was lowered into MW-2 to record images from the casing and open borehole of the well. The purpose of the video logging of the well was: 1) to determine which portions of the borehole could provide an optimum seal for performing the packer tests and 2) to determine the geologic nature of the aquifer materials that the borehole intersects.

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## **Additional Groundwater Investigation Report**

### **Deiss & Nugent Feed Company**

Based on the results of the video logging it is believed the open portion of the borehole consists of multiple layers of fractured and non-fractured bedrock. Consistent with other geologic descriptions in the area, the geologic formation encountered likely represent the Lower Magnesian or Prairie Du Chien Formation. The Prairie Du Chien Formation can be described as a gray to light gray dolomite. Locally it has been described as containing interbedded layers of sandstone.

The video logging was completed by Bergerson Caswell, Inc. of Maple Plain, Minnesota. The equipment consisted of a van-mounted hoist used to lower a 4 inch diameter black and white video camera. The video recorded depth below ground surface measurements every 1 foot as it descended and ascended the well. The video clearly depicts the fractured nature of the aquifer and the condition of the well casing and open borehole.

All down-hole equipment was decontaminated with agrichemical-free water prior to begin this project.

An interpretation of the video log is presented in Appendix C. A copy of the video tape has been delivered to WDATCP for their records.

#### **Packer Test Sampling**

On April 20, 1998, three individual packer tests were performed at separate intervals on MW-2. The purposes of the tests were: 1) to determine agrichemical concentrations of individual intervals of the aquifer and 2) to determine if the head in the well represented watertable conditions or a significant pressure head from a lower confining portion of the aquifer. Based on the results of those test it was determined that observed head in MW-2 likely represents water-table conditions. Packer test data is presented in Appendix C.

The procedure consisted of lowering single and double Aardvark Corp. inflatable packer assemblies into the well attached to 2 inch steel piping. A Grundfos submersible pump was hung inside a perforated section of steel pipe 2.5 feet above the lower packer. The packer(s) were inflated with inert nitrogen gas to >100 psi to seal off specific portions of the saturated open borehole.

Groundwater measurement were obtained before, during, and after each test to assess the impact of the groundwater pumping. After the packer(s) were properly inflated, the selected interval was pumped at approximately three gallons per minute. Approximately three borehole volumes of groundwater were removed from each interval before sampling. Head measurements during the pumping of Test #1 indicated 0.1 feet of drawdown. Head measurements during the pumping of Test #2 indicated 0.2 feet of drawdown. Head measurements during the pumping of Test #3 indicated no observable drawdown.

All down-hole equipment was decontaminated with agrichemical-free water prior to beginning this project.

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## **Additional Groundwater Investigation Report**

### **Deiss & Nugent Feed Company**

Groundwater samples were collected while the pump was running from the end of the hose attached to the pump. Ammonia groundwater samples were preserved with sulfuric acid and maintained at approximately 4 degrees celsius. Nitrate+Nitrite as N and herbicide groundwater samples were collected in unpreserved containers and maintained at 4 degrees celsius.

The only problem encountered during this project was during setting up of Test #3. Due to the tortuosity of the borehole at depth, an air line supplying nitrogen gas to the packer was severed while attempting to position it at the desired interval (139-141 feet below ground surface). Because of this problem, the second attempt required the packer to be set at 137-139 feet below ground surface.

#### **Ellsworth Creamery Well Sampling**

On April 20, 1998, the Ellsworth Creamery Well (WUWN FD902) was sampled for agrichemicals. The creamery routinely uses between 175,000 to 200,000 gallons of water daily for production purposes. The well had been in use prior to sample collection and therefore no additional purging of the well was conducted. The groundwater samples were collected at the first sampling point adjacent to the wellhead. Ammonia groundwater samples were preserved with sulfuric acid and maintained at approximately 4 degrees celsius. Nitrate+Nitrite as N and herbicide groundwater samples were collected in unpreserved containers and maintained at 4 degrees Celsius.

#### **Drilling Project Sampling**

On July 10, 1998, a boring was advanced and completed as a monitoring well by Boart Longyear of Schofield, Wisconsin, under the supervision of METCO personnel. The well was installed in accordance with WDATCP requested specifications. Using a truck-mounted auger drill rig, the boring was completed in accordance with ASTM D-1452, "Soil Investigation and Sampling by Auger Boring," using 4.25-inch, inside-diameter (ID) augers. Soil sampling was conducted in accordance with ASTM D-1586 "Penetration Tests and Split-Barrel Sampling of Soils" using a 2-inch, outside-diameter (OD) 2.5-foot split spoon sampler. Using this procedure, a split spoon sampler is driven into the soil by a 140 pound weight falling 30 inches. Split spoon geotechnical samples were collected at 2.5-foot increments to the end of the boring (29 feet).

Field observations such as soil characteristics and blow counts were noted throughout the drilling process. No analytical samples were collected. The Soil Boring Log for this boring is presented in Appendix E.

#### **Monitoring Well Installation**

Monitoring well installation was completed by Boart Longyear under the supervision of METCO personnel and done in accordance with Wisconsin Department of Natural Resources Chapter NR141, "Groundwater Monitoring Well Requirements." The monitoring well was constructed of flush threaded, 2-inch inside-diameter schedule 40

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## **Additional Groundwater Investigation Report Deiss & Nugent Feed Company**

polyvinyl chloride (PVC) piping and a fifteen foot well screen with 0.010-inch slots. Uniform washed sand was installed around the well screens to serve as a filter pack. Bentonite was used above the filter pack to provide an annular space seal.

An eight inch outside diameter borehole was advanced to weathered sandstone, 27 feet below ground surface. The borehole was backfilled with 3/8 inch chipped bentonite, then hydrated to 25 feet below ground surface. Following the bentonite, the borehole was backfilled with 2 feet of filter pack sand. The monitoring well was installed to a depth of 23 feet below ground surface. Uniform washed sand was installed around the well screen to serve as a filter pack. Bentonite was used above the filter pack to provide an annular space seal.

The well was finished with approximately 3.5 feet of PVC casing protruding above ground surface and a locking watertight cap. Two bumper posts were installed to provide protection from vehicular damage. No water was present in the well one hour after installation. No water was present in the well on September 29, 1998. A Monitoring Well Construction form and Well Inventory Form for this well is presented in Appendix E.

### **QUALITY CONTROL AND ASSURANCE**

#### **Laboratory Certification**

Katalyst Analytical Technologies, Inc..  
WDNR Certification # 999871840

#### **Sampling and Transportation Quality Control**

Equipment advanced into the subsurface was cleaned between sampling locations. Cleaning consisted of washing with a biodegradable alconox solution and rinsing with potable water. Disposable equipment was not cleaned, but immediately disposed of after use.

### **INVESTIGATIVE WASTES**

All purge water removed from MW-2 was pumped into a mobile storage tank and used for routine agrichemical applications. Drill cuttings for the construction of MW-3 were placed in two 55 gallon DOT barrels and sealed. The drill cuttings will be landspead during the soil remediation phase of this project.

### **CONCLUSIONS**

The video log illustrates fractured bedrock within the open borehole of MW-2 between 103 and 159 feet below ground surface. This evidence confirms the presence of a carbonate formation that would be likely classified as the Lower Magnesian or Prairie Du Chien Formation.

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## Additional Groundwater Investigation Report Deiss & Nugent Feed Company

The results of the packer test pumping suggests that the groundwater elevation observed in MW-2 (approximately 91 feet below ground surface) likely represents water table conditions. Relatively similar groundwater elevations are observed in nearby private wells constructed similarly to MW-2.

Analytical results from the packer tests show low level detects of agrichemicals with NR140 exceedences in all three tests. Similar concentrations of agrichemicals were observed in a previous sample collected from this well. The data from the packer tests do not illustrate an obvious vertical pattern or distribution of contaminates.

Analytical results from the sampling of the Ellsworth Creamery well (WUWN FD902) showed no NR140 exceedences. No herbicides were detected and low concentrations of nitrate + nitrite as N were reported.

A monitoring well, MW-3, was installed to a depth of 23 feet below ground surface in accordance with WDATCP requested specifications. The well was installed on north end of the subject property to investigate the presence or absence of perched groundwater. To date, no water has come into the well.

### RECOMMENDATIONS

Due to the possibility of downward vertical groundwater movement in the area of the subject property, METCO recommends the reconstruction or abandonment of MW-2 to eliminate the potential for vertical migration of agrichemical impacted groundwater into lower portions of the aquifer. Due to the non-existence of groundwater in MW-3, METCO recommends the abandonment of this well. *yes!*  
*NO!*

Due to presence of agrichemicals in groundwater beneath the subject property, METCO recommend the following: 1) monitoring the Ellsworth Creamery well (WUWN FD902) annually for Nitrate + Nitrite as N and SDWA Method 507, which include those compounds previously detected in MW-2 and 2) implementing a soil remediation plan in late summer 1999. The soil remedy will likely involve excavation and landspreading of agrichemical impacted soil.

### STANDARD OF CARE

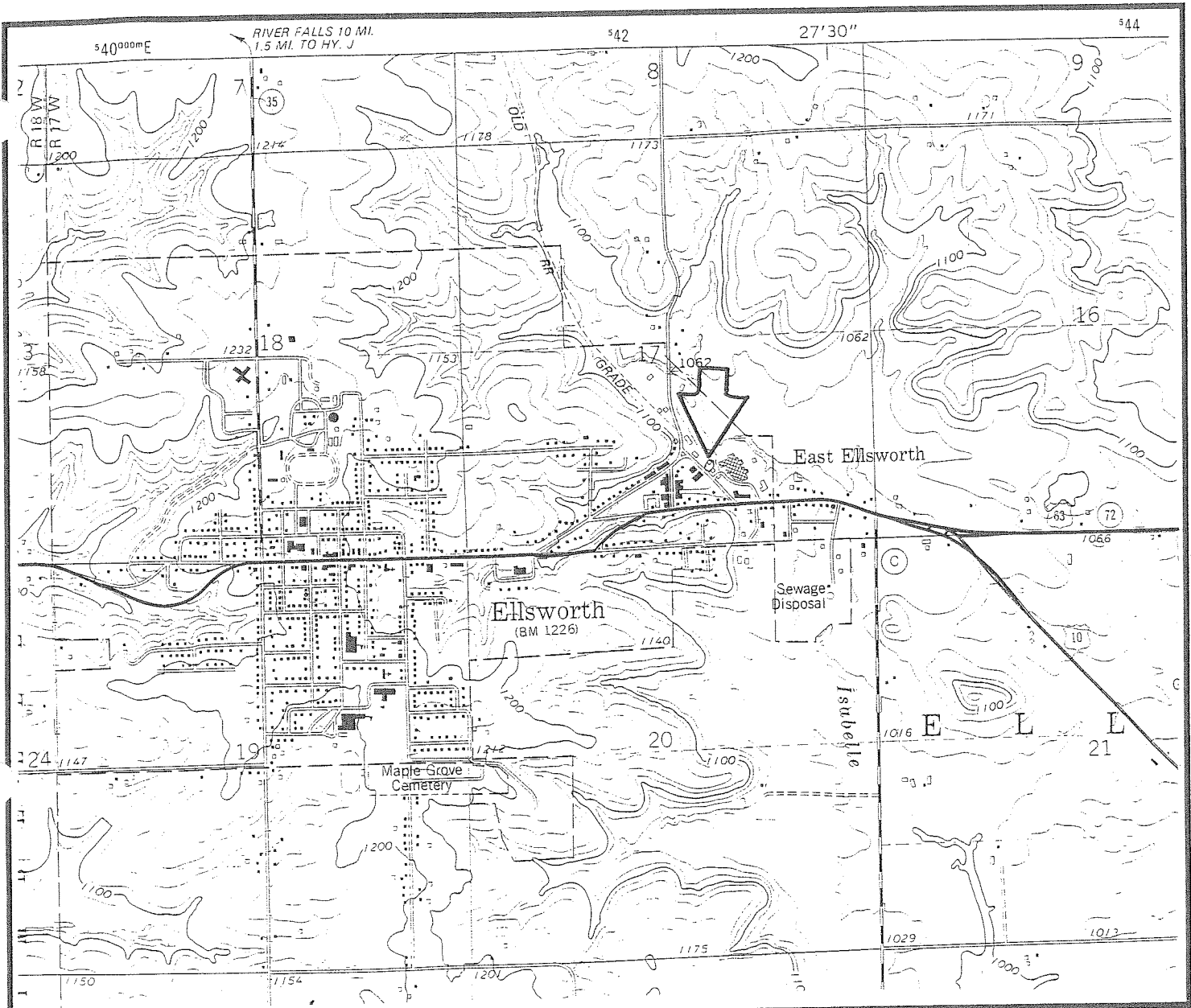
The analysis and conclusions expressed in this report are based upon data obtained from the indicated subsurface locations and from other sources discussed in this report. Actual subsurface conditions may vary and may not become evident without further assessment.

All work conducted by METCO is in accordance with currently accepted hydrogeologic and engineering practices and they neither imply nor intend warranty.

We appreciate the opportunity to be of service to you. If you have any questions or require additional information, please do not hesitate to contact us.

METCO

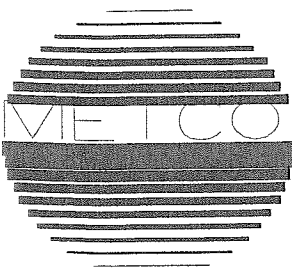
La Crosse, WI (608)781-8879 Hillsboro, WI (608)489-2198



## SITE LOCATION MAP

DEISS & NUGENT FEED COMPANY

270 NORTH MORSE STREET, EAST ELLSWORTH, WISCONSIN

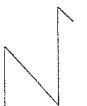


520 FISHERMAN'S ROAD  
LA CROSSE, WI 54603  
608/ 781-8879  
608/ 781-8893 FAX

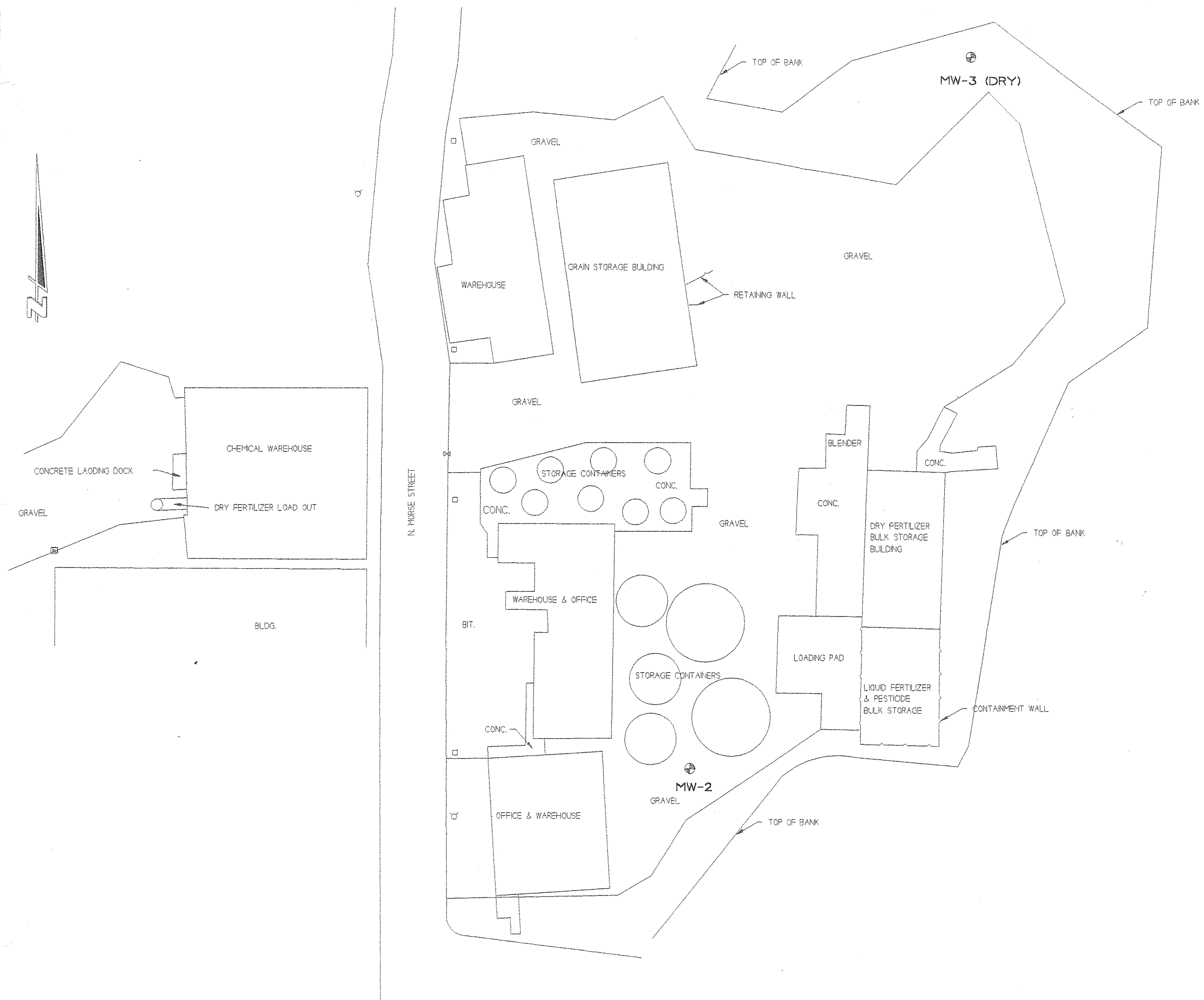
PO BOX 448  
ENTERPRISE DRIVE  
HILLSBORO, WI 54634  
608/ 489-2198  
608/ 489-2389

ELLSWORTH QUADRANGLE  
7.5 MINUTE SERIES

1 INCH = 2,000 FEET



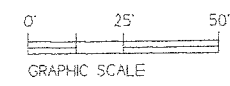




SITE LAYOUT MAP	
DEISS & NUGENT FEED CO. EAST ELLSWORTH, WISCONSIN	
METCO 2000 E. ELLSWORTH AVE. EAST ELLSWORTH, WI 54924 TEL: 920-855-1111 FAX: 920-855-1112	SCALE: 1 INCH=50 FEET DRAWN BY: DC DATE: 1/18/98 JOB NO: R-98-483/C720

NOTE: BASE MAP PRODUCED BY CEDAR CORPORATION

⊕ MONITORING WELL LOCATION



80  
FEET  
BGS.  
85  
90  
95  
100  
105  
110  
115  
120  
125  
130  
135  
140  
145  
150  
155  
160

# VIDEO LOG AND PACKER TESTS MW-2

DEISS & NUGENT FEED CO.  
EAST ELLSWORTH, WISCONSIN

METCO

520 FISHERMAN'S ROAD  
LA CROSSE, WI 54603  
608/ 78-8870  
608/ 78-8823 FAX  
PO BOX 448  
ENTERPRISE DRIVE  
MILLSBORO, WI 54634  
608/ 489-2388  
608/ 489-2389

DRAWN BY: DC  
DATE: 11/18/98  
JOB NO.: R-98-483/C720

117-119 2 FT. INFLATABLE PACKER LOCATION

103 BOTTOM OF 6" STEEL CASING  
103-107 BOREHOLE SMOOTH WITH SMALL CIRCULAR OPENINGS

107 DIFFERENTIAL RESISTANCE HORIZONTAL OPENING OR  
FRACTURE POSSIBLE BEDDING SURFACE

TEST #1 SAMPLE INTERVAL  
91-117 FEET BGS.  
0.91 UG/L ALACHLOR  
5.0 UG/L ATRAZINE  
3.5 UG/L METOLACHLOR  
4.0 UG/L CYANAZINE  
24.7 MG/L NO3 + NO2  
0.32 MG/L NH3

109 IRREGULAR BOREHOLE WITH >3" IRREGULAR OPENINGS  
110 BOREHOLE ROUGH WITH ANGULAR FRACTURES IN HORZ.  
WITH >3" OPENINGS  
112 SAME AS ABOVE WITH 12" IRREGULAR OPENING

113-116.5 VERY SMOOTH BOREHOLE

117-119

119-120 DIFFERENTIAL RESISTANCE POSSIBLE BEDDING PLANES  
120-123 SMOOTH BOREHOLE WITH FEWER BEDDING PLANES

120-122

123-125 ROUGH BOREHOLE WITH BEDDING PLANE @125

125-127 IRREGULAR BOREHOLE WITH FRACTURES IN THE  
HORZ. AND VERT.

TEST #2 SAMPLE INTERVAL  
122-135 FEET BGS.  
0.5 UG/L ALACHLOR  
1.0 UG/L ATRAZINE  
0.68 UG/L METOLACHLOR  
4.0 UG/L CYANAZINE  
14.1 MG/L NO3 + NO2  
4.2 MG/L NH3

127-128 SMOOTH BOREHOLE  
128.5-130 BEDDING PLANE DIFFENTIAL RESISTANCE

130-133 SMOOTH BOREHOLE  
133 SAME AS ABOVE WITH <3" CIRCULAR OPENINGS  
134-136 ROUGH BOREHOLE POSSIBLY LESS CEMENT  
136 SAME AS ABOVE WITH <3" OPENINGS

135-137

137-138 IRREGULAR BOREHOLE WITH >3" IRREGULAR OPENINGS

137-139

139-140 VERY SMOOTH BOREHOLE WITH <3" CIRCULAR OPENINGS  
140-141 SAME AS ABOVE WITH TRANSITION TO ROUGH BOREHOLE

142 ANGULAR FRACTURING >3" OPENINGS

143 VERY SMOOTH BOREHOLE WITH NO OPENINGS  
144 BOREHOLE BECOMING ROUGHER WITH SMALL OPENINGS  
144-145 SAME AS ABOVE WITH GREATER NUMBER AND  
SIZE OF OPENINGS

146 BOREHOLE ROUGHER CLEAR TRANSITION MANY SMALL  
ANGULAR OPENINGS

147 SAME AS ABOVE WITH 1 >3" IRREGULAR OPENING AND  
ANGULAR FRACTURES IN THE HORIZ.

148 BEDDING PLANES IN A SMOOTH BOREHOLE

149 ROUGH BOREHOLE

150 SMOOTH BOREHOLE WITH <1" OPENINGS

151-152 IRREGULAR BOREHOLE WITH MANY OPENINGS

AND ANGULAR FRACTURES

152-155 SMOOTHER BOREHOLE WITH MANY OPENINGS

BEDDING PLANE AT 154

155-157 SAME AS ABOVE WITH >3" OPENINGS

157-158 VERY IRREGULAR BOREHOLE WITH LARGE

ANGULAR FRACTURES

158-159 BOREHOLE NOT VISIBLE - CAVERN

159 END OF BORING LARGE ANGULAR ROCK DEBRIS

TEST #3 SAMPLE INTERVAL  
139-159 FEET BGS.  
0.57 UG/L ALACHLOR  
3.1 UG/L ATRAZINE  
2.6 UG/L METOLACHLOR  
4.0 UG/L CYANAZINE  
19.5 MG/L NO3 + NO2  
0.3 MG/L NH3



Alpha Terra Science, Inc.  
1237 S. Pilgrim Road, Plymouth, WI 53073-4969  
TEL 920/892-2444 FAX 920/892-2620  
E-mail: [alphaterra@excel.net](mailto:alphaterra@excel.net)  
Respond to: P.O. Box 21, Stevens Point, WI 54481  
TEL: 715/345-9999, FAX: 715/345-7777

January 31, 2002

Richard Graham  
Wisconsin Department of Agriculture, Trade  
and Consumer Protection  
P.O. Box 8911  
Madison, WI 53708-8911

RE: Groundwater Monitoring Report for Deiss & Nugent Feed Co., East Ellsworth, WI  
DATCP Case No. 93409110301

Dear Mr. Graham:

Enclosed is the Groundwater Monitoring Report for the above referenced site.

This report completes the work outlined in the work plan and budget. As explained in the report, the groundwater contaminant trend is questionable due to the significant increase in the water table elevation during the sampling period. Alpha Terra Science proposes two more sample rounds before evaluating remedial options. March and June 2002 sample rounds would still allow time for remedial action in the late summer or fall.

We will wait until you have had a chance to review the report, and if you agree with this approach, we will submit for approval a cost estimate for the additional two sample rounds. Based on the results of the next two rounds, the suitability of an engineered barrier may become clearer, and a remedial action work plan could then be prepared.

Please contact me at your convenience to discuss the report and future action.

Sincerely,

ALPHA TERRA SCIENCE, INC.

A handwritten signature in cursive script, appearing to read 'G C Phelan'.

Gerard C. Phelan, P.E.  
Senior Engineer

Enclosure

c: J. Michael Lansing, Deiss & Nugent Feed Co.  
Kevin Brey, DATCP

## EXECUTIVE SUMMARY

In January 2001, as part of a continuing agrochemical investigation, Alpha Terra Science installed two monitoring wells and three additional soil borings at the Deiss & Nugent site. The new monitoring wells (MW-4 and MW-5), the previously installed monitoring well (MW-2), and the Ellsworth Creamery high capacity water supply well were sampled in March, June, and September of 2001. Groundwater analyses included nitrate/nitrite, ammonia-N, and pesticides. The three soil borings were installed to check for deeper fertilizer soil contamination in areas known to have high contaminant concentrations in the shallow soils.

METCO completed most of the site investigation and remedial action work in 1999. Elevated concentrations of pesticides and nitrogen-based fertilizer were found in the site soils during test pit sampling performed by METCO in October 1999. A total of 2,900 cubic yards of nitrogen- and pesticide-contaminated soil was removed on October 14, 15, and 18, 1999. This work was documented in METCO's report titled *Soil Excavation and Groundwater Monitoring Report* dated April 21, 2000. DATCP's May 2, 2000 letter expressed some concerns about the report and its recommendations. Deiss & Nugent Feed subsequently hired Alpha Terra Science to complete the site investigation work, which was limited primarily to investigating the groundwater. This additional groundwater investigative work was deemed necessary as a result of contaminant concentrations that exceeded their respective preventive action limits at MW-2, combined with the unfortunate fact that nitrogen soil contamination extended to bedrock in Area I (which was excavated to bedrock in October 1999).

The intent of the additional investigative work was to get a reasonably good picture of the site's groundwater condition at the least cost. An important aspect of the investigation was to determine if the October 1999 soil removal from Area I resulted in a significant reduction in the groundwater contamination. Although much more is known about the condition of the groundwater at this time, it is difficult to conclude from three rounds of samples whether or not the drop in nitrate concentration seen in the downgradient well (MW-4) is the result of the Area I soil removal. The contaminant level increases seen at MW-5 are probably due to the significant rise in the groundwater elevation and the close proximity of MW-5 to the deep contaminant source near the southeast corner of the concrete containment area (Area II). A spike at MW-4 resulting from the higher groundwater elevation might be seen later, and if not seen, then that would be a good indication that the contaminant concentration drop is the result of the Area I soil removal.

Remedial action in the area north of the dry fertilizer bulk storage building (Area IV) does not currently appear warranted based on (1) the relatively low groundwater contaminant concentrations at MW-4 (17 mg/l nitrate/nitrite; 5.1 µg/l metolachlor), (2) the apparent downward contaminant trend at MW-4 (except metolachlor), (3) the depth of the soil contamination (i.e., elevated total nitrogen levels at a depth of 20 feet at B-1 and B-2) and consequentially high cost for removal, and (4) groundwater flowing away from potential receptors.

Remedial action at the southeast area (Area II) appears necessary; however, excavation in that area would be extremely difficult. An engineered barrier may be a more practical and cost-effective solution for that area.

Based on groundwater flow direction and chemistry data, the Ellsworth Creamery water supply well appears to be unaffected by contamination at the Deiss & Nugent facility.

## 1.0 INTRODUCTION AND BACKGROUND

The investigation work covered in this report is a continuation of earlier investigation and monitoring work performed by METCO and Cedar Corp. The expanded groundwater investigation work was intended to document the trend in nitrogen and pesticide levels in the groundwater, monitor the potential receptor of greatest concern (the Ellsworth Creamery well), and help determine whether additional soil remediation efforts would be necessary.

### 1.1 Responsible Party

Deiss & Nugent Feed Co.  
P.O Box 69  
270 N. Morse  
East Ellsworth, WI 54010  
Contact: Mr. J. Michael Lansing  
Phone: (715) 273-5066

### 1.2 Consultant Information

Alpha Terra Science, Inc.  
P.O. Box 21, 945A Main Street  
Stevens Point, WI 54481  
Attn: Gerard C. Phelan, P.E.  
Phone: 715/345-9999  
FAX: 715/345-7777

### 1.3 Site Location

The site location is:

Deiss & Nugent Feed Co.  
270 N. Morse  
East Ellsworth, WI 54010  
Pierce County

SW1/4, SE1/4, Sec 17, T26N, R17W

See Figure 1

## 1.4 Site History

The site description and history are documented in previous reports. However, for convenience, general site and background information has been included in the Executive Summary above.

## 2.0 GEOLOGY AND RECEPTORS

### 2.1 Regional and Local Geology and Hydrogeology

Based on the construction of MW-3,<sup>1</sup> the soils from the surface to 20 feet below ground surface consist of fill material and was described by METCO as being brown, very fine to coarse-grained, clayey silt to silty clay till. From approximately 20 to 25 feet below ground surface exists a brown to orange silty sand with some concrete debris. From approximately 25 to 29 feet, soils were described as brown to yellow to white sand with some silt seams and larger clasts of chert and quartz believed to be weathered sandstone (METCO, 1998).

During the October 1999 soil removal effort, bedrock was encountered at 22 to 24 feet below ground surface (METCO, 2000). The boring log for MW-3 indicates weathered sandstone (yellow to white, fine to coarse grained), at 27.5 feet, with the end of boring being at 30 feet (METCO, 1998).

On April 20, 1998, the then open borehole of MW-2 was video logged, and on the same day, three packer tests were performed. METCO's *Additional Groundwater Investigation Report* indicated the following:

Based on the results of the video logging it is believed the open portion of the borehole consists of multiple layers of fractured and non-fractured bedrock. Consistent with other geologic descriptions in the area, the geologic formation encountered likely represent the Lower Magnesian or Prairie Du Chien Formation. The Prairie Du Chien Formation can be described as containing interbedded layers of sandstone.

Soil borings B-1, B-2 and B-3 were advanced under Alpha Terra Science's direction in January 2001 (see Appendix B for boring logs). In addition split-spoon samples were taken

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<sup>1</sup> MW-3 was installed under METCO's direction on July 10, 1998. It was installed at the north end of the site to monitor for possible perched groundwater; however, it was dry on the two occasions it was checked by METCO (July 10, 1998 and September 29, 1998) as well as during each of Alpha Terra Science's three sample events in 2001.

from borings for monitoring wells MW-4 and MW-5. Split-spoon samples were collected only from the soil sample depths of 10', 15' and 20'. The samples were similar to those previously described from these depths. Silty clay was the dominant soil type above bedrock.

## 2.2 Potential Receptors

Before completing the additional groundwater investigation work, there was a concern that the Ellsworth Creamery well could be a potential receptor of contaminated groundwater originating from the site. The creamery well is located approximately 400 feet southwest of the Area I excavation area at the Deiss & Nugent facility. Prior to collecting data from the petroleum spill site north of the Deiss & Nugent site, there was information suggesting the groundwater flow at the site was towards the southeast, which would result in greater potential for impacts to water supply wells. The petroleum site and the new wells at the Deiss & Nugent site are consistent and indicate the groundwater flow direction is towards the northeast. There are no potential water supply receptors in the northeasterly direction.

As shown in the Groundwater Investigation Addendum Report (Midwest Environmental Management Company, 1998), Figure 2, there are no wells located within several thousand feet to the northwest of the site. The Doug Dickson well is located approximately 4000 feet north-northeast of the site.

*what about creamery*

## 3.0 SITE INVESTIGATION RESULTS

Five soil borings were advanced in January 2001; two were completed as monitoring wells (MW-4 and MW-5) and three were advanced to 20 feet to collect soil samples for nitrogen analysis. Soil sample results indicate that significant concentrations of nitrogen (primarily ammonia) exist in the deeper soils in the areas previously known to have shallow soil contamination (i.e., B-1, B-2 and B-3 in Areas II and IV). Soil sample results from the two monitoring well borings indicate no significant contamination in those two areas. Groundwater results have been variable and are discussed below.

### 3.1 Methods of Investigation

The two new monitoring wells were well placed for evaluating the groundwater condition. Alpha Terra Science relied on data from the petroleum spill investigation north of the Deiss & Nugent property (indicating a northeasterly groundwater flow direction) to locate MW-4 and MW-5. Borings were advanced using 4 1/4-inch hollow stem auger until auger refusal (28 feet below ground surface at both monitoring well locations), at which point rotary air drilling was used to complete the borings. Well screens are 15 feet long. The top of the well screen was installed five feet above the estimated groundwater elevation. MW-5 was installed before MW-4.



People familiar with the site's prior drilling experience indicated difficulties with sloughing of sand in unconsolidated layers when drilling through the sandstone bedrock at MW-1 (MW-1 was later abandoned). As a result, the drilling contractor for MW-4 and MW-5 (Boart Longyear) was instructed to bring a foaming agent for possible use if a similar situation arose, which it did at MW-5. MW-5 was drilled to 85 feet below ground surface and left overnight. The next morning there was no water in the borehole, so the borehole was advanced to 105 feet. Obvious water was present at 90 feet. Upon removal of the drill rods and installation of the well casing, the borehole had become plugged at 90 feet. The borehole was re-drilled using the foaming agent to help prevent the fine sandy material from sloughing in. A 4-inch steel casing was installed to 105 feet and removed as the well was completed. Water was present at 85 feet<sup>2</sup> below ground surface, and the bottom of the 15-foot well screen was set at 94 feet below ground surface (expecting to leave 6 feet of unsaturated screen length). From approximately 95 to 90 feet, a large volume of filter pack sand was consumed (Boart Longyear used the entire supply of sand that they had brought for completing both wells, and additional sand had to be delivered the next morning before the well could be completed).

While drilling MW-4, the drill rod dropped quickly from 83 to 88 feet below ground surface with little or no hammering indicating a cavity might exist in the bedrock(). The foaming agent was added in the hope of avoiding the problems encountered at MW-5. When the drill stem was removed from MW-4, the well casing was able to be installed in the open borehole (i.e., the 4-inch steel casing was not installed in MW-4). Unlike MW-5, the MW-4 filter pack did not require excessive sand. The apparent cavity at MW-4 was not saturated at the time of the well installation or the March 2001 sample event, but was saturated in June and September. If the cavity does exist at 83 to 88 feet below grade, the top of the well screen is installed approximately at the bottom of the cavity.

Alpha Terra Science does not have definitive information regarding the construction of MW-2. MW-2 was originally completed as a 6-inch-diameter open borehole. The lower portion of the borehole was later abandoned and a 2-inch PVC well screen and casing were installed. Terra Science measured 111 feet from the top of casing to the well point. Rick Graham (DATCP) indicated that the well has a 15' screen.

MW-4 and MW-5 were developed using an electric submersible pump (see Appendix B for well development forms). Wells were developed immediately after installation, but were not sampled until six weeks after installation. Four well volumes of groundwater were purged from each well before sampling.

Sample handlers wore a new pair of disposable latex gloves for each sample collected. A sample was collected from each well and deposited directly from the bailer. Nitrogen samples were poured into a 125-ml plastic sample bottle with sulfuric acid as a preservative; pesticide samples were poured into 1-liter amber, unpreserved glass jars. Sample bottles were labeled

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<sup>2</sup> The depth of the borehole the day before (85') must have been just short of the water table.

and stored in a cooler on ice until delivered to Northern Lake Service (Crandon, WI) for analysis. Samples were analyzed for nitrate/nitrite and ammonia/ammonium-nitrogen (two separate analyses) per standard methods for the nitrogen species. Pesticides analysis was per EPA method 8141.

The creamery water sample was taken under the supervision of Joe Hines, Superintendent at Ellsworth Creamery. The sample was collected from a spigot tapped directly into the main pipe supplying the plant from the high capacity well. The well is constantly being used so purging was not necessary.

Samples were delivered to the laboratory by overnight courier (Dunham Express). Appropriate chain-of-custody protocol was followed.

### 3.2 Data Discussion

Groundwater elevation data from the three on-site wells has confirmed a consistent groundwater flow direction towards the northeast. The depth to water has varied between 75 to 91 feet below ground surface depending on the well and season.

Hydraulic conductivity appears to be quite high in all of the wells (see Section 3.3 below for further discussion).

Although the top of the well screens at MW-4 and MW-5 were set five or six feet above the groundwater elevation when installed in January 2001, the groundwater elevation rose significantly between January and September 2001. This could have had a measurable effect on the chemistry results measured at MW-4 and MW-5. The presence of the cavities intersecting both of the well screens adds a complicating factor, especially at MW-4 where it may be saturated only during periods when the water table is high. The significant drop in the groundwater nitrate concentrations at MW-4 and the significant rise in nitrate at MW-5 (see Figures 8 and 9) may be related to the unusually wet spring (i.e., either the increase in the water table elevation or the increased leaching through the areas of known soil contamination).

The increased nitrate results seen at MW-5 are likely related to the increased leaching of groundwater through the Area II contaminated soil during the very wet spring of 2001. To confirm whether the contaminant plume is truly advancing, several more sample rounds would need to be conducted through cycles of rising and falling water table. The September 2001 water table was four feet above the top of MW-5's screen. So, as dramatic as the nitrate increase was over the three sample events (73 to 160 to 210 mg/l; see Figure 8), it is possible that the highest nitrate concentrations were flowing above the well screen, which would skew the results lower than they otherwise would have been if the screen had been installed 4 feet higher. In reality, the groundwater contaminant levels in the uppermost groundwater zone could be much higher than those detected in the well. With the close proximity of MW-5 to the Area II source and the high groundwater flow

velocity expected through the permeable water-bearing unit, little vertical diffusion would be expected. However, this scenario is most likely if the entire screen intersects 15 feet of uniform, unconsolidated material. Most of the recharge could be coming into the well through the "cavity" zone in the estimated range of 90 to 95 feet below ground surface (elevation 972 to 967 feet), in which case the water table being above the well screen at the time of the last two sample events would have little or no effect on groundwater concentrations measured at the well.

Conditions are different at MW-4 where groundwater might only be present in the cavity during periods with a high water table elevation. A lot of very speculative theories could be advanced suggesting, for instance, that the cavity at MW-4 is recharged by groundwater that does not leach through the Area IV, but does pick up higher concentrations of metolachlor. There is less speculation about MW-5 since its cavity has always been within the saturated zone of the well screen. If there is a drop in nitrate concentration with increasing depth into the groundwater table, the groundwater with the highest contaminant levels will not intersect the well screen during high water table periods. This does not fit the observed trend at MW-5 where the contaminant levels rise with increasing groundwater elevations.

Groundwater elevation data are shown on Table 1 along with the chemistry results. Most of the results are also charted on Figures 7, 8, and 9.

Hydraulic gradient and flow direction have remained fairly consistent for the three sample events. Hydraulic gradient ranged from 0.00163 feet/foot (June 8, 2001) to 0.00226 feet/foot (March 9, 2001) across the three sample events.

MW-2 chemistry results have been under the NR140 enforcement standard (ES) for nitrate/nitrite (10 mg/l) and all pesticides for the three most recent sample events. In April 1999, this well had a nitrate/nitrite result of 24 mg/l and an atrazine concentration of 3.5 µg/l (ES is 3 µg/l). MW-4 had nitrate/nitrite levels above ES for all three rounds (although with a decreasing trend) and atrazine slightly above ES. Metolachlor at MW-4 is below ES but shows an increasing trend. MW-5 has the highest contaminant concentrations, and they continue to increase. Nitrate/nitrite and atrazine are above ES, with the last round showing 210 mg/l nitrate/nitrite (21 times ES) and atrazine at 14 µg/l (4.7 times ES).

MW-3 has been dry every time Alpha Terra Science has been on site (January, March, June, and September 2001).

### 3.3 Permeability and Hydraulic Conductivity

Hydraulic conductivity tests have not been conducted, and due to the uncertainty of the thickness, composition, and continuity of the saturated zone, hydraulic conductivity testing may be of questionable value. However, the development and purging work indicates that at least a portion of the well screen's saturated zone is very permeable. There was little

difference in the depth to water before and after development (0.2 feet lower at MW-4 after pumping 120 gallons; and 0.04 feet lower at MW-5 after pumping 180 gallons). When bailing the wells there is no discernable difference in the depth to water between the start and end of the purging process. Due to the depth of the wells (roughly 80 to 90 feet to water), a significant time elapsed in removing the development pump and taking the "after development" water level measurement, i.e., a significant time elapsed (approximately 3 minutes) relative to the high recharge rate of the wells.

### 3.4 Discussion of Results

After only three rounds of samples from the two new wells, it is difficult to make any conclusions about the results. Some additional insights might be gained by installing additional monitoring wells and conducting specialized hydrogeologic tests. However, considering the cost/benefit, additional sample rounds taken from the existing three wells may provide sufficient answers to the important questions relating to water table elevation and contaminant trends. This is especially true since the results thus far indicate that the potential for environmental or human health impacts is low.

The extent of the groundwater contaminant plume has not been fully defined; however, when the groundwater investigation was initiated, it was not expected that the plume would be defined with the addition of only two monitoring wells. Although some questions have been raised after installing the new wells, the results to date have been useful in determining the possible need for future remedial action. Additional sample rounds are needed before certain conclusions can be made; however, the placement of the wells could not have been better for accomplishing the objectives of the investigation. It is expected that additional sampling rather than additional wells will be all that is required to confirm the appropriate remedial action.

Now that the groundwater flow direction has been confirmed, there are some questions regarding upgradient sources of contamination that impacted MW-2. The most-recent data suggest that upgradient sources are of little concern at this time.

### 3.5 Contaminant Migration

Elevated nitrate/nitrite and pesticide concentrations are migrating off-site towards the northeast. The closest potential receptor, the high-capacity creamery water supply well is located side gradient from groundwater flow. As indicated in Section 2.2 above, there are no private wells in the groundwater contaminant migration pathway.

As an inexpensive way of checking for possible influence from the high-capacity creamery well, consideration was given to scheduling a sample round when the water level response at the existing monitoring wells could be checked as the creamery well was shutdown. A lack of effect at MW-5 for several hours after the well stopped pumping could provide added assurance that the contaminated area is not in the creamery well's capture zone. However, the creamery has no regularly scheduled plant shutdown, annual or otherwise, that would allow any such testing. A shutdown would be an unscheduled, emergency situation. The

well pumps 175,000 to 200,000 gallons per day (121 to 139 GPM) at a steady flow rate, seven days per week. However, there is some evidence to suggest that the well's effect on the natural flow direction of the contaminated water at the Deiss & Nugent site may not be significant. When the well was constructed, a 3-hour pump test was conducted at a pumping rate of 200 GPM with only a 4-foot drawdown (static level was 110 feet bgs; pumping level was 114 feet bgs). The well was originally cased to 95 feet. In 1950, six years after the well was installed, the well was cased to 225 feet. The shallow groundwater at the Deiss & Nugent site would have been more likely to be affected before the deeper casing was installed.

#### 4.0 CONCLUSIONS AND RECOMMENDATIONS

There is no longer any doubt that the release of fertilizers and pesticides at the Deiss & Nugent site is adversely impacting the groundwater quality. In the past, the presence of contaminants in MW-2 indicated the possible presence of upgradient sources, but the impact that any upgradient source is having on the site's groundwater condition is relatively minor compared to the impacts that are apparent from Area II and Area IV soils. The decreasing contaminant trend at MW-4 is encouraging; however, after only three sample rounds (taken during a period of significantly rising groundwater elevations), it is not possible to make definitive conclusions. Likewise the increase at MW-5 may be a transitory trend.

Alpha Terra Science makes the following recommendations:

- 1) The three monitoring wells and the creamery wells should be sampled in March and June 2002. Assuming that dramatic improvement is not evident following the June sampling, a work plan should then be developed for installing an engineered cap over Area II. This should be developed according to a schedule that would permit installation by the fall of 2002. No cap over Area IV would be proposed if the downward contaminant trend continues at MW-4.
- 2) Installation of additional monitoring wells is not recommended since it is thought that additional sample rounds will adequately satisfy the objectives of the groundwater investigation at a lower cost.
- 3) Following the assumed installation of the engineered cap(s), semiannual monitoring of the three monitoring wells and creamery well should be conducted for two years.

#### 5.0 REFERENCES

METCO, *Additional Groundwater Investigation Report*, December 3, 1998

METCO, *Soil Excavation and Groundwater Monitoring Report*, Deiss & Nugent Feed Company, April 21, 2000

Midwest Environmental Management Company, Groundwater Investigation Addendum Report –  
Deiss & Nugent Feed Company, January 13, 1998.

Alpha Terra Science, 2000, Groundwater Site Investigation Work Plan, Deiss & Nugent Feed  
Company, October 2000. Consultant report.



Alpha Terra Science, Inc.  
1237 S. Pilgrim Road, Plymouth, WI 53073-4969  
TEL 920/892-2444 FAX 920/892-2620  
E-mail-alphaterra@excel.net

Respond to: P.O. Box 21, Stevens Point, WI 54481  
TEL: 715/345-9999, FAX: 715/345-7777

February 19, 2002

Richard Graham  
Wisconsin Department of Agriculture, Trade  
and Consumer Protection  
P.O. Box 8911  
Madison, WI 53708-8911

RE: Deiss & Nugent Feed Co., East Ellsworth, WI  
DATCP Case No. 93409110301

Dear Mr. Graham:

Enclosed are revised boring logs for MW-4 and MW-5. The Boart-Longyear logs have been supplemented with additional information.

Since you indicated in our recent phone conversation that you approved of the report's recommendations, I have enclosed a cost estimate for the next step. If the costs are acceptable, you could save some time by approving the costs along with your written response to the *Groundwater Monitoring Report*. The cost estimate includes (1) collecting two more rounds of samples (March and June 2002); (2) briefly evaluating whether the presumed remedial action (engineered barrier(s)) appears viable; (3) writing a brief letter report documenting the upcoming sample results; and (4) submitting a cost estimate for preparing the remedial action work plan.

Please contact me if there are any questions.

Sincerely,

ALPHA TERRA SCIENCE, INC.

A handwritten signature in dark ink, appearing to read 'G C Phelan'.

Gerard C. Phelan, P.E.  
Senior Engineer


Enclosure

c: J. Michael Lansing, Deiss & Nugent Feed Co. (w/enclosures)  
Kevin Brey, DATCP (w/enclosures)


Route To: Watershed/Wastewater ☐ Waste Management ☐  
Remediation/Redevelopment ☐ Other ☒ DATCH

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Facility/Project Name Deiss & Nugent		License/Permit/Monitoring Number		Boring Number MW-4	
Boring Drilled By (Firm name and name of crew chief) Boart Longyear - T. Schmalfeldt		Date Drilling Started 1/24/2001		Date Drilling Completed 1/24/2001	
Drilling Method 4 1/4" HSA		WI Unique Well No.		DNR Well ID No.	
Common Well Name MW-4		Final Static Water Level Feet MSL		Surface Elevation Feet MSL	
Borehole Diameter 8.0 Inches		Boring Location or Local Grid Origin (Check if estimated: <input type="checkbox"/> ) State Plane SW 1/4 of SE 1/4 of Section 17, T 26 N, R 17 W		Local Grid Location (If applicable) Lat. _____° _____' _____" _____" Long. _____° _____' _____" _____" Feet <input type="checkbox"/> N <input type="checkbox"/> E Feet <input type="checkbox"/> S <input type="checkbox"/> W	
Facility ID 10851		County Pierce		County Code 48	
Civil Town/City/ or Village Ellsworth					

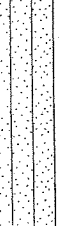



Sample		Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments		
Number and Type	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200			
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			12													

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature  Firm Boart Longyear  
101 Alderson St. Schofield, WI 54476  
Tel: (715)359-7090  
Fax: (715)355-5715

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completions of this form is mandatory. Failure to file this form may result in forfeiture of between \$10 and \$25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.



Boring Number		MW-4										Use only as an attachment to Form 4400-122.									
Sample		Soil/Rock Description And Geologic Origin For Each Major Unit		USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties						RQD/ Comments							
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet					Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200									
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		4	14																		
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3 SS	24 10	9	17																		
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			31																		
			32																		
		Gry CLAY w/Some Sand																			
		Gry CLAY w/Some Sand and Rock Fragments																			
		WEATHERED SANDSTONE																			
		(Auger Refusal)																			
		EARTH DRILL																			
		SANDSTONE BEDROCK, LIGHT GRAY.																			

Boring Number

MW-4

Use only as an attachment to Form 4400-122.

[illegible]

Boring Number MW-4

Use only as an attachment to Form 4400-122.

[illegible]

Boring Number MW-4

Use only as an attachment to Form 4400-122.

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Sample		Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments	
Number and Type	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200		
			73												
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			80												
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			84	DRILL ROD DROPPED											
			85	WITH LITTLE OR											
			86	NO DOWNWARD											
			87	PRESSURE. NO											
			88	SLOUGHING SAND OR											
			89	VOID APPARENT DURING											
			90	WELL INSTALLATION.											
			91												
			92												

COMPLETED  
AIR DRILLING  
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FOAM  
AGENT.

Use only as an attachment to Form 4400-122.

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Route To: Watershed/Wastewater ☐ Waste Management ☐  
Remediation/Redevelopment ☐ Other ☒ DATA

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Facility/Project Name <b>Deiss &amp; Nugent</b>		License/Permit/Monitoring Number		Boring Number <b>MW-5</b>	
Boring Drilled By (Firm name and name of crew chief) <b>Boart Longyear - T. Schmalfeldt</b>		Date Drilling Started <b>1/22/2001</b>		Date Drilling Completed <b>1/22/2001</b>	
Drilling Method <b>4 1/4" HSA</b>		WI Unique Well No.		DNR Well ID No.	
Common Well Name <b>MW-5</b>		Final Static Water Level <b>Feet MSL</b>		Surface Elevation <b>Feet MSL</b>	
Borehole Diameter <b>8.0 Inches</b>		Boring Location or Local Grid Origin (Check if estimated: <input type="checkbox"/> )			
State Plane <b>SW 1/4 of SE 1/4 of Section 17, T 26 N, R 17 W</b>		Lat. <b>° ' "</b>		Local Grid Location (If applicable) Feet <input type="checkbox"/> N <input type="checkbox"/> E <input type="checkbox"/> S <input type="checkbox"/> W	
Long. <b>° ' "</b>					

Facility ID <b>10851</b>	County <b>Pierce</b>	County Code <b>48</b>	Civil Town/City/ or Village <b>Ellsworth</b>
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Sample		Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments	
Number and Type	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200		
1 SS	24 20	3 4 4 5	1	EARTH DRILL											
			2												
			3												
			4												
			5												
			6												
			7												
			8												
			9												
			10	Moist Br Silty CLAY											
			11												
			12												

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

*[Signature]*

Firm

**Boart Longyear**  
101 Alderson St. Schofield, WI 54476

Tel: (715)359-7090

Fax: (715)355-5715

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completions of this form is mandatory. Failure to file this form may result in forfeiture of between \$10 and \$25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.

[illegible]

MW-5

Use only as an attachment to Form 4400-122.

Boring Number		MW-5													Use only as an attachment to Form 4400-122.		Page 5 of 6	
Sample		Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties						RQD/ Comments			
Number and Type	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200					
			33	SANDSTONE BEDROCK LIGHT GRAY														
			34															
			35															
			36															
			37															
			38															
			39															
			40															
			41															
			42															
			43															
			44															
			45															
			46															
			47															
			48															
			49															
			50															
			51															
			52															



[illegible]

Boring Number MW-5 Use only as an attachment to Form 4400-122.

Sample		Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
			73											
			74											
			75											
			76											
			77											
			78											
			79											
			80											
			81											
			82											
			83											
			84											
			85											
			86											
			87											
			88											
			89	— ?										
			90	CAVERN APPARENT DURING WELL COMPLETION. FINE SAND FILLED BOREHOLE BELOW THIS POINT.										
			91	— ? (SEE NOTE ON NEXT SHEET)										
			92											

WET

Boring Number		Use only as an attachment to Form 4400-122.										Page 6 of 6		
Sample		Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
			93											
			94											
			95											
			96											
			97											
			98											
			99											
			100											
			101											
			102											
			103											
			104											
			105											
				<div style="border: 1px solid black; padding: 10px; margin: 10px;"> <p>RE-DRILLED FROM 90 FEET TO END OF BORING USING FOAM AGENT TO MINIMIZE SLOUGHING OF SAND. FOLLOWING RE-DRILLING, BORING STAYED OPEN AND ALLOWED INSTALLATION OF 4-INCH STEEL CASING THROUGH WHICH WELL WAS INSTALLED. STEEL CASING REMOVED AS WELL WAS INSTALLED.</p> <p>LIKELY CARBONATE BEDROCK AT VOID LOCATIONS.</p> </div>										
				<p>EOB 105.0' Well Set 94.0'</p> <p>Drill 4 1/4" HSA to 28' Install 6" Temp Casing to 28' Drill 6" Air to 105'. Row in 4" Temp Casing to 105' Install well at 94' through 4" Casing Pull Casing</p>										