

Precision Nutrient Application

Of
Agricultural Fertilizers

1997-99

A study of over 17,000 acres of Northwest Ohio farmland including grid soil sampling in 2 ½ acre grids. Variable Rate Application Technology was developed that is successful in Northwest Ohio. Global Positional Systems equipment was reviewed to determine which can be used to deliver a more accurate rate of fertilizer materials by VRT methods. A systems approach to VRT nitrogen application was developed that can be used successfully.

Project Sponsor:

Maumee Valley Resource Conservation and Development (RC&D) Council

This project was made possible by a generous grant from:

The Lake Erie Protection Fund

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Precision Nutrient Management

By
George Ropp

The Maumee Valley Resource Conservation and Development Council prepared a grant proposal concerning precision nutrient management in May of 1996. The proposal was reviewed and approved by the Lake Erie Protection Fund. This final report of the Precision Nutrient Management Program is designed to assist agricultural producers and agribusiness as they develop precision programs.

Background of Maumee Valley RC&D

The Maumee Valley RC&D is a ten county non-profit organization, sponsored by County Commissioners, Soil & Water Conservation Districts, and the Maumee Watershed Conservancy District. The long term objective is to improve environmental conditions through treatment and development of the areas of natural resources. The specific goals are: to promote and host seminars on highly technical agricultural practices; reduce erosion impacts; improve wildlife habitat; and improve water quality discharge for non-point sources. Since the ten county area contributes 100% of its water directly into the Maumee River, there is special concern with the nutrient and sediment impact on Lake Erie.

Project Goals

What has been identified as "Precision Farming" or "Variable Rate Technology" is essentially nutrient soil testing on a 2 ½ acre grid pattern. Previous work of the Maumee Valley RC&D indicates that about one third of cropland tested show excess fertilizer nutrients being applied. The goal of the Precision Nutrient Application project was to grid sample 12,000 acres of northwest Ohio cropland. Specific goals are as follows:

1. Inventory soil nutrients using Global positioning Systems(GPS) on 12,000 acres.
2. Conduct educational programs for ag industry and farmers on nutrient management.
3. Assist ag industry and farmers with GPS variable rate technology.
4. Develop system maps and plans for variable rates of nutrient application.
5. Retest 10% of the fields to determine changes that take place following variable rate applications.
6. Test different types of GPS equipment such as GPS receivers, computers, VRT controllers, and software.
7. Develop a system of nitrogen VRT application that a farmer can use.

Project Implementation

The Maumee Valley RC&D awarded the Precision Nutrient Application sub-contract to Ropp Crop Management Service to complete the field work. The project started January 9, 1997 and all field work was completed September 1, 1999. Members of the sub-contract team include George Ropp who managed the project and Mark Springer, who gathered most of the field data. The goal of 12,000 acres to be grid sampled was surpassed by over 5,000 acres with a total of over 17,000 acres tested. This was possible due to negotiated lower soil test lab fees and efficiency of operations.

Educational Meetings and Tours

Several meetings and tours have been conducted to tell about the “Precision Nutrient Management” program. The following list describes some of these educational activities.

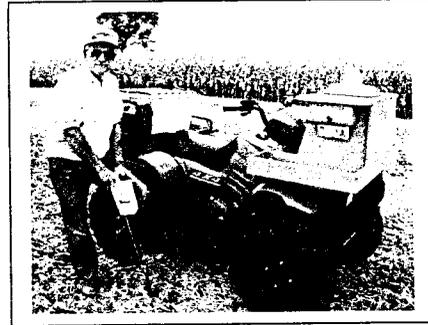
- The “Precision Nutrient Management” Program – Lake Erie Protection Fund meeting, Cleveland, Ohio
- “Precision Nutrient Management” Update – Maumee Valley RC&D winter meeting
- PNA Demonstration – Maumee Valley RC&D Summer meeting, Dara Site, Defiance County
- “Precision Nutrient Management” Tour and Demonstration – Maumee Valley RC&D Summer meeting, Van Wert County
- VRT Demonstration Field Day – Mercer Landmark Field Day, Van Wert County
- Grid Mapping Demonstration – Homier Field Day, Continental, Ohio
- GPS Equipment Demonstration – Wellman Seeds Field Day, Van Wert County
- GPS Demonstration – Farm Focus Farm Show, Van Wert County
- PNA Program – Vocational Agriculture Adult Farmer meeting, Spencerville, Ohio
- PNA Program – Vocational Agriculture Adult Farmer meeting, Delphos, Ohio

Interaction with farmers and agribusiness indicates that one of the greatest concerns with those contemplating site-specific management is the cost of technology packages that are required. With the current uncertainty of benefit-to-cost ratios and added demands on an already crowded management schedule, it is easy to understand that concern. Yield monitors, GPS equipment, and information processing systems can easily overwhelm. What should be remembered, however, is that site specific management is not simply a new package of technologies. It is a different way of thinking about crop production. Those who have tried site-specific management and are sticking with it understand that assessing its benefits takes time. They are finding that information collected over a period of years is more important than data collected in a specific crop year.

Why Precision Agriculture?

The primary goal of farmers as they evaluate changes in management systems is to increase profits. However, profitability is not the only goal. There are others, including:

- * Environmental protection of soil and water resources.
- * Compliance with state and federal guidelines.
- * Spending more quality time with family.
- * Leaving the farm in better shape, for the next generation, than the farmer found it.



Site-specific nutrient management will allow tomorrow's farmers to use their nitrogen, phosphorous, potassium, and other nutrients more efficiently. The result will be more profitable crop yields, a cleaner environment, and a longer life expectancy of the resources used to produce food. The importance of building and maintaining proper soil levels should never be taken lightly or treated as an environmentally threatening practice. The fact of the matter is that as soil fertility levels are balanced and built appropriately, yield potentials increase, and environmental protection is enhanced

Phosphorous and Nitrogen Issues

Since the late 1960's point sources of water pollution have been reduced due to the passage of the Clean Water Act in 1972. However, water quality problems remain, and attention is now being directed towards the role of agricultural non-point sources in water quality degradation. Besides soil and pesticide loss from agriculture, most environmental concerns center on non-point transport of phosphorous and nitrogen, which are essential inputs for optimum crop and animal production. Phosphorous concerns focus mainly on its transport in surface runoff, while nitrogen concerns revolve around nitrate movement through the soil profile to ground water.

The major concern with phosphorous is eutrophication of surface waters. Biological activity of many surface water bodies is dependant on the amount of phosphorous. When phosphorous inputs are increased, algal and other plant growth are stimulated. The resulting eutrophication restricts the use of surface waters for aesthetics, fisheries, recreation, industry and drinking water. While phosphorous may move through the soil into groundwater in some situations, such as in sandy soils with shallow water tables or where there is artificial drainage in soils with macropore structure, the major pathway for phosphorous loss is by surface runoff and soil erosion. Management practices to limit phosphorous loss focus on reducing soil erosion and runoff. Control of phosphorous inputs is critical to reducing freshwater eutrophication.

Nitrate is a water quality concern because it has been linked to methemoglobinemia in infants. It is also associated with increased eutrophication in fresh waters.

Startup – The Precision Nutrient Project

During the first year of the program (1997) equipment was purchased and assembled to grid sample over 6,600 acres of cropland in northwest Ohio. Soil samples were analyzed at the Ohio State University soils lab in Wooster, Ohio. Sample interval was set at 2 ½ acres on all fields.

Equipment was procured to conduct the Precision Nutrient Management project, and throughout the length of the project various pieces of site-specific equipment were tested. Testing was done on field mobile equipment, field rugged computers and office GIS computers, and satellite and beacon receivers. Following is a review of some of this equipment and software.

Mobile Field Equipment

Most of the field work in the Precision Nutrient Management project was accomplished with an ATV 4-wheel drive unit. Three different units were tested and the 4-stroke cycle engines proved to be superior over the 2-cycle unit. The engine in the 2-cycle unit fouled constantly due to prolonged idle periods during sampling. Engine RF noise is a constant battle with some GPS receivers and antennas must be placed appropriately.



Another field unit that was tested was the Jeep. The advantage of this unit over the ATV is the enclosure for all electronic equipment. It also serves well in inclement weather. In addition, the computer monitor is well shielded from sunlight and is easy to see. The down-side of the Jeep type vehicle is the turn radius problem when bordering a field. Getting in and out of this type vehicle can be a bit cumbersome.



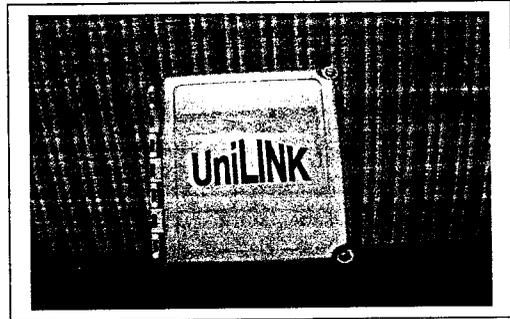
One field item which was not tested was the automatic soil sampling probe. These are usually hydraulic driven probes which permits the operator to take samples without leaving the seat of the field unit. The expense of these units prevented testing of these machines.

GPS Receivers

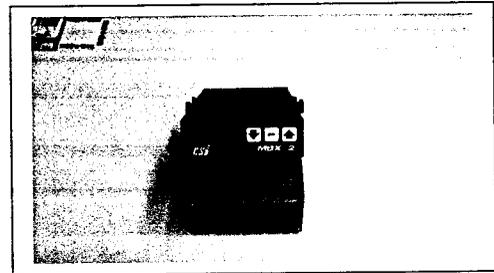
There are several brands of global positioning system (GPS) receivers on the market. And there are several types of units available. The Precision Nutrient Management (PNA) project tested four different types.

- Satellite receiver with DCI FM Differential Correction
- Satellite Receiver with Coast Guard Beacon Differential Correction
- Satellite Receiver with Satellite Differential Correction
- Satellite Receiver with Satellite and Beacon Differential Correction

The “UniLink” is a satellite receiver with an FM differential correction. The FM correction signal is a sub-carrier of some radio broadcast stations. The differential signal is quite stable as long as field operations are fairly close to the radio station. The PNA project initially used the DCI system until the radio station ceased broadcasting the required FM correction signal.



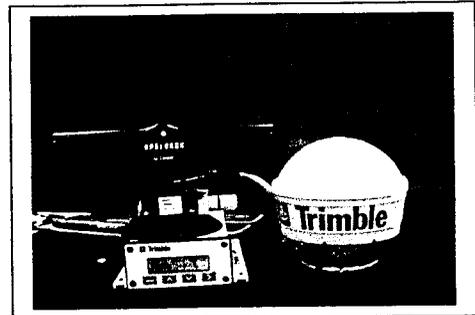
The “CSI” satellite receiver was tested by the PNA project and was found to be very economical. This is the satellite – beacon type unit capable of receiving free Coast Guard AM signals. The unit has a readout on the front cover which provides a comfort level for the operator. It was found that noise rejection was sometimes a problem with this unit especially since beacon signals were quite distant from the northwest Ohio area.



The Satloc system was tested extensively. This was the L-Band type unit which uses satellite differential correction. There is an annual subscription fee associated with this unit. One disadvantage of this unit is there is no front panel screen for setup and diagnostics.



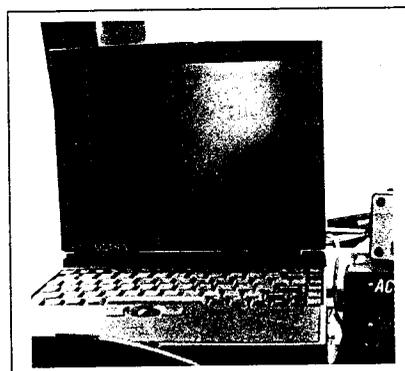
The Model 132 Trimble receiver was tested and found to be a superior unit. The Model 132 has the capability of receiving either free beacon Coast Guard differential signals or subscription satellite differential. In addition, the front panel screen setup and diagnostics are a real plus. The Trimble seems to have excellent noise rejection.



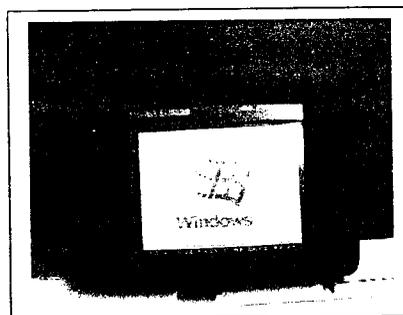
Field Computers

Computers, which are used in the field must be rugged enough to withstand abuse under field conditions. The Precision Nutrient Application project tested at least four field computer units with the following results.

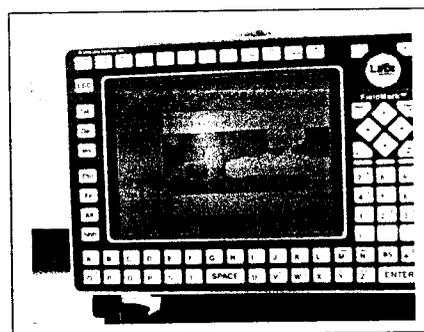
Laptop computers are not rugged enough to withstand severe service. The PNA project initially used a laptop with little success. Hard drives in laptop computers are not built for rough handling in rough fields. In addition, weed seeds and dust jam the keyboard.



The Excalibre and Fujitsu were both tested with mixed reviews. The disadvantage of the Excalibre is there are no provisions for fast data export since the unit does not contain floppy disk drives or PCMCIA drives. The unit must be hard wired to another computer in order to extract field data. The Fujitsu does have a PCMCIA drive to export data. Both computers are a bit hard to see in field sunlight conditions.



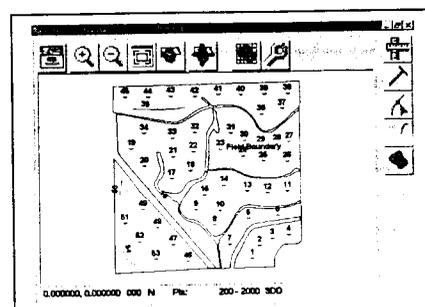
The Field Mark is both rugged and very easy to see in bright sunlight. The colored screen is easy for the operator to view different rates during variable rate operations. The unit has a built in weather tight keyboard. Both floppy disk and PCMCIA drives are incorporated into the computer. The Field Mark is available in either 6 1/2" or 10" screens



GPS Software

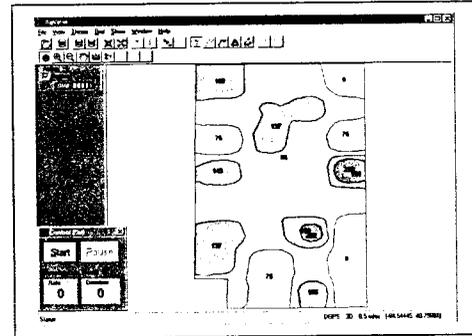
The Precision Nutrient Application project tested two different field software packages and one office GIS software package.

Fieldlink and Fieldlink II were used during the PNA project. This field software is user-friendly and quite adequate for soil test gridding operations. Fieldlink II is a windows based program and very easy to operate.

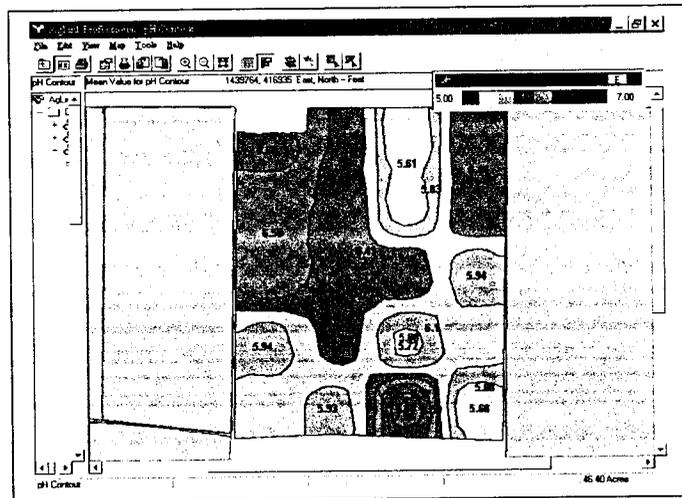


GPS Software (continued)

AgView mobile software is a windows based program that can be used for soil sample gridding as well as variable rate applications. The program has a variety of setup choices regarding cursor size and color and the program is quite user-friendly. AgView uses the universal shape-file protocol in file development.



The PNA project used the Professional version of Aglink GIS software for office operations. This program was found to be very user-friendly with a variety of capabilities. Aglink will import and export to nearly all GIS formats. The program contains “plug-ins” that include geo-referencing soil type maps, yield mapping, profit maps, and a spatial compositor. The latest release also contains a statistical analysis tool. Aglink is a state of the art software program for agriculture.



Global Positioning System Technology

A GPS receiver can be compared with a simple Am or FM radio. A GPS receiver listens for the signals that are broadcast from the 24 GPS satellites operated by the Department of Defense. Orbiting around the earth at an altitude of 12,550 miles, these satellites are in predictable locations. We refer to the system of satellites as the GPS constellation.

Each satellite broadcasts almanac data that contain information about the actual position of the satellites within the constellation. Minor variations in their orbits occur due to gravitational forces from the sun and the moon. The DoD continuously monitors the satellites and adjusts the almanac data to represent the actual orbits of the satellites.

The broadcast signals also contain precise times, and predictable codes. There is a very small delay between the time the signals leave the satellites and the time they arrive at a GPS receiver. Yet, as a GPS receiver moves farther away from a satellite, this tiny delay becomes a little larger. A GPS receiver uses these delays to determine its distance from the satellites. The receiver then uses triangulation to determine its position on the earth.

Triangulation is a mathematical method for location points in three-dimensional space. If the distances to each of three satellites and the approximate location of the receiver are known, the GPS receiver can calculate its position on earth. If information from four satellites is available, elevation can also be determined.

The overall accuracy of a GPS receiver at any given time depends on five factors:

1. proper installation
2. degree of technology used in the receiver
3. number and location of satellites
4. errors introduced by selective availability, atmospheric conditions, the troposphere, the ionosphere, radio signals bouncing off objects in the area
5. differential corrections

Reacquisition time is the time it takes to get an accurate position fix after a short-time loss of satellite signals. This may occur for a variety of reasons, including traveling near trees or buildings where some satellites are no longer in 'line of sight'. Reacquisition time is important for most agricultural applications and, especially for guidance with applicators. New technology in GPS receivers has shortened reacquisition time. Receivers that can track 8 to 12 satellites are less susceptible to acquisition loss.

The accuracy attainable with GPS depends partly on how much you are willing to spend. The cost for a basic DGPS (differential global positioning system) receiver suitable for most agricultural applications is about \$3000 to \$5000 and provides a typical accuracy of about 3 feet, which is sufficient for yield monitoring and grid soil sampling.

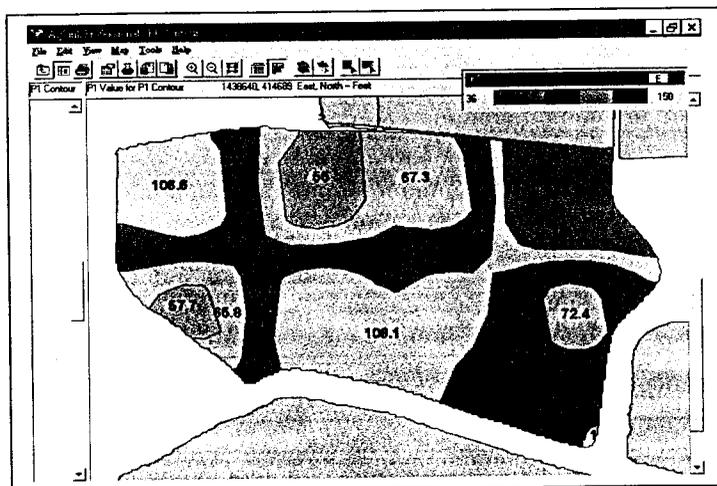
If free Coast Guard differential signals are out of range and satellite differential must be used, the typical subscription rates may be \$500 to \$800 per year depending upon which service is used.

GPS and Phosphorous Management

The Precision Nutrient Management project has shown that there is great variability in phosphorous levels within nearly all fields.

The phosphorous map on this 20 acre field shows "P" variability from 55 pounds per acre to 189 pounds. The optimum "P" soil test value for this soil is 45 to 60 pounds depending upon the intended crops to be grown.

As the soil test variability increases, the benefits associated with variable rate applications



increase. For example, a consultant collects a field composite sample made up of 10 to 15 cores which is analyzed and used to develop a conventional single rate P application. If each of the cores contained identical P concentrations, then the field can be correctly fertilized with a conventional one-rate application. However, if the several cores have P concentrations ranging from 55 pounds to 189 pounds, such as this field, one can readily see that much of the field will be over-fertilized with a single rate application.

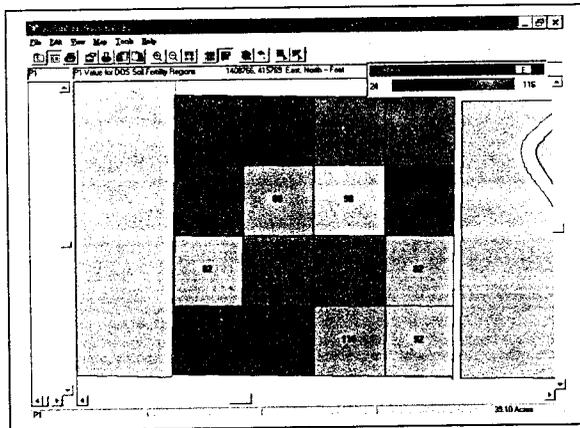
Precision Nutrient Application Project Statistics

Nearly 18,000 acres of farmland in northwest Ohio were grid sampled in 2 ½ acre grids. There were a total of 542 fields in the program with an average size of 35.53 acres. Sixty-four different farm producers cooperated in the three year project. Approximately 2000 acres were re-tested in order to compare initial nutrient readings with post variable rate application readings.

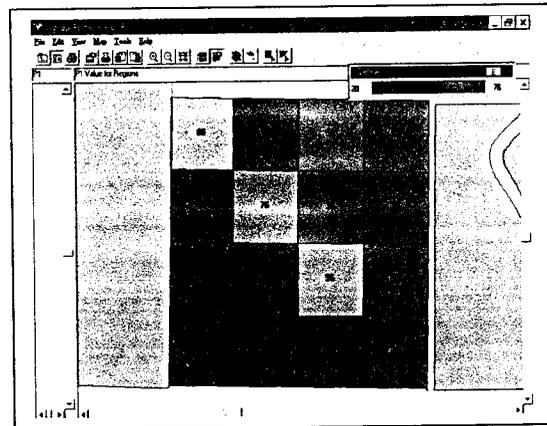
Farms included in the project were located mainly in Van Wert, Allen, Putnum, Paulding Counties, with a fewer number in Auglaize, Williams, and Mercer Counties. A prerequisite for fields being enrolled was that water from the farm must go to Lake Erie. Large farm producers as well as small farms were selected to participate.

A standard soil fertility lab analysis was used on all grid samples. This included pH, buffer pH, phosphorous, potassium, magnesium, and cation exchange capacity. The main emphasis was placed on the phosphorous element of the test.

The main goal was to demonstrate how to reduce the high levels of nutrients in a field while bringing the very lows into more balance.

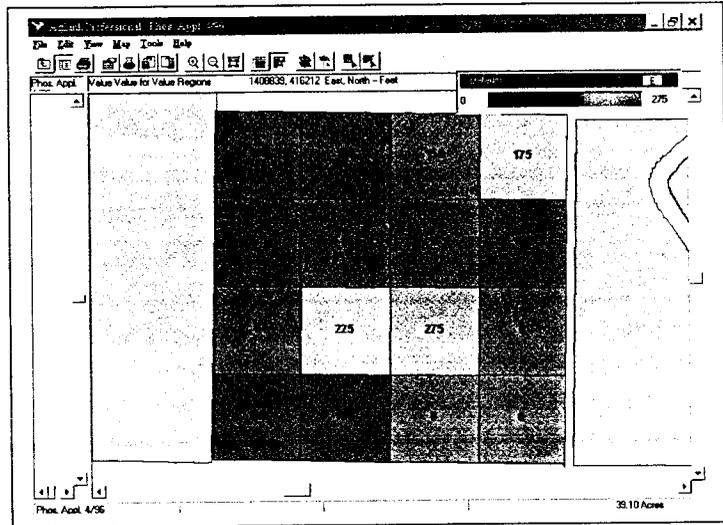


These grid samples were taken during the first year of the project with an average phosphorous test of 66 units per acre. The range of tests was 24 to 116 units from the lowest to the highest grid. This is a difference of 92 units, which shows great variability.



This shows the lab results two years later after two cycles of GPS variable rate fertilizer application. The range of tests was 20 to 76 units or a difference of 56 units. After just two years of VRT applications the phosphorous level on the field was reduced to 45 units.

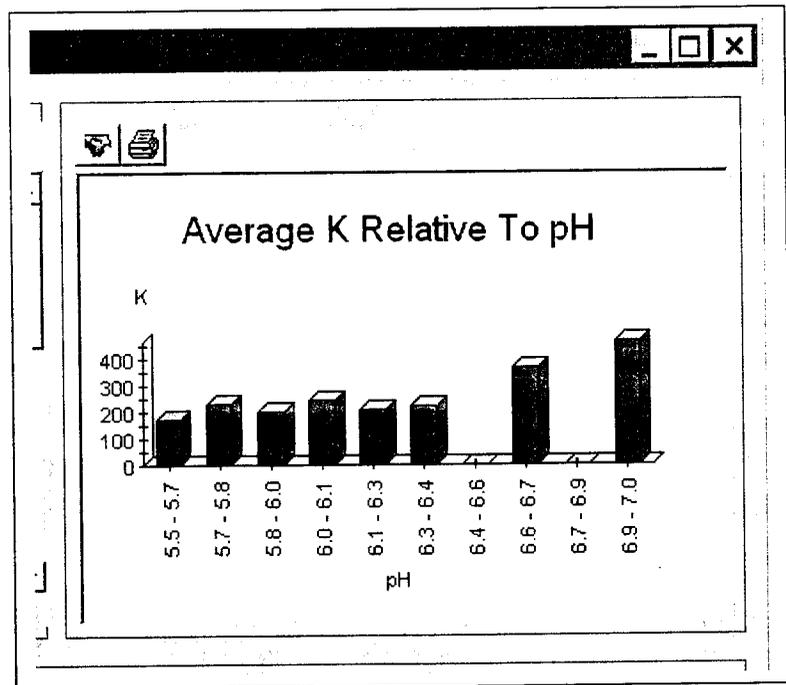
This is the actual phosphorous application map used on the field on the previous page. This represents one annual application for a corn crop. Notice the variance in application rates throughout the field. The average rate of triple super phosphate was only 91 pounds per acre, or an equivalent of 42 pounds of P₂O₅. Without variable rate technology this farmer would have applied 150 pounds of phosphate fertilizer.



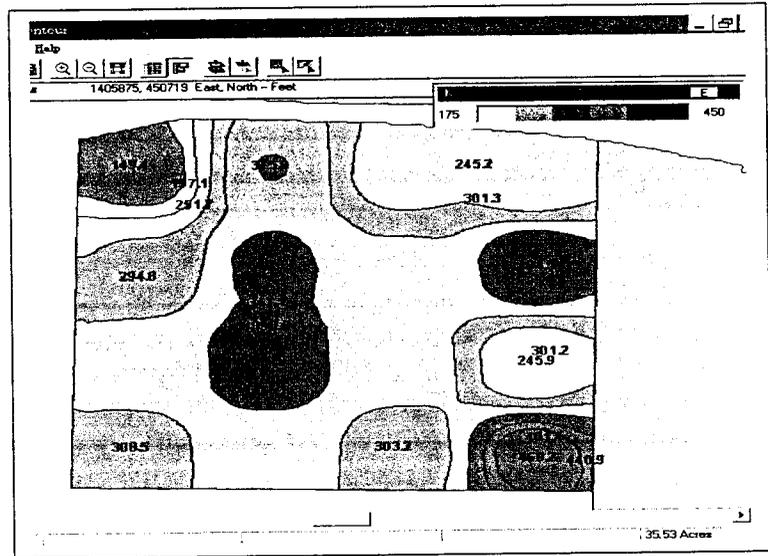
Other Nutrients Tested

In addition to phosphorous testing, the project tested for pH, potassium, cation exchange capacity, and magnesium. It is important to consider the interaction of all major nutrients when evaluating environmental concerns. For example, low pH readings seem to reduce the availability of potassium in the soil.

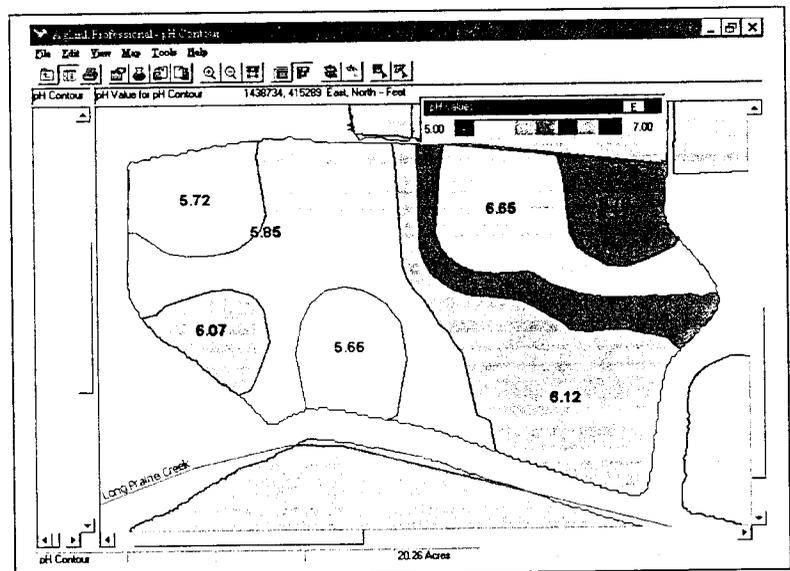
Here is a typical field enrolled in the project that shows the availability of potassium (K) increasing as the pH level in the field increases.



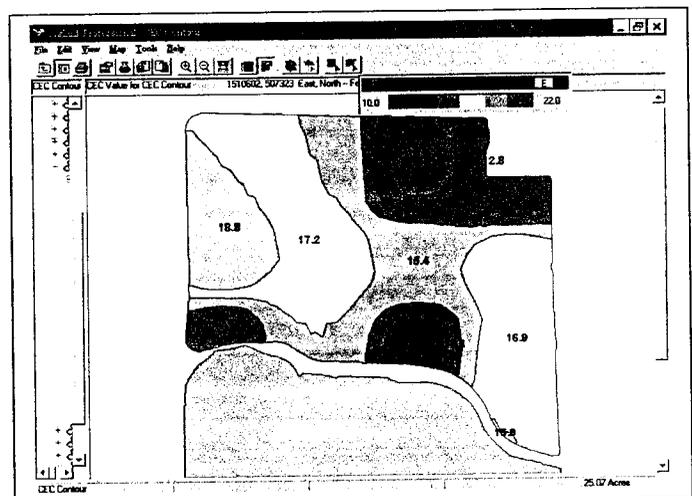
This map shows the great variability of potassium levels, ranging from a low of 149 units per acre to a high of 460 units per acre. Through the use of variable rate technology these potassium levels were leveled out and there is now much more consistency in the field. This results in more potential for increased crop production, more efficiency in fertilizer use and more protection of the environment.



This pH map shows the pH variability of just one of the project fields. In this 20 acre field there is a low pH of 5.6 and a high pH of nearly 6.8. The optimum pH range should be 6.2 – 6.5. Acidity of pH is an important nutrient that controls the availability of many other crop nutrients and the amount of calcium and magnesium in the soil.

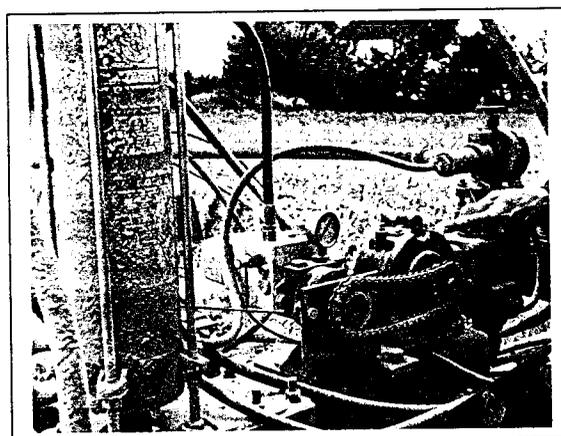


This map shows the extreme variability in cation exchange capacity (CEC). CEC has a direct influence in nutrient holding ability of a soil. The higher the CEC, the more capacity the soil has to hold nutrients and water. CEC is used in the formula when building recommendations of buildup fertility to prevent over fertilization of low CEC soils.



Variable Rate Nitrogen

One of the important aspects of the Precision Nutrient Application project was to evaluate the application of nitrogen based upon variable rate technology. Equipment was secured and software was perfected to apply anhydrous ammonia VRT using soil types as the basis for determining rates. The hypothesis used was that heavier darker soil types that have greater yield potential should receive larger amounts of N than lighter colored soils. Test fields were digitized so that soil type data could be used as the template for determining the correct amount of N to be applied within various soil type regions.



VRT Anhydrous equipment used in the PNA project

Variable Rate Nitrogen Tests - 1998

Treatment	Yield Bu/Acre	N Weighted Ave.	Nitrogen Cost Per Acre	\$ Advantage of VRT per Acre
Check Field 1	171.2	192	28.80	
VRT Field 1	164.5	172.2	25.83	-10.40
Check Field 2	163.5	192	28.80	
VRT Field 2	170.8	180.6	27.09	+16.31
VRT Field 2	170.2	153	22.95	+17.54
Check Field 3	159.7	192	28.80	
VRT Field 3	161.1	175.1	26.27	+5.33
VRT Field 3	160.4	148.3	22.25	+1.20
Check Field 4	4569 (Lbs.)	192	28.80	
VRT Field 4	4519 (Lbs.)	180.9	27.14	+6.66
Check Field 5	169.5	160	24.00	
VRT Field 5	164.4	172.7	25.91	-12.11

Average Dollar Advantage per Acre of VRT Nitrogen Application +\$3.04

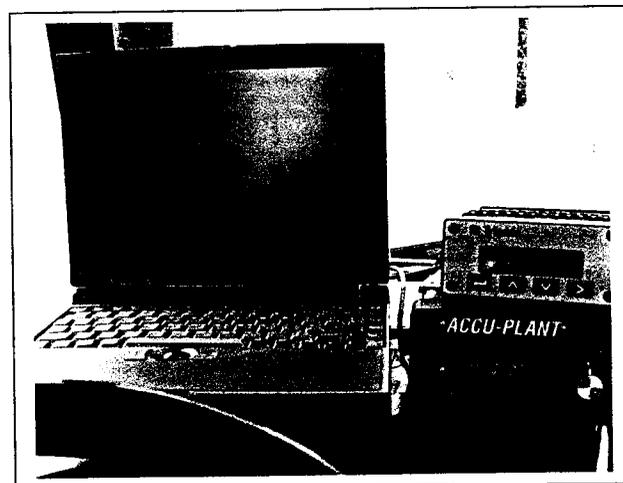
Variable Rate Nitrogen Tests - 1999

Treatment	Yield (Bu. Per Acre)	N Weighted Ave.	Nitrogen Cost per Acre	\$ Advantage of VRT per Acre
VRT Test 1	143.3	173.5	20.82	+11.58
Check Test 1	138.5	190	22.80	
VRT Test 2	137.1	178.75	21.45	-15.65
Check Test 2	145.6	190	22.80	
VRT Test 3	146.3	174	20.88	+11.68
Check Test 3	141.5	190	22.80	
VRT Test 4	130.2	170.5	20.46	+66
Check Test 4	133.2	190	22.80	
VRT Test 5	115.3	169.75	20.37	+3.63
Check Test 5	114.7	190	22.80	

Average Dollar Advantage per Acre of VRT Nitrogen Application +\$2.38

In summary the project demonstrated that by using variable rate technology to apply nitrogen on corn, it is possible to increase profits by \$2.71 per acre. At the same time the results showed that nitrogen rates can be reduced by 20 pounds per acre. Not only can corn producers earn more profit per acre, but by using variable rate technology, less nitrogen can be used which is an environmental advantage.

It is possible to make variable rate nitrogen application user friendly for the farm producer. It requires a GPS receiver, controller, and some type of computer. There are several brands of mobile software that can be used. The PNA project used Fieldlink software in the field.



General Summary

After completing nearly 18,000 acres of GPS grid testing it has been determined that nearly every individual field can be benefited by using grid sampling on 2 ½ acre grids and by making variable rate fertilizer applications. In this study of some 18,000 acres it was found that not only will farmers benefit from more efficient fertilizer applications, but the environmental implications are tremendous.

It was found that every field sampled had huge swings in fertilizer elements between grids. Many have stated that fertility variability is not a concern in flat country like much of the Northwest Ohio region. This was not the case with the fields enrolled in the Precision Nutrient project. Slope or flatness was not a factor in fertility variability.

This project has had several far-reaching effects upon certain elements in Northwest Ohio. Commercial applicators now have an interest in equipping their operations with variable rate application equipment because now there is a base of GPS acres to use this type equipment. One of the reasons that GPS agriculture has been slow to develop in this area is because that base of grided acres was not there. For example, one commercial fertilizer operation in the PNA grant area now has four VRT rigs and prior to the grant this firm had none.

The same scenario is happening with the farm population. It seemed as if it took just one field of grid sampling to convince a farmer that he needs to do more. There were many instances that a farmer just enrolled one field, he saw the results and decided to do more of his farm because he could see the monetary and environmental advantages. Now, with low farm commodity prices, it may be increasingly difficult to sell new farmers on the advantages of GPS grid sampling.

However, it is encouraging to know that many of the grant enrollees are re-gridding their fields. They realize that the information gained is far too valuable to give up.

Appendix A

The following map pages show the maps that were included for each field in the Precision Nutrient Application project. The maps were provided to the farmer client for each field.

Summary of maps:

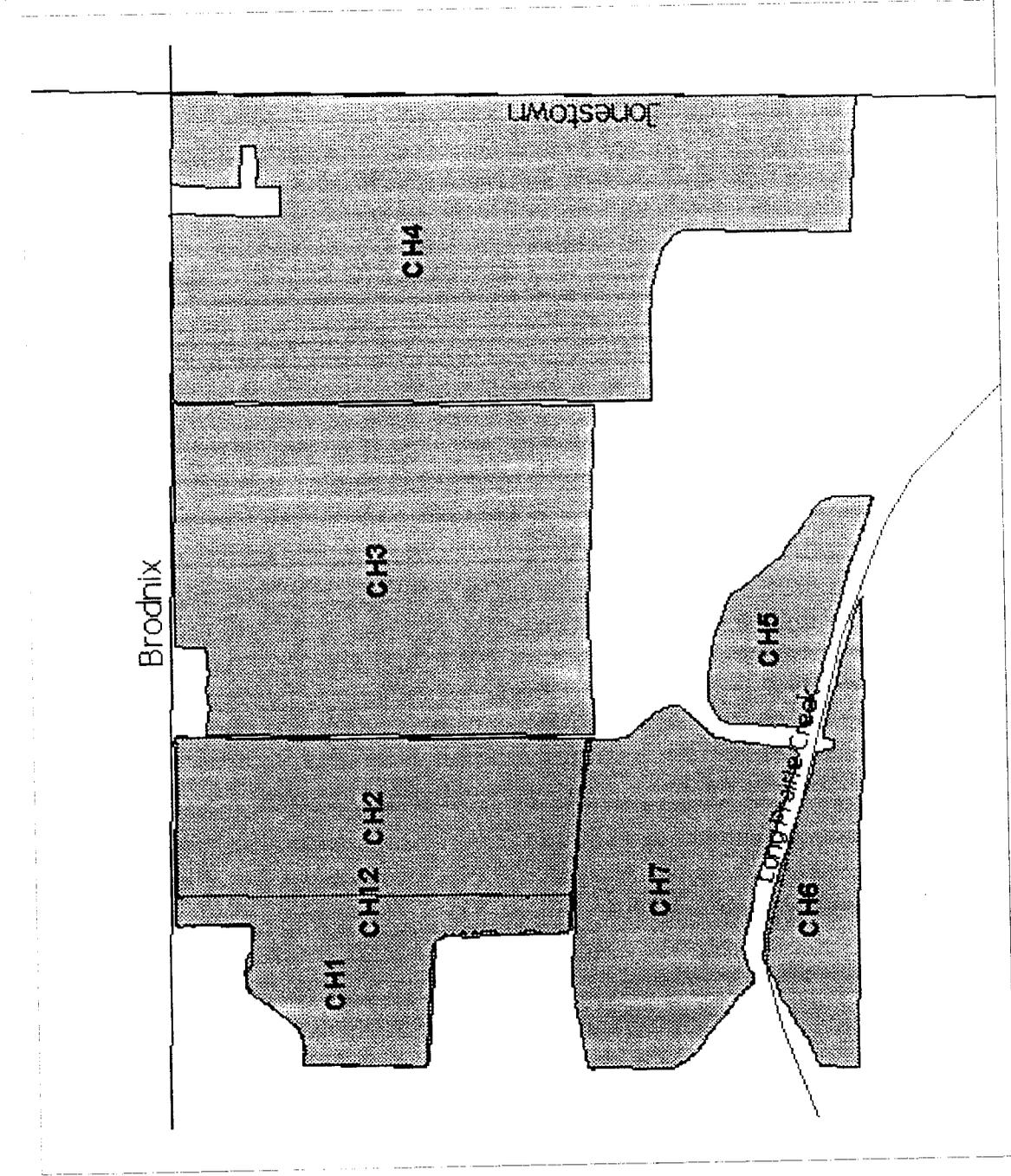
1. GPS Total Farm/Field Layout
2. Soil Type Map
3. PH Site Map
4. CEC Site Map
5. Phosphorous (P1) Site Map
6. Potassium (K) Site Map
7. PH Contour Map
8. CEC Contour Map
9. Phosphorous (P1) Contour Map
10. Potassium (K) Contour Map
11. Potassium Application Map (K)
12. Phosphorous Application Map (P1)
13. Nitrogen (NH₃) Application Map

Appendix B

The following pages contain a summary of all Clients, Farms, and Fields enrolled in the Precision Nutrient Application Project.

Ropp Crop Management Service

Colonial Hill Farm



Reported Area:



Weighted Average:

Computed Area: 210.49

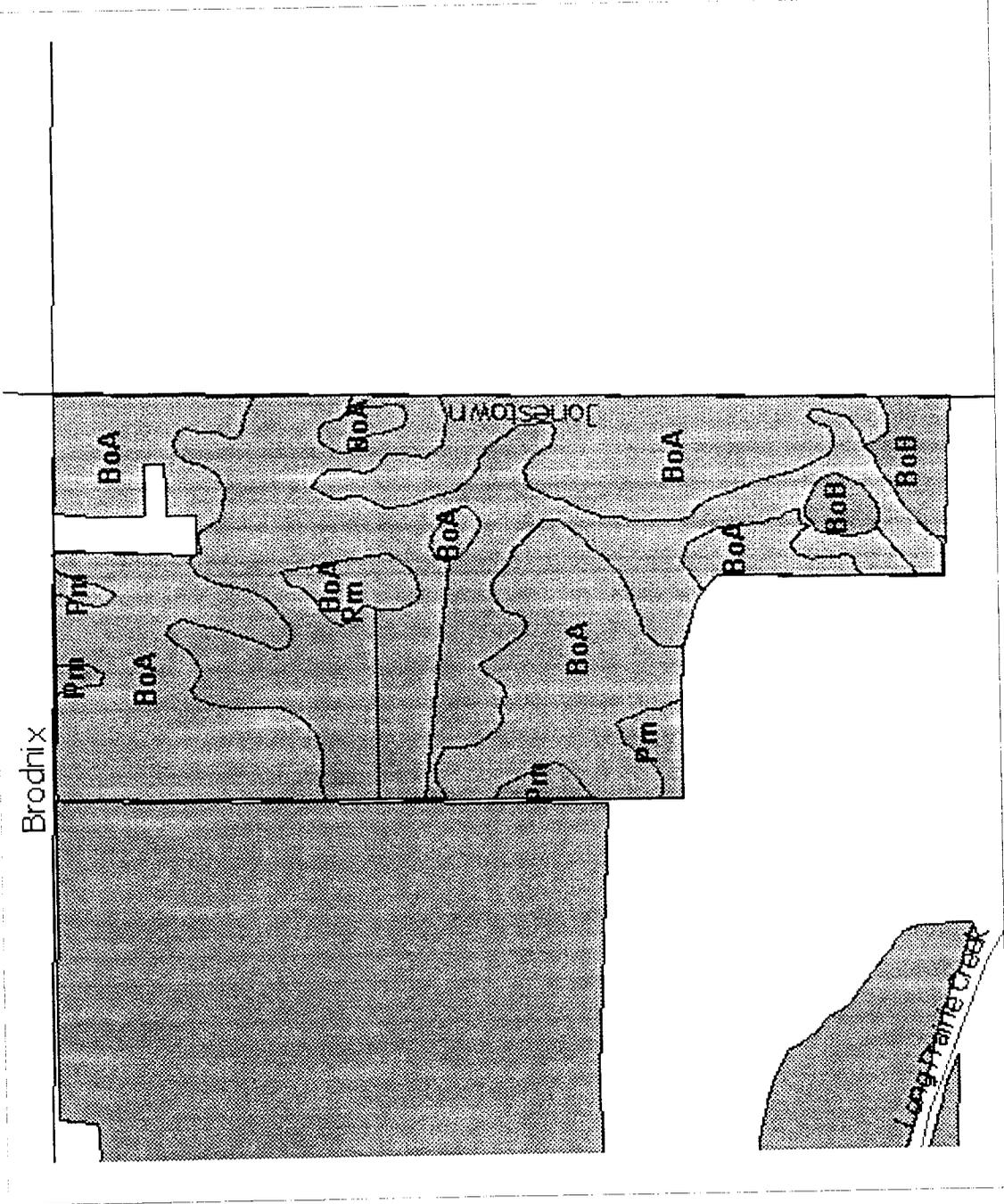
Ropp Crop Management Service

Colonial Hill Farm
Colonial Hill Farm
CH4
Soil Type

Reported Area: 59.04 Acres

Soil Type

-  Pm (25.87)
-  BoA (32.62)
-  BoB (2.28)



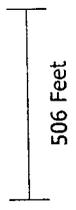
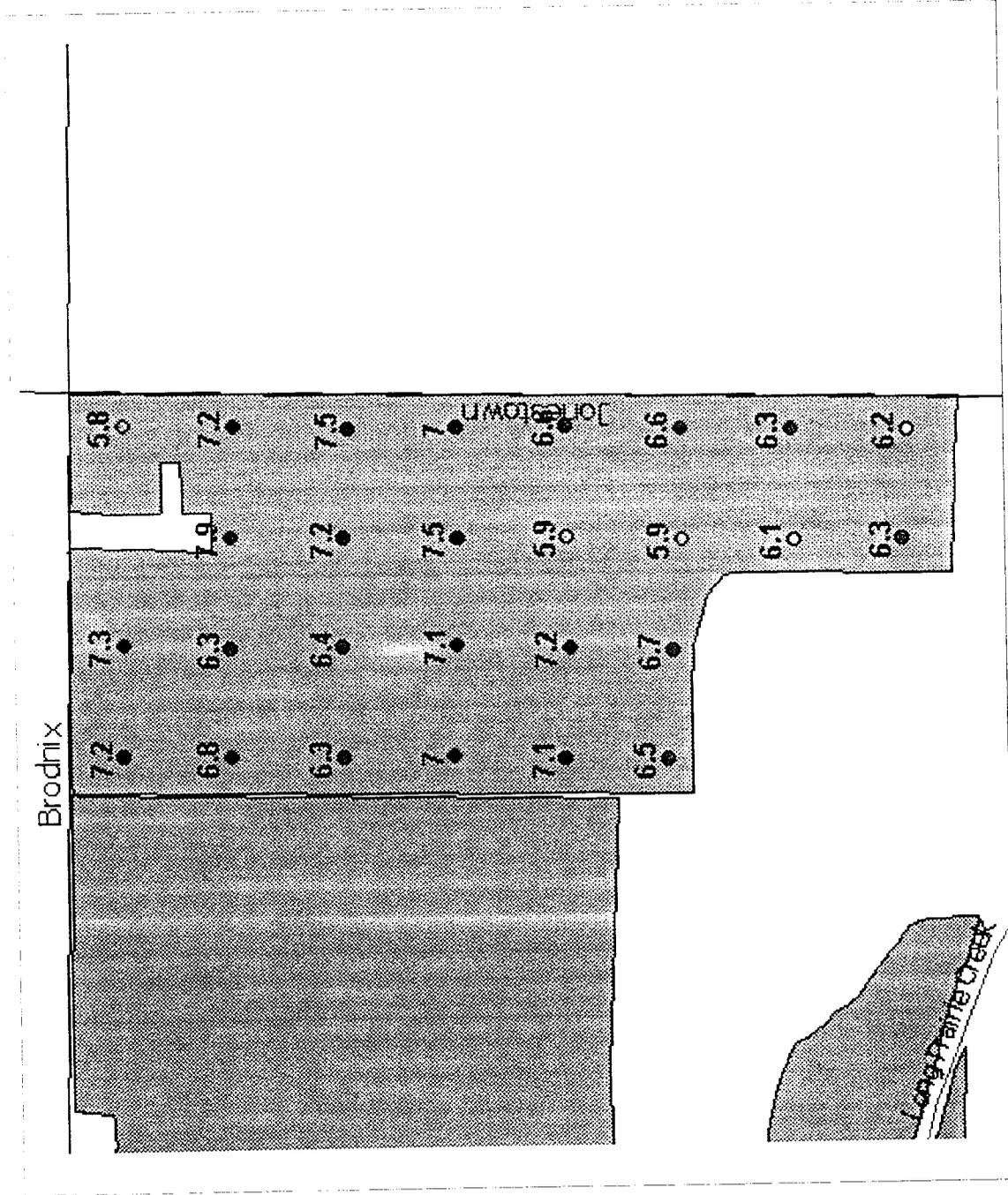
Computed Area: 59.04

Weighted Average:



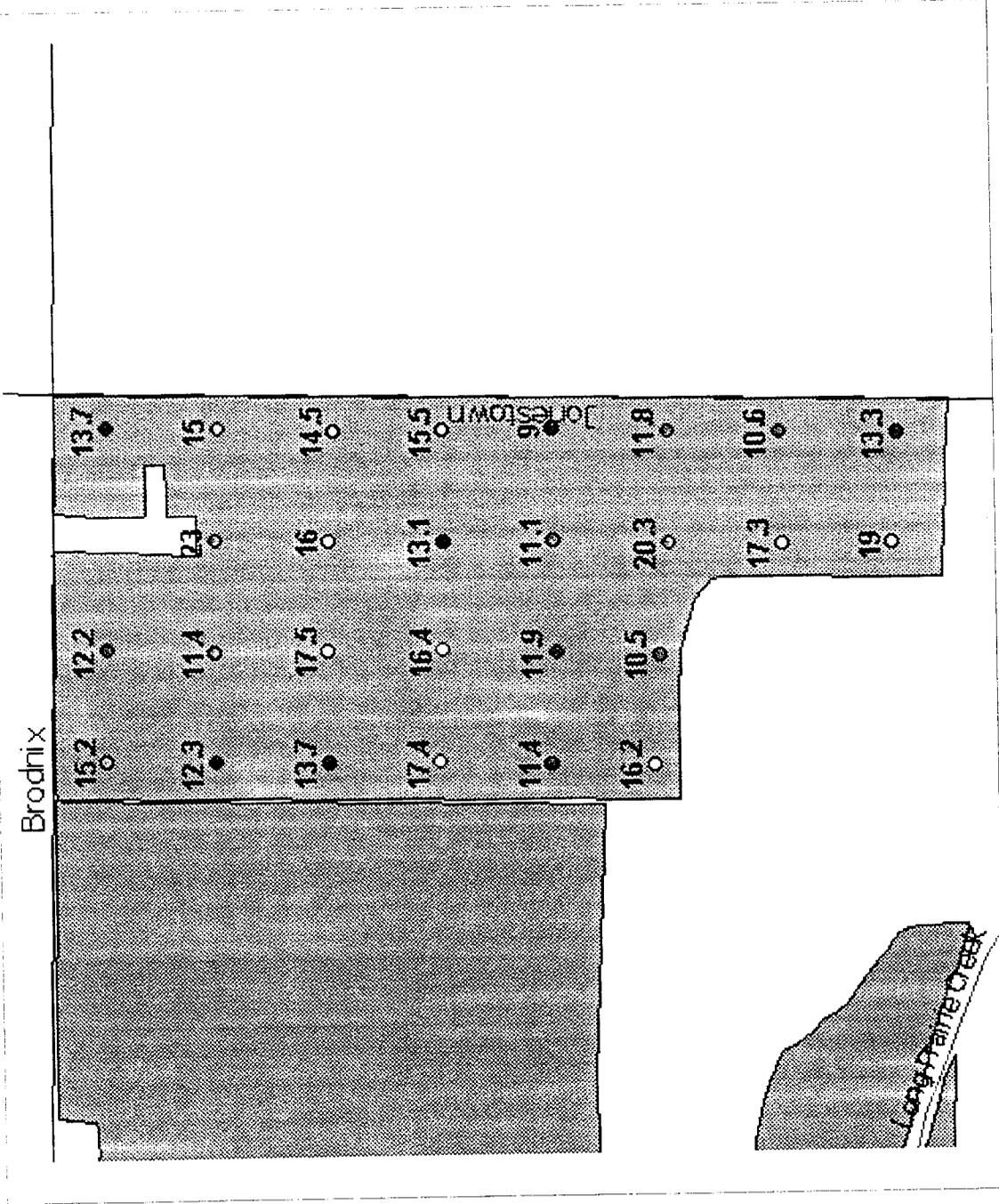
Ropp Crop Management Service

Colonial Hill Farm
 Colonial Hill Farm
 CH4
 1998 Soil Test
 Fertility Sites
 pH
 Reported Area: 59.04 Acres



Ropp Crop Management Service

Colonial Hill Farm
 Colonial Hill Farm
 CH4
 1998 Soil Test
 Fertility Sites
 CEC
 Reported Area: 59.04 Acres

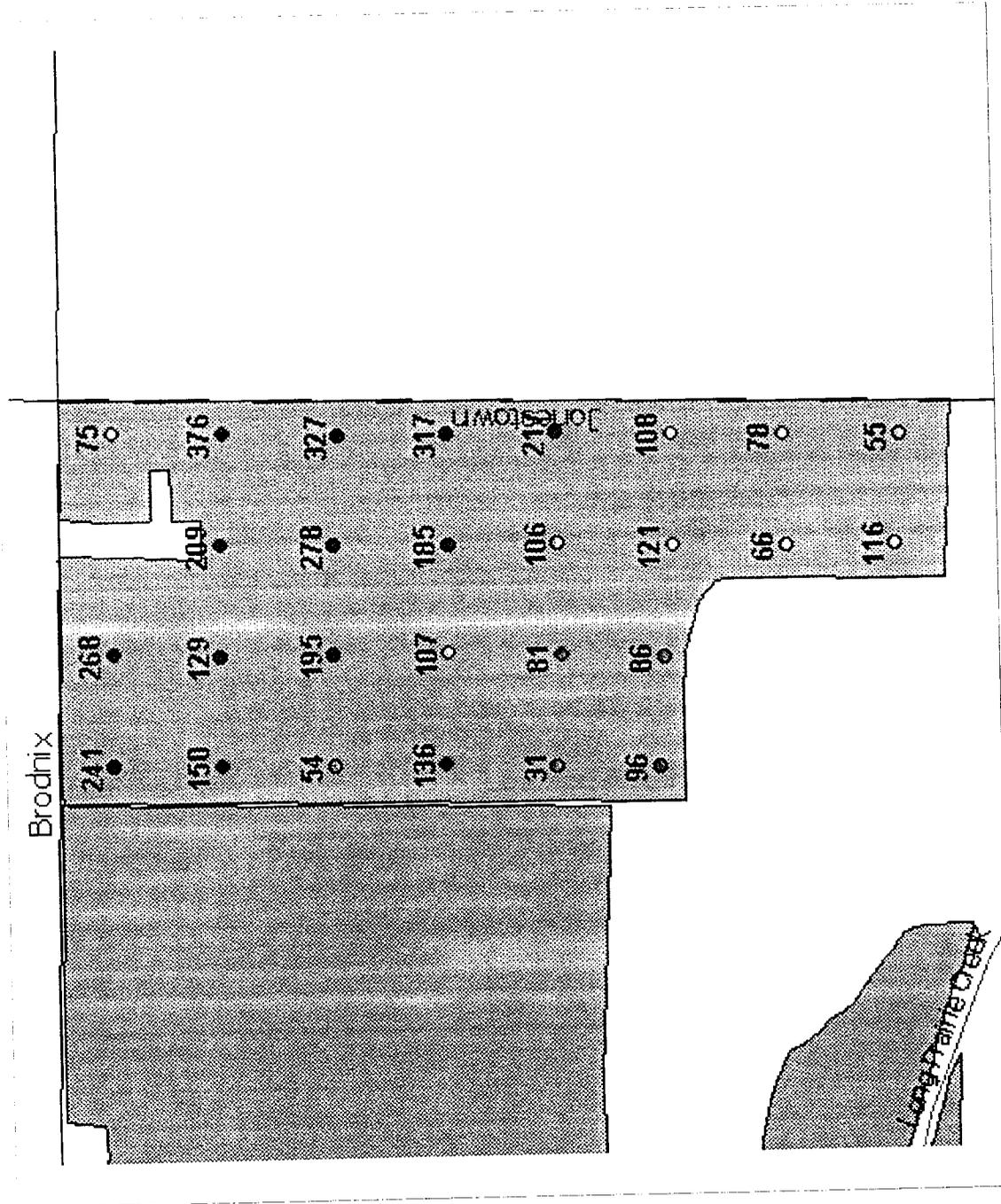


Weighted Average: 14.4 Computed Area: 59.04

506 Feet

Ropp Crop Management Service

Colonial Hill Farm
 Colonial Hill Farm
 CH4
 1998 Soil Test
 Fertility Sites
 P1
 Reported Area: 59.04 Acres

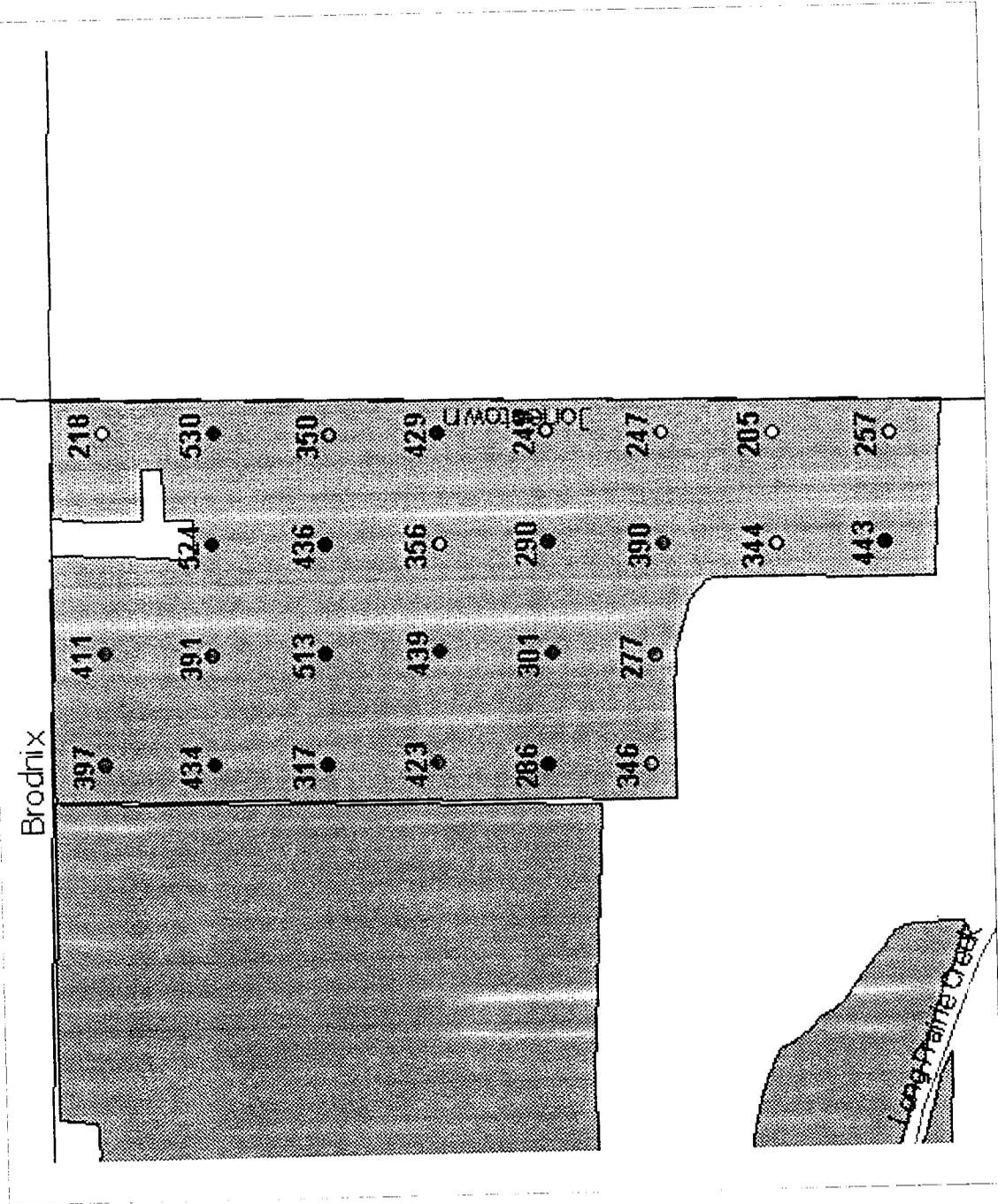
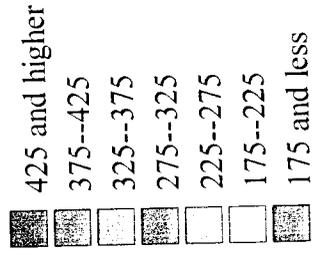


Ropp Crop Management Service

Colonial Hill Farm
 Colonial Hill Farm
 CH4
 1998 Soil Test
 Fertility Sites
 K

Reported Area: 59.04 Acres

Potassium Test



Computed Area: 59.04

Weighted Average: 363



Ropp Crop Management Service

Colonial Hill Farm

Colonial Hill Farm

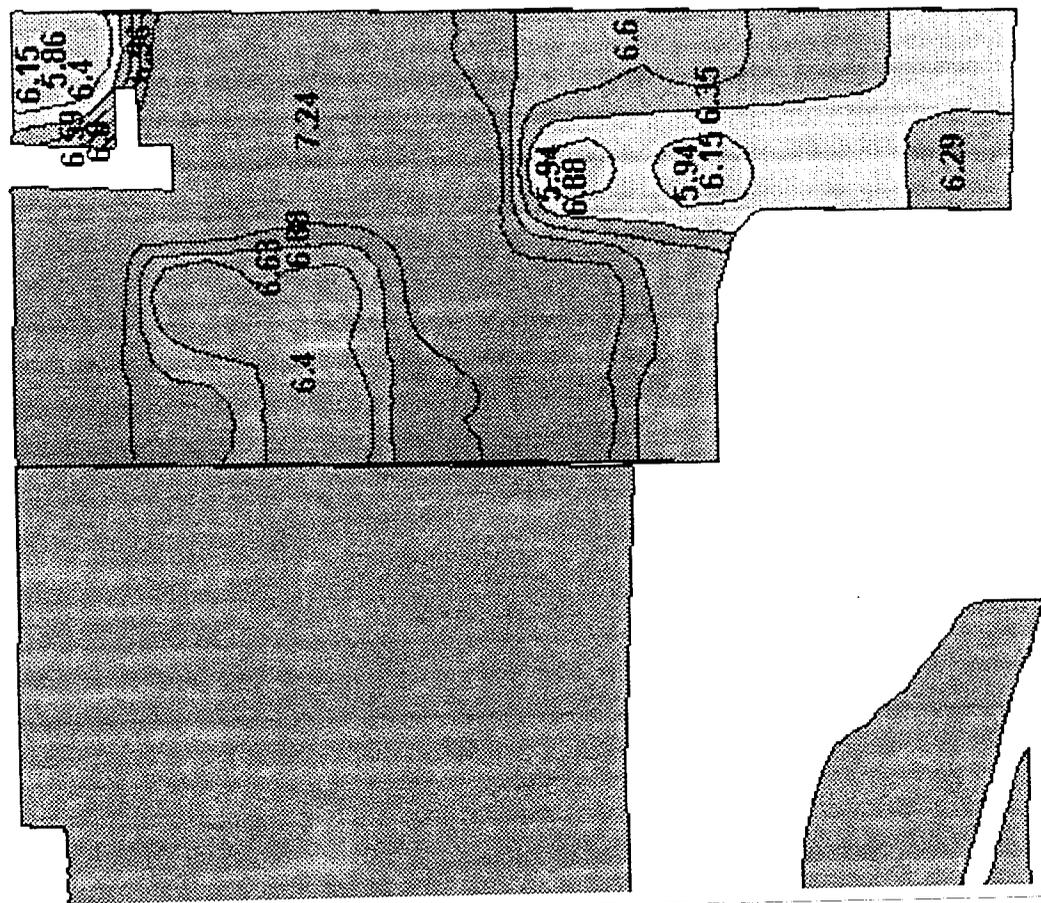
CH4

1998 Soil Test

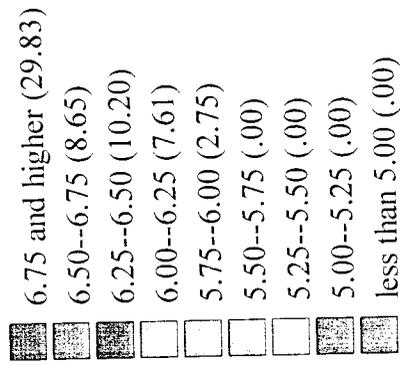
pH Contour

pH

Reported Area: 59.04 Acres

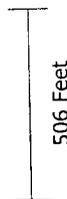


pH values



Weighted Average: 6.75 Computed Area: 59.04

Produced with AgLink for WindowsTM



Ropp Crop Management Service

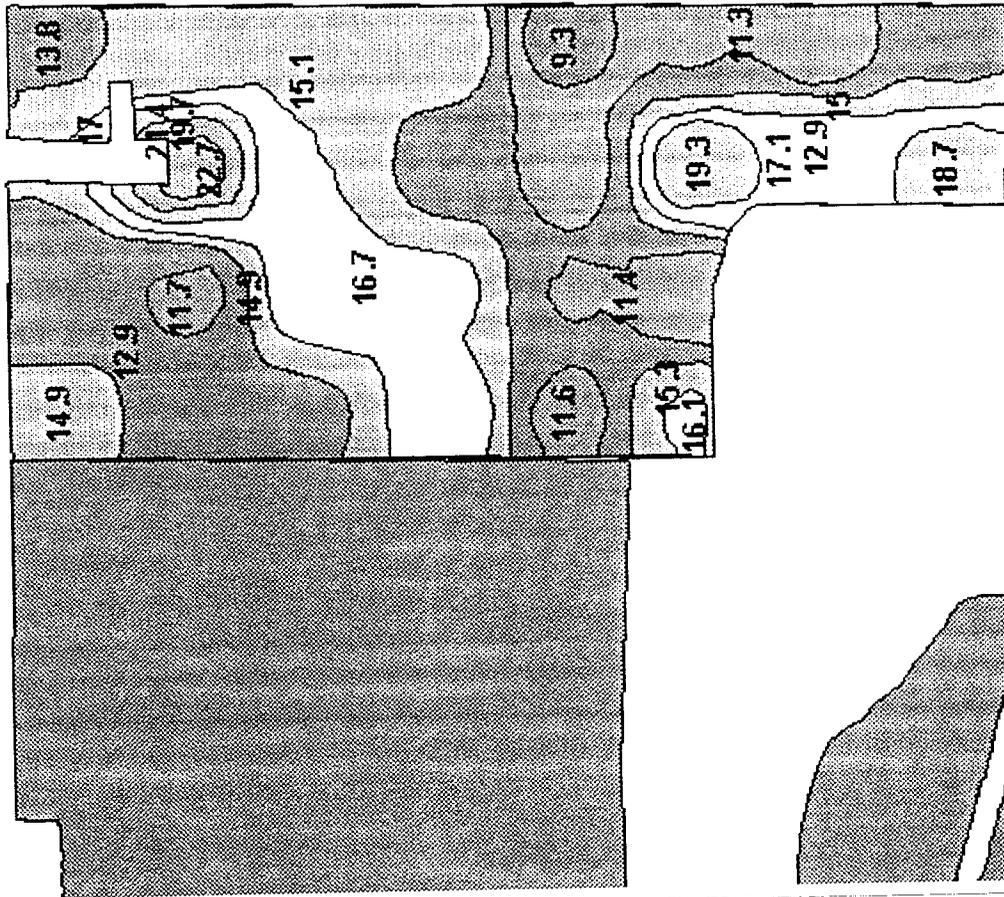
Colonial Hill Farm
 Colonial Hill Farm
 CH4

1998 Soil Test
 CEC Contour
 CEC

Reported Area: 59.04 Acres

Cation Exchange (CEC)

- 20.0 and higher (1.17)
- 18.0--20.0 (3.28)
- 16.0--18.0 (11.26)
- 14.0--16.0 (15.61)
- 12.0--14.0 (18.37)
- 10.0--12.0 (8.36)
- less than 10.0 (.99)



506 Feet

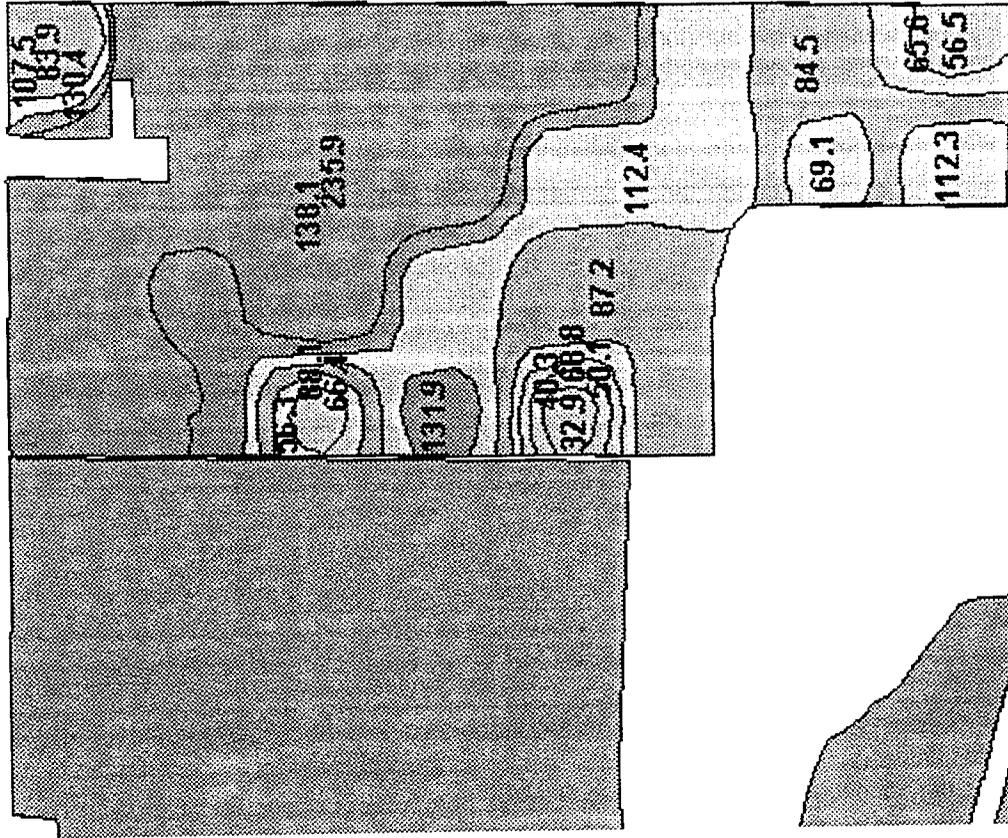
Weighted Average: 14.5 Computed Area: 59.04

Ropp Crop Management Service

Colonial Hill Farm
 Colonial Hill Farm
 CH4
 1998 Soil Test
 P1 Contour
 P1
 Reported Area: 59.04 Acres

Phosphorous Soil Test

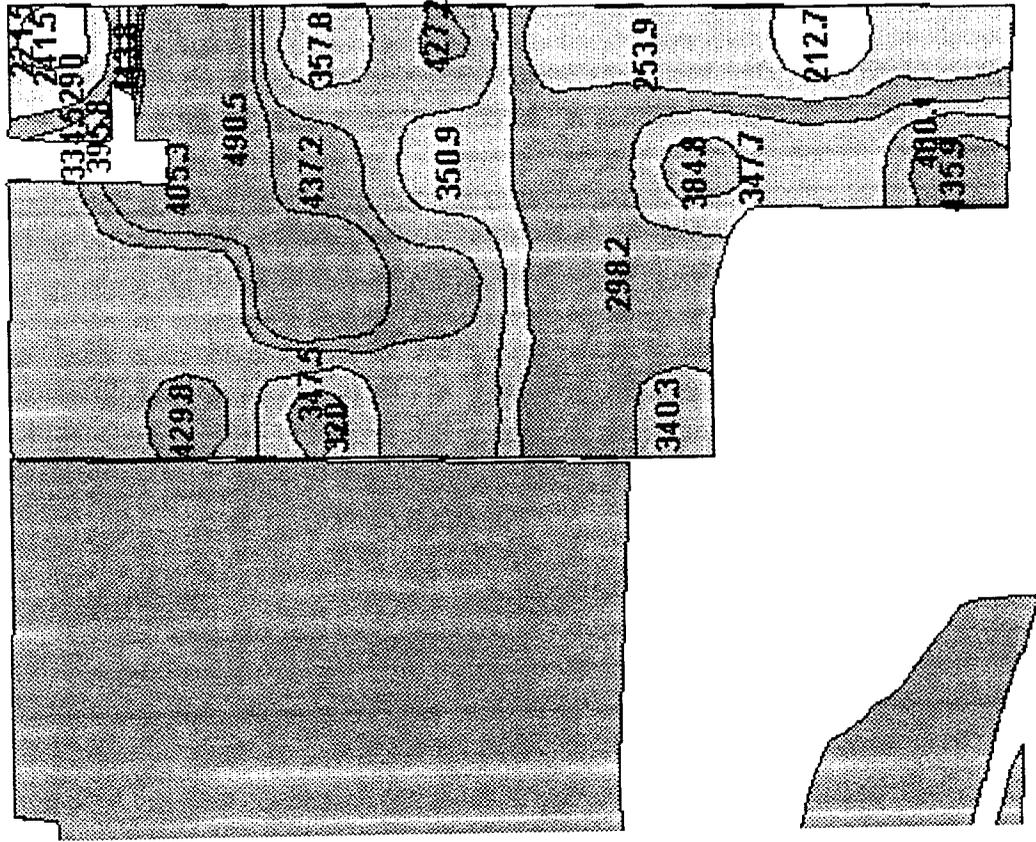
- 125 and higher (31.00)
- 100--125 (10.55)
- 80--100 (11.35)
- 60--80 (3.30)
- 40--60 (2.38)
- 20--40 (.46)
- less than 20 (.00)



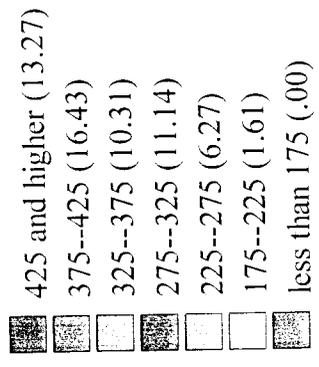
Weighted Average: 157 Computed Area: 59.04

Ropp Crop Management Service

Colonial Hill Farm
 Colonial Hill Farm
 CH4
 1998 Soil Test
 K Contour
 K
 Reported Area: 59.04 Acres



Potassium Test



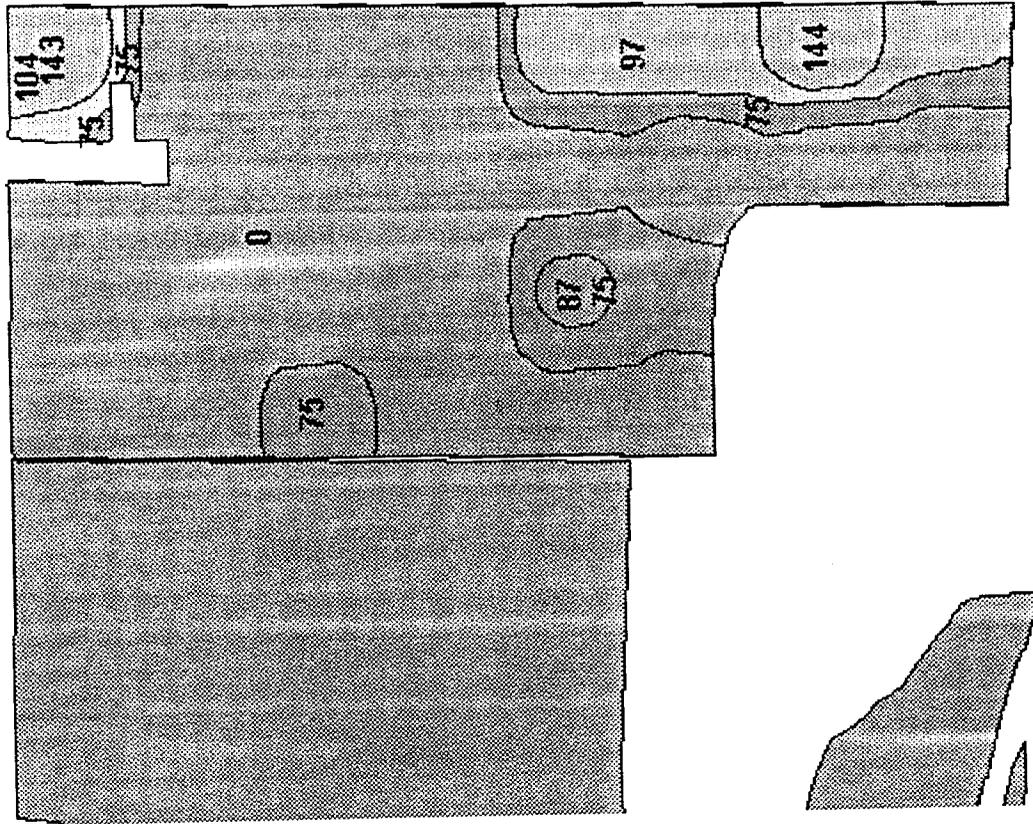
Weighted Average: 367

Computed Area: 59.04



Ropp Crop Management Service

Colonial Hill Farm
Colonial Hill Farm
C114
1999 Crop Plan
CH4 -- Rate(Lbs) EXP K
Rate(Lbs)
Reported Area: 59.04 Acres

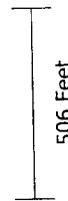


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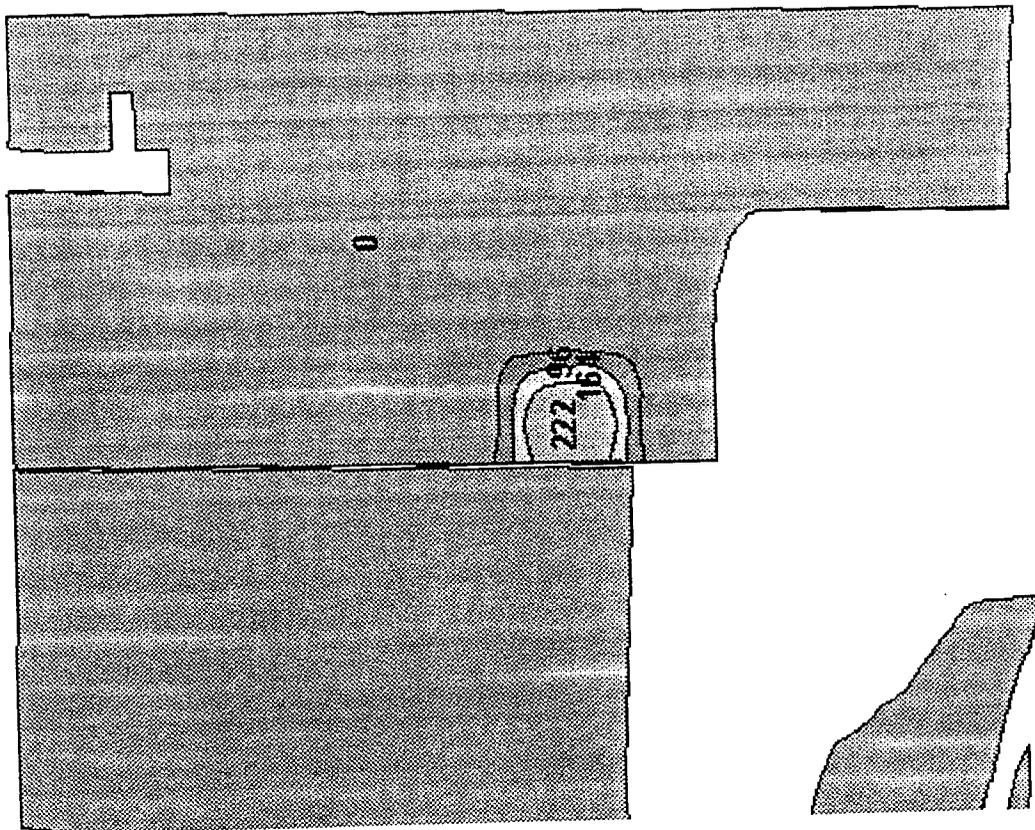
Weighted Average: 29.16

Computed Area: 59.04



Ropp Crop Management Service

Colonial Hill Farm
Colonial Hill Farm
CH4
1999 Crop Plan
CH4 -- Rate(Lbs) EXP P
Rate(Lbs)
Reported Area: 59.04 Acres



<u><Default></u>

222.00

166.50

111.00

55.50

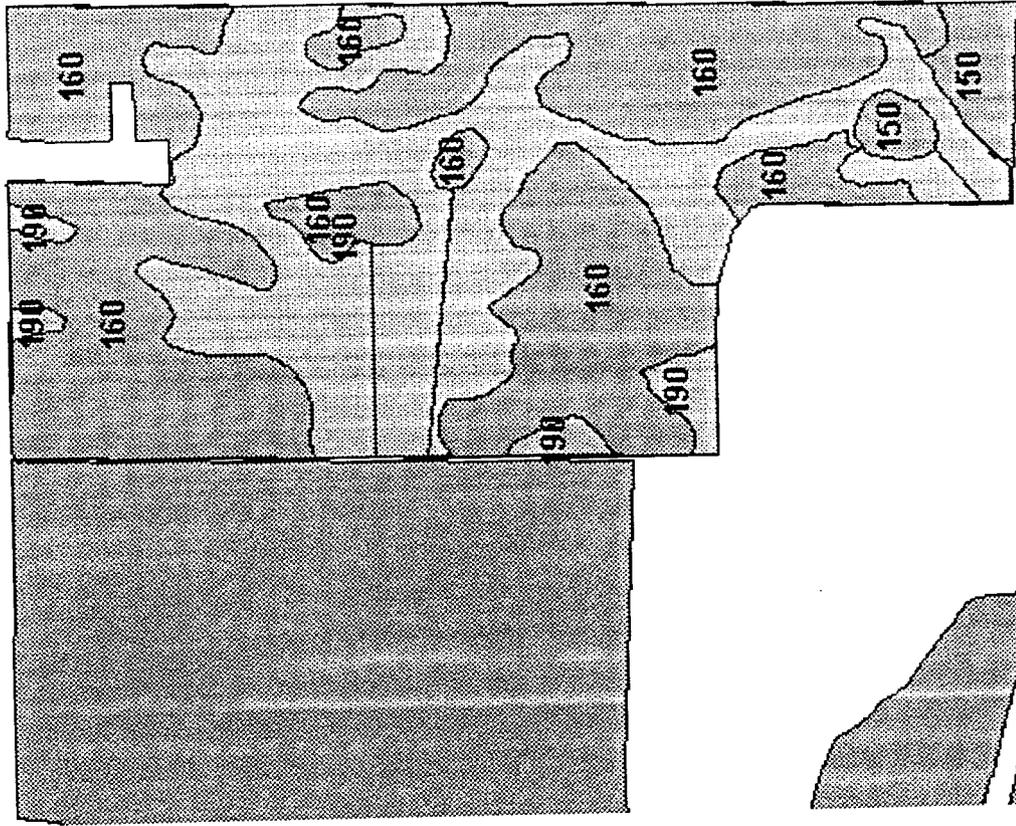
0.00

Weighted Average: 6.80 Computed Area: 59.04

506 Feet

Ropp Crop Management Service

Colonial Hill Farm
Colonial Hill Farm
CH4
1999 Crop Plan
CH4 -- Rate(Lbs) NH3
Rate(Lbs)
Reported Area: 59.04 Acres



506 Feet

Weighted Average: 172.39

Computed Area: 60.77



List for Client Root

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Client	Farm	Field	Township	Legal	Area
mandinger, David	Dave Allmandinger Farm	DA1 M&M-1			50.49 Acres
		DA2 M&M-2			35.95 Acres
		DAKN			40.94 Acres
		DAKS			39.87 Acres
		DAM1 Merkle Farm			29.22 Acres
		DAR1 Rager Farm			153.38 Acres
		DRN			43.09 Ares
		Total Area for Dave Allmandinger Farm			
Ron Allmandinger		RA60F			29.71 Acres
		RAH1			40.16 Acres
		RAH2			7.57 Acres
Total Area for Ron Allmandinger					77.44 Acres
Total Area for Allmandinger, David					470.38 Acres
mandinger, Ron	Allmandinger, Ron				
Colonial Hill Farm	Colonial Hill Farm	CH1			34.14 Acres
		CH12			46.40 Acres
		CH2			59.04 Acres
		CH3			7.40 Acres
		CH4			8.97 Acres
		CH5			20.26 Acres
		CH6			176.21 Acres
		CH7			
Total Area for Colonial Hill Farm					176.21 Acres
Total Area for Colonial Hill Farm					176.21 Acres
Eichholt, Ray	RAY EICHOLT FARM	RE224			51.90 Acres
		RE6 Home-6			109.48 Acres
		REDUP			117.21 Acres
		REFH3			56.86 Acres
		REFH5			4.44 Acres
		REFH8			38.10 Acres



List for Client Root

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Client	Farm	Field	Township	Legal	Area
		REG1			23.35 Acres
		REG2			24.19 Acres
		REG3			20.05 Acres
		RELH1			10.80 Acres
		RELH2			26.12 Acres
		RELH3			24.84 Acres
		RELH4			4.98 Acres
Total Area for RAY EICHOLT FARM					512.32 Acres
Total Area for Eickholt, Ray					512.32 Acres
Evans, Ralph	RALPH EVANS HOME FARM	REH1			31.05 Acres
Total Area for RALPH EVANS HOME FARM					31.05 Acres
	South Farm	REFS2 SOUTH 2			25.11 Acres
		RESO3			25.24 Acres
		South, 1 RESO1			25.35 Acres
Total Area for South Farm					75.7 Acres
Total Area for Evans, Ralph					106.75 Acres
Evans/Timlinson	Bill Evans Farm	BEET1			14.25 Acres
		BEET2			10.05 Acres
		BEETA			11.86 Acres
		BEFF			71.61 Acres
		BEGAM			72.36 Acres
		BEH1			16.50 Acres
		BEH2			26.09 Acres
		BEH3			12.66 Acres
		BEHP			11.58 Acres
		BEHPS			6.19 Acres
		BEHPSE			41.89 Acres
Total Area for Bill Evans Farm					295.04 Acres
Total Area for Evans/Timlinson					295.04 Acres
Hays, Paul	Paul Hays Farm	PH1			17.42 Acres



List for Client Root

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Client	Farm	Field	Township	Legal	Area
Total Area for Paul Hays Farm					17.42 Acres
<hr/>					
Hertel, Don	<i>Don Hertel, 2</i>	<i>Don Hertel, 2</i>			
	<i>DON HERTLE DAVIS</i>	<i>DHDSW1</i>			10.00 Acres
		<i>DHDSW2</i>			23.81 Acres
	Total Area for DON HERTLE DAVIS				33.81 Acres
	<i>Don/Kevan Farm 1</i>	<i>Don/Kevan Field 1</i>			63.63 Acres
	Total Area for Don/Kevan Farm 1				63.63 Acres
	<i>Don/Kevan Farm 5</i>	<i>Don Hertel, 5-1</i>			33.83 Acres
	Total Area for Don/Kevan Farm 5				33.83 Acres
	<i>Ruth/Kevan Farm 3</i>	<i>DH3AN</i>			13.99 Acres
		<i>DH3BN</i>			26.90 Acres
		<i>Don Hertel farm 3, Field 3</i>			27.93 Acres
		<i>Mid</i>			7.81 Acres
		<i>Don Hertel, Farm 3, South</i>			
		<i>SOUTH & MIDDLE</i>			
	Total Area for Ruth/Kevan Farm 3				76.63 Acres
	<i>Ruth/Kevan Farm 4</i>	<i>Don Hertel, Home 4-n</i>			38.41 Acres
		<i>Don Hertel, Home, 4S</i>			26.53 Acres
	Total Area for Ruth/Kevan Farm 4				64.94 Acres
Total Area for Hertel, Don					272.84 Acres
<hr/>					
Other Farms	<i>Assoc. Charities</i>	<i>KFAC1</i>			4.67 Acres
		<i>KFAC2</i>			25.73 Acres
		<i>KFAC3</i>			37.63 Acres
		<i>KFAC4</i>			25.99 Acres
		<i>KFAC5</i>			36.02 Acres



List for Client Root

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Client	Farm	Field	Township	Legal	Area
		KFAC6			12.81 Acres
		KFAC7			25.29 Acres
		Slane			16.74 Acres
Total Area for Assoc. Charities					184.88 Acres
Bowers		Keber Farms, Bowers, 1			
Brickner		Keber Farms, Bricker, 2			6.84 Acres
		Keber Farms, Bricker, 3			19.53 Acres
		Keber Farms, Brickner, 1			13.53 Acres
Total Area for Brickner					39.9 Acres
Clifton		KFC1			14.46 Acres
		KFC2			20.10 Acres
Total Area for Clifton					34.56 Acres
Downs		Downs, 3			51.53 Acres
		Downs, 4			40.38 Acres
		Downs, 1			14.78 Acres
		KFD2			52.92 Acres
Total Area for Downs					159.61 Acres
Exline		Exline Woods North			
		KFX1			11.76 Acres
		KFX2			42.56 Acres
		KFX34			59.23 Acres
Total Area for Exline					113.55 Acres
Fauble		Keber Farms, Fauble, 1			
		Keber Farms, Fauble, 2			
		Keber Farms, Fauble, 3			
		Keber Farms, Fauble, 6			



List for Client Root

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Client	Farm	Field	Township	Legal	Area
Herl		Keber Farms, Herl, 1			40.12 Acres
Total Area for Herl					40.12 Acres
Hertel/Tindall		Keber Farms, Hertel/Tindall 1			37.54 Acres
		Keber Farms, Hertel/Tindall 2			30.39 Acres
Total Area for Hertel/Tindall					67.93 Acres
HOMESTEAD, 99		KF991			51.99 Acres
		KF992			42.62 Acres
		KF993			61.78 Acres
		KF994			56.07 Acres
Total Area for HOMESTEAD, 99					212.46 Acres
Jim Hertel		Hertel 3,4			34.72 Acres
		Keber Farms, Hertel, 1			43.06 Acres
		Keber Farms, Hertel, 2			16.71 Acres
		Keber Farms, Hertel, 3			
		Keber Farms, Hertel, 4			
		Keber Farms, Hertel, 5			141.12 Acres
		Keber Farms, Hertel, 6			54.15 Acres
Total Area for Jim Hertel					289.76 Acres
Jones/Hoaglin		Keber Farms, Jones, 1			
		Keber Farms, Jones, 2-3			
		Keber Farms, Jones, 4			
KFG, Gamble		KFG1			18.95 Acres
Total Area for KFG, Gamble					18.95 Acres
KFI, IRENE		KFI1			77.62 Acres
		KFI2			26.67 Acres



List for Client Root

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Client	Farm	Field	Township	Legal	Area
		KFI3			112.73 Acres
		KFI5			4.44 Acres
Total Area for KFI, IRENE					221.46 Acres
	KFOV Oakview	KFOV1			28.30 Acres
Total Area for KFOV Oakview					28.3 Acres
	Moyer	Keber Farms, Moyer, 1			10.63 Acres
		Keber Farms, Moyer, 2			59.66 Acres
Total Area for Moyer					70.29 Acres
	Osborn	Keber Farms, Osborn, 1			76.46 Acres
Total Area for Osborn					76.46 Acres
	Owens	Keber Farms, Owens, 1			56.22 Acres
Total Area for Owens					56.22 Acres
	Snyder	KFS1			16.82 Acres
		KFS2			17.69 Acres
		KFS3			39.03 Acres
Total Area for Snyder					73.54 Acres
	Taylor	Keber Farms, Taylor, 1			
Total Area for Keber Farms					1687.99 Acres
	Linton, Larry	LSL FARMS LINTON	LSL14 1-4		70.42 Acres
			LSL2		43.43 Acres
			LSL3		6.92 Acres
Total Area for LSL FARMS LINTON					120.77 Acres
Total Area for Linton, Larry					120.77 Acres



List for Client Root

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Client	Farm	Field	Township	Legal	Area
Matthews, Jeff-Todd	Jeff Todd Matthews	JME			18.32 Acres
	Total Area for Jeff Todd Matthews Ellinger				18.32 Acres
Matthews, Jeff-Todd	Jeff-Todd Matthews,Bobs	Jeff-Todd Matthews,Bobs 16A MF16 BOBS			29.35 Acres
	Total Area for Jeff-Todd Matthews,Bobs				29.35 Acres
	Jeff-Todd Matthews C Easley	Jeff-Todd Matthews C Easley 23			
	Jeff-Todd Matthews Clouse	Jeff-Todd Matthews Clouse 28 Jeff-Todd Matthews Clouse 28A JM29 Clouse 29			54.80 Acres 4.67 Acres 38.21 Acres
	Total Area for Jeff-Todd Matthews,Clouse				97.68 Acres
	Jeff-Todd Matthews,Emma Easley	Jeff-Todd Matthews,Easley 9			
	Jeff-Todd Matthews,G.S.I.	Jeff-Todd Matthews G.S.I.7			
	Jeff-Todd Matthews,Genes	Jeff-Todd Matthews Genes 24			
	Jeff-Todd Matthews Grandma	Jeff-Todd,Matthews,Grandr			77.08 Acres
	Total Area for Jeff-Todd Matthews,Grandma				77.08 Acres
	Jeff-Todd Matthews Habitzal	Jeff-Todd Matthews Habitzal 5			
	Jeff-Todd Matthews,Home Farm	Jeff-Todd Matthews Home 3-4			76.62 Acres



List for Client Root

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Client	Farm	Field	Township	Legal	Area
Total Area for Jeff-Todd Matthews,Home Farm					76.62 Acres
Jeff-Todd Matthews, John Fvink		Jeff-Todd Matthews Fvink 10 Jeff-Todd Matthews Fvink 10A Jeff-Todd Matthews Fvink 11			
Jeff-Todd Matthews, Knoll		JMKN Knoll, 26 Knoll, 27			37.24 Acres
Total Area for Jeff-Todd Matthews,Knoll					37.24 Acres
Jeff-Todd Matthews, K-R Shortys		K-R Shortys			39.37 Acres
Total Area for Jeff-Todd Matthews, K-R Shortys					39.37 Acres
Jeff-Todd Matthews Owens		Jeff-Todd Matthews Owens 1 Jeff-Todd Matthews Owens 2			65.41 Acres 78.46 Acres
Total Area for Jeff-Todd Matthews, Owens					143.87 Acres
Jeff-Todd Matthews, Ross		Jeff-Todd Matthews Raner R Jeff-Todd Matthews, Ross 18			
Jeff-Todd Matthews T Witten		Emma Home 12a Emma Home 13 Emma Home 14 Emma Home 19 Emma Home 19a Jeff-Todd Matthews F Grant 15 Jeff-Todd Matthews F Grant 15A Jeff-Todd Matthews, Emma Home 12			8.54 Acres 48.79 Acres 34.97 Acres
Total Area for Jeff-Todd Matthews, T. Witten					92.3 Acres
Jeff-Todd Matthews W Witten		Jeff-Todd Matthews W Witten Jeff-Todd Matthews W Witten 17			



List for Client Root

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Client	Farm	Field	Township	Legal	Area
Total Area for Matthews, Jeff-Todd					611.83 Acres
Merkle, Kent	Kent Merkle Harold Merkle	HLJM			33.44 Acres
		Kent Merkle Harold Merkle H 196			35.71 Acres
		KMHMN			45.08 Acres
Total Area for Kent Merkle Harold Merkle					114.23 Acres
Merkle, Dave	Kent Merkle, Dave	MEDM1 - Dave Merkle			37.06 Acres
		MEDM3			34.91 Acres
		Total Area for Kent Merkle, Dave			71.97 Acres
Total Area for Merkle, Kent					186.2 Acres
Neate Farm	Neate Farm Daves	NFDN1			52.89 Acres
		NFDN2			6.96 Acres
		NFDN3			55.46 Acres
Total Area for Neate Farm Daves					115.31 Acres
Neate Farm Foust	Neate Farm Foust	NFFE			72.54 Acres
		NFFW			58.61 Acres
		NFFW1			8.97 Acres
Total Area for Neate Farm Foust					140.12 Acres
NEATE FARM HARRY HFI FN		NFEE			47.27 Acres
		NFEE1			1.09 Acres
		NFEW EVANS WEST			74.61 Acres
		NFHH1E			21.07 Acres
		NFHH1W 1-WEST			81.90 Acres
		NFHH1WA 1WEST A			3.34 Acres
		NFHH2E			47.60 Acres
		NFHH2N			13.99 Acres
		NFHH2S			25.95 Acres
		NFRN1			28.25 Acres



List for Client Root

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Client	Farm	Field	Township	Legal	Area
Total Area for NEATE FARM HARRY HELEN					345.07 Acres
<i>Neate Farm Joe Hertle</i>		<i>Hertel - Wren Landeck</i>			81.78 Acres
		<i>NFJH1</i>			70.18 Acres
		<i>NFJH3 Hertel, 3</i>			71.60 Acres
		<i>NFJH4</i>			112.13 Acres
		<i>NFJH5</i>			66.19 Acres
Total Area for Neate Farm Joe Hertle					401.88 Acres
<i>NEATE FARM STOLLER</i>		<i>NFST1</i>			34.11 Acres
		<i>NFST2</i>			32.68 Acres
Total Area for NEATE FARM STOLLER					66.79 Acres
<i>NEATE FARM MARBAUGH</i>		<i>NFM</i>			76.91 Acres
Total Area for NEATE FARM, MARBAUGH					76.91 Acres
<i>Wise Farm</i>		<i>NFW1 Wise - 1</i>			55.12 Acres
		<i>NFW2 Wise 2</i>			20.33 Acres
		<i>NFW3</i>			35.51 Acres
Total Area for Wise Farm					110.96 Acres
Total Area for Neate Farm					1257.04 Acres
<i>Dussbaum, Dan</i>	<i>Grotehouse</i>	<i>DNGR1</i>			14.15 Acres
		<i>DNGR2</i>			20.98 Acres
Total Area for Grotehouse					35.13 Acres
<i>Home</i>		<i>DNH1</i>			14.55 Acres
		<i>DNH2</i>			20.04 Acres
		<i>DNW1</i>			35.16 Acres
		<i>DNW23</i>			46.48 Acres
		<i>DNWE</i>			19.17 Acres
Total Area for Home					135.4 Acres



List for Client Root

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Client	Farm	Field	Township	Legal	Area
	Koester	DNK1			22.24 Acres
Total Area for Koester					22.24 Acres
	Rager	DNR			37.86 Acres
Total Area for Rager					37.86 Acres
	Sanders	DNSA1			20.12 Acres
		DNSA2			2.45 Acres
Total Area for Sanders					22.57 Acres
	Shaw	DNS1 SHAW			9.10 Acres
		DNS2			24.48 Acres
Total Area for Shaw					33.58 Acres
Total Area for Nussbaum, Dan					286.78 Acres
Oberlitner, Clarence	Clearance Oberlitner Farm	COH1			51.40 Acres
		COJ			57.18 Acres
		COJH			36.20 Acres
		COJT1 JAY			
		COJT2 JAY			
		COT			
		COTE			13.46 Acres
		COTW			24.99 Acres
Total Area for Clearance Oberlitner Farm					183.23 Acres
Total Area for Oberlitner, Clarence					183.23 Acres
Owens, Kevin	Kevin Owens , Knoll	KOKS			34.92 Acres
Total Area for Kevin Owens , Knoll					34.92 Acres
Total Area for Owens, Kevin					34.92 Acres
Bank, Roger	Triple R Farms	TRFBL1			47.78 Acres
		TRFBL3 BLAUSER 3			18.53 Acres
		TRFBL4 Blauser - 4			3.64 Acres
		TRFK2 Knittle 2			17.48 Acres



List for Client Root

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Client	Farm	Field	Township	Legal	Area
		TRFK3			15.75 Acres
		TRFK4			7.85 Acres
		TRFK5			6.36 Acres
		TRFOR4 OWEN 4			19.23 Acres
		TRFOR5			19.09 Acres
		TRFPK1			11.97 Acres
		TRFPK2			8.18 Acres
		TRFPK3			20.10 Acres
		TRFRR3			13.99 Acres
		TROR13 Owen - 1,2,3			46.55 Acres
		TRRR12			57.68 Acres
Total Area for Triple R Farms					314.18 Acres
Total Area for Rank, Roger					314.18 Acres
Recker, Dan	Dan Recker Farm	DRFN			25.07 Acres
		DRFS			21.88 Acres
Total Area for Dan Recker Farm					46.95 Acres
Total Area for Recker, Dan					46.95 Acres
Ricketts, R & D	Roger Ricketts Farm	744-4			22.45 Acres
		744-47			
		D. Ricketts Home 3-4			60.01 Acres
		D.R.J.K. 42-1			10.85 Acres
		DRDA1			24.91 Acres
		DRDMC MCDowell			29.78 Acres
		DRH1			44.37 Acres
		DRHE			36.84 Acres
		DRK3			30.21 Acres
		DRKE EAST			2.17 Acres
		DRKW WEST			27.00 Acres
		DRRT20			20.82 Acres
		DRRTW			22.63 Acres
		E.K.42-4			31.00 Acres
		R.M.83-1			32.02 Acres
		R.Ricketts Home 2			40.72 Acres
		RRD			5.55 Acres
		RRG Guliland			37.31 Acres
		RRH1 HOME 1			



List for Client Root

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Client	Farm	Field	Township	Legal	Area
		RRHW			39.73 Acres
		RROL OLIVER			26.76 Acres
		RRS SOUTH			19.35 Acres
		RRV VERDELLA			11.53 Acres
		RRW			17.00 Acres
		RRWE			26.00 Acres
		RRWN			1.95 Acres
		RRWW1			20.42 Acres
		RRWW2			52.27 Acres
Total Area for Roger Ricketts Farm					693.65 Acres
Total Area for Ricketts, R & D					693.65 Acres
es, Bob	Bob Ries, 14	Bob Ries, 14-7,8,8a			
		Bob Ries, 14-E7 (South)			
		RF14W6			47.47 Acres
Total Area for Bob Ries, 14					47.47 Acres
	Ed Busch, RF47	ED BUSCH, RF471			51.83 Acres
		ED BUSCH, RF47-4			8.09 Acres
		ED BUSCH, RF47-5			1.93 Acres
Total Area for Ed Busch, RF47					61.85 Acres
	Haines 43	BEATRICE HAINES, RF43			
	Kline Farm, 12	Kline Farm, 12-3			
		Ries Farm Kline 12			69.03 Acres
		Ries Farm, Kline, 12-2			
Total Area for Kline Farm, 12					69.03 Acres
	Laing 97	Laing Farm, 97-1			39.03 Acres
Total Area for Laing 97					39.03 Acres
	Leah Ries, 13	Ries Farm, Leah Ries, 13-B			72.04 Acres
		Ries Farm, Leah Ries, 14-S			



List for Client Root

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Client	Farm	Field	Township	Legal	Area
Total Area for Leah Ries, 13					72.04 Acres
M. Bagley, 69		Bagley Farm, 69-1,2			41.50 Acres
Total Area for M. Bagley, 69					41.5 Acres
Medaugh, 30		Ries Farm 30-1 Medaugh			35.63 Acres
Total Area for Medaugh, 30					35.63 Acres
Miller, 03		Ries Farm 03, Miller Farm, #3 Ries Farm, 03, Miller Farm #2 Ries Farm, Miller, 03-A			
Paula Allmandinger, 04		Almandinger Field 1,2 Paula Allmandinger, 04-1 Paula Allmandinger, 04-1 2 3 Paula Allmandinger, 04-6			39.44 Acres 115.35 Acres 79.05 Acres
Total Area for Paula Allmandinger, 04					233.84 Acres
Rauch, 60		RF601 RF602 RF603 RF605 RF607			19.33 Acres 55.87 Acres 33.81 Acres 40.97 Acres
Total Area for Rauch, 60					149.98 Acres
Springer, RF72C		RF72C1 RF72C3			39.85 Acres 24.68 Acres
Total Area for Springer, RF72C					64.53 Acres
Springer, RF72D		KENNETH SPRINGER, RF72D1			



List for Client Root

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Client	Farm	Field	Township	Legal	Area
Springer, RF72B		KENNETH SPRINGER, RF72B			
Springer, 72-A		Ries Farm, Springer, 72-A			1.72 Acres
		Ries Farm Sprinner 72-A 2-3			5.71 Acres
		Ries Farm, Springer, 72-A, 4			5.71 Acres
		Ries Farm, Springer, 72-A, 5			37.31 Acres
Total Area for Springer, 72-A					50.45 Acres
Tim Agler, TA		RFTA13			11.33 Acres
		RFTA15			22.54 Acres
		RFTA16			20.06 Acres
		RFTA21			9.79 Acres
		RFTA22			5.40 Acres
		RFTA26			18.01 Acres
		RFTAH			28.35 Acres
		TARM			16.82 Acres
Total Area for Tim Agler, TA					132.3 Acres
Wayne, 51		RF511			
		RF512			
		RF513			81.98 Acres
		RF514N			
		RF515			
		RF516			
		RF517			
		RF518			
		RF519			71.73 Acres
Total Area for Wayne, 51					153.71 Acres
Winters Farm, 13B		Ries Farm, Leah Ries, 13-B			
		Winters Farm, 13B-1			



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Client	Farm	Field	Township	Legal	Area	
Rogers, Gary	Ellis	Ellis			78.75 Acres	
	Total Area for Ellis				78.75 Acres	
Rogers, Gary	Farm 127	GRF127, Rt. 127 Farm			67.16 Acres	
	Total Area for Farm 127				67.16 Acres	
	High School Farm	GRFHS HIGH SCHOOL			40.13 Acres	
	Total Area for High School Farm				40.13 Acres	
	Home Farm	Home North			29.07 Acres	
		Home South			45.98 Acres	
	Total Area for Home Farm				75.05 Acres	
MP		GRMP			70.09 Acres	
					Total Area for MP	70.09 Acres
Rogers Rd. farm		GRRR1			57.12 Acres	
					GRRR2 Rogers Rd. 2	45.45 Acres
					Total Area for Rogers Rd. farm	102.57 Acres
Walters,709		Walters 709			74.78 Acres	
					Total Area for Walters,709	74.78 Acres
Waltz Farm		GRFWTZ Waltz			41.00 Acres	
					GRWTZW Waltz Farm	35.59 Acres
		Total Area for Waltz Farm				76.59 Acres
Washburn		GRFW Washburn			78.29 Acres	
					Total Area for Washburn	78.29 Acres
Total Area for Rogers, Gary					663.41 Acres	
Slagle, Dan	Slagle	DSHN1			32.30 Acres	



List for Client Root

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Client	Farm	Field	Township	Legal	Area
		DSHS			41.16 Acres
		DSHW			41.72 Acres
		DSPF			68.61 Acres
Total Area for Slagle					183.79 Acres
tal Area for Slagle, Dan					183.79 Acres
Itz Farm	<i>Brooks Trust</i>	<i>TWBT</i>			20.09 Acres
Total Area for Brooks Trust					20.09 Acres
	<i>Carey Farm</i>	<i>Carey</i>			
	<i>Gill</i>	<i>TWGIL1</i>			26.28 Acres
		<i>TWGIL2</i>			21.75 Acres
		<i>TWGIL3</i>			34.27 Acres
		<i>TWGIL4</i>			12.15 Acres
		<i>TWGIL5</i>			38.01 Acres
		<i>TWGIL6</i>			37.33 Acres
Total Area for Gill					169.79 Acres
	<i>HOME FARM</i>	<i>HOME 1</i>			35.54 Acres
		<i>HOME 2</i>			20.02 Acres
		<i>HOME 3</i>			27.92 Acres
		<i>HOME 4</i>			46.43 Acres
		<i>HOME 5</i>			9.24 Acres
		<i>HOME 6</i>			31.35 Acres
		<i>HOME 7</i>			
		<i>HOME 8</i>			5.94 Acres
Total Area for HOME FARM					176.44 Acres
	<i>Nieman Farm</i>	<i>TWNIE</i>			35.48 Acres
Total Area for Nieman Farm					35.48 Acres
	<i>Waltz Farm, Waltz 5</i>	<i>Waltz Farm, Waltz 5</i>			



List for Client Root

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Client	Farm	Field	Township	Legal	Area
	Waltz Farms, Clay	Clay 3			81.28 Acres
		Waltz Farms, Clay			81.28 Acres
	Total Area for Waltz Farms, Clay				81.28 Acres
	Waltz Farms, Elder	Waltz Farms, Elder, 1			
		Waltz Farms, Elder, 2			
		Waltz Farms, Elder, 3			
	Waltz Farms, Morris, 1	TWM1			56.98 Acres
	Total Area for Waltz Farms, Morris, 1				56.98 Acres
	Waltz Farms, Mounts	Mounts/Allen Field 1, 3			48.41 Acres
		Tim Waltz Farm, Mounts, Alan 3			
		Tim Waltz Farm, Mounts, Alan 4			
		Tim Waltz Farm, Mounts Brooks			
		Tim Waltz Farm, Mounts Home 1			
		Tim Waltz Farm, Mounts Home 2			
		Tim Waltz Farm Mounts Alan 1			
		Tim Waltz Farm Mounts Home 2			
		Waltz Farm, Mounts, Alan, 2			
		Waltz Farm, Mounts, W1			
		Waltz Farms, Mounts - 6			
	Total Area for Waltz Farms, Mounts				48.41 Acres
	Total Area for Waltz Farm				588.47 Acres
WayEllen	WayEllen Farm				
		WE10			77.24 Acres
		WE2			107.42 Acres
		WE3N			34.08 Acres
		WE3S			39.17 Acres
		WE4			93.58 Acres
		WE5-6			153.97 Acres
		WE7-8			109.72 Acres



List for Client Root

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Client	Farm	Field	Township	Legal	Area
		WE9			23.72 Acres
Total Area for WayEllen Farm					638.9 Acres
Total Area for WayEllen					638.9 Acres
Wallman Farms	<i>Alphonse Miller</i>	WFAM3			
	<i>Ethel Farm</i>	WFE1			37.31 Acres
		WFEE			34.78 Acres
Total Area for Ethel Farm					72.09 Acres
	<i>Home Farm</i>	WFH1			21.79 Acres
		WFH10			10.30 Acres
		WFH2			19.02 Acres
		WFH3			18.41 Acres
		WFH4			10.13 Acres
		WFH5			19.58 Acres
		WFH6			12.90 Acres
		WFH7			6.79 Acres
		WFH8			10.73 Acres
		WFH9			8.30 Acres
Total Area for Home Farm					137.95 Acres
	JENSEN FARM	WFJF1			
		WFJF2			
		WFJF3			42.02 Acres
		WFJF4			
Total Area for JENSEN FARM					42.02 Acres
	JOHN ELWER	WFJE1			20.19 Acres
		WFJE2			9.86 Acres
		WFJE4			23.07 Acres
		WFJE5			4.08 Acres
		WFJE6			65.30 Acres
		WFJE7			



List for Client Root

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Client	Farm	Field	Township	Legal	Area
Total Area for JOHN ELWER					122.5 Acres
LONG FARM		WFLO13			46.74 Acres
		WFLO4			
		WFLO5			30.08 Acres
Total Area for LONG FARM					76.82 Acres
LUMA		WFLU1			54.87 Acres
		WFLU2			30.40 Acres
		WFLU3			10.96 Acres
		WFLU4			14.02 Acres
		WFLU5			32.05 Acres
Total Area for LUMA					142.3 Acres
MARTIN		Middle Point-Wetzel Rd.			
		Wellman Farms, Martin, 1			
		WELLMAN FARMS, MARTIN 3			
		WFM			58.17 Acres
Total Area for MARTIN					58.17 Acres
Middlepoint		WFMP			
REDD RD.		WFRE1			38.31 Acres
		WFRE2			38.60 Acres
Total Area for REDD RD.					76.91 Acres
Toledo Mold & Die		WFTM1			4.34 Acres
		WFTM2			
		WFTM3 TMD-3			28.36 Acres
Total Area for Toledo Mold & Die					32.7 Acres
Total Area for Wellman Farms					761.46 Acres



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Client	Farm	Field	Township	Legal	Area
Adams, Robert	B.ADAMS	BAH1			56.72 Acres
		BAH2			42.86 Acres
		BAH3			40.08 Acres
		BAH4			30.06 Acres
		BAN			76.65 Acres
		BAS			24.36 Acres
		Total Area for B.ADAMS			
Adams, Robert	Gallman Rd.	BAGN			39.48 Acres
		BAGS			32.90 Acres
		Total Area for Gallman Rd.			
Total Area for Adams, Robert					343.11 Acres
Adams, Tom	Tom Adams J	TAJ1			17.95 Acres
		TAJ2			34.24 Acres
		TAJ3			16.94 Acres
		Total Area for Tom Adams J			
Total Area for Adams, Tom					69.13 Acres
Adams, Troy	Troy Adams	TRAH1			36.54 Acres
		Total Area for Troy Adams			
Total Area for Adams, Troy					36.54 Acres
Baer, Edwin	Edwin Baer Farm	EB81			32.12 Acres
		Total Area for Edwin Baer Farm			
Total Area for Baer, Edwin					32.12 Acres
Baer, Mike	BFS	BSF92			34.17 Acres
		Total Area for BFS			
Total Area for Baer, Mike					34.17 Acres
Bauf, Mike	Balbauf Farm	IBD			25.56 Acres
		IBD1			15.01 Acres



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Client	Farm	Field	Township	Legal	Area
		IBH1			38.53 Acres
	Total Area for Balbauf Farm				79.1 Acres
Total Area for Baldauf					79.1 Acres
Bowsher, Ron	R.Bowsher Farm	RBD31			31.38 Acres
		RBD531			14.58 Acres
		RBD532			27.22 Acres
		RBF1			19.03 Acres
		RBH1			35.28 Acres
		RBH2			19.66 Acres
		RBJB			38.63 Acres
	Total Area for R.Bowsher Farm				185.78 Acres
Total Area for Bowsher, Ron					185.78 Acres
Breese, Dave	Dave Breese Farm	DBD			31.93 Acres
		DBHW			20.18 Acres
		DBJLBW			47.61 Acres
		DBSF			28.17 Acres
	Total Area for Dave Breese Farm				127.89 Acres
Total Area for Breese, Dave					127.89 Acres
Clement, Dick	DICK CLEMENT	DC1N			
		Dick Clement Farm			
	PAUL THOMAS FARM	DCPT23			
	STEIGER FARM	DCHS1 Soybean Yield			
		DCHS2 96 Soybean Yield			
		DCHS3 Soybean Yield			
		DCHS4			



List for Client Root

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Client	Farm	Field	Township	Legal	Area
	VIOLA CLEMENT	Dick Clement, Viola			
	WRIGHT - DOC	DCDOC1N DCDOC2 DCDOC3			
	Zirkle Farm 709	Dick Clement, Zirkle Farm, 709			85.71 Acres
	Total Area for Zirkle Farm 709				85.71 Acres
	Zirkle-Home	Clement, Zirkle, Home, DC71 Clement, Zirkle, Home, DC72			
	Total Area for Clement, Dick				85.71 Acres
Dicus, Kevin	Kevin	KDN			9.03 Acres
		KDS			9.32 Acres
	Total Area for Kevin				18.35 Acres
	Total Area for Dicus, Kevin				18.35 Acres
Evans, Tom	Millpond	MJMB1			28.94 Acres
		MJMB1N			39.28 Acres
		TECEM			32.52 Acres
		TEFMPJ1			34.59 Acres
		TEFMY2			
		TEFVW			45.93 Acres
		TEMCH			19.62 Acres
		TEME			21.89 Acres
		TEMY1			30.30 Acres
		TEVS			12.87 Acres
	Total Area for Millpond				265.94 Acres
	Total Area for Evans, Tom				265.94 Acres



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Client	Farm	Field	Township	Legal	Area
Hesse, Rick	Rick Hesse Farm	RH1			48.45 Acres
		RHBWE			14.30 Acres
		RHBWW			33.47 Acres
Total Area for Rick Hesse Farm					96.22 Acres
Total Area for Hesse, Rick					96.22 Acres
Miller, Tom	Pollock Farm	TMP Pollock Farm			33.26 Acres
		TMPE			24.15 Acres
		Total Area for Pollock Farm			
Miller, Tom	Tom Miller Farm	TMB1			31.02 Acres
		TMWL			10.75 Acres
		Tom Miller Farm, Red Barn			
		Total Area for Tom Miller Farm			
Miller, Tom	Tom Miller Farm Sally	Sally			21.52 Acres
		Sally A			21.52 Acres
Total Area for Tom Miller Farm Sally					21.52 Acres
Miller, Tom	Tom Miller Farm, Garwick	Garwick 2			35.51 Acres
		Garwick 3			13.94 Acres
		TMG38			39.00 Acres
		Tom Miller Farm, Garwick 1			
Total Area for Tom Miller Farm, Garwick					88.45 Acres
Miller, Tom	Tom Miller Farm, Home	Home Farm			2.99 Acres
		Home Farm A			2.99 Acres
Total Area for Tom Miller Farm, Home					2.99 Acres
Miller, Tom	Tom Miller Farm, Paul Thomas	Paul Thomas A			33.41 Acres
		TMPTN			16.28 Acres
		TMPTS Paul Thomas			
Total Area for Tom Miller Farm, Paul Thomas					49.69 Acres



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Client	Farm	Field	Township	Legal	Area
	TOM MILLER MAX	TMM1			10.01 Acres
	TOM MILLER MAX	TMM2			0.49 Acres
		TMM3			4.23 Acres
		TMM4			36.31 Acres
		TMM5			10.09 Acres
		TMM6			70.84 Acres
		TMM7			7.15 Acres
		TMME1 ELGIN 1			55.85 Acres
		TMME2			4.36 Acres
Total Area for TOM MILLER MAX					199.33 Acres
	Tom Miller, Grand Canyon	Grand Canyon			
		Grand Canyon 1			
Total Area for Miller, Tom					461.16 Acres
Gerdeman	R-G Gerdeman Farm	Delphos Farm			
		GFSW			63.60 Acres
		R-G Gerdeman Farm State			
		Rrl Farm			
		RGGFHN			21.96 Acres
		RGGFHS			
		RGGFHSB			
		RGGFR ROGER			8.11 Acres
Total Area for R-G Gerdeman Farm					93.67 Acres
Total Area for R G Gerdeman					93.67 Acres
Richards, Ron	Ron Richards	RRH1			28.83 Acres
		RRH2			28.16 Acres
		RRH3			18.42 Acres
		RRH4			20.58 Acres
		RRH5			18.10 Acres
		RRM1			22.32 Acres
		RRM2			17.86 Acres
		RRM3			34.86 Acres
Total Area for Ron Richards					189.13 Acres



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Client	Farm	Field	Township	Legal	Area
Total Area for Richards, Ron					189.13 Acres
<i>Reindel, Louis</i>	<i>Louis Reindel, Elgin Farm</i>	<i>Elgin South Farm, LRELG</i>			
	<i>Louis Riendel, Utrup</i>	<i>LRUN</i>			<i>38.18 Acres</i>
		<i>LRUTRS</i>			<i>65.00 Acres</i>
Total Area for Louis Riendel, Utrup					103.18 Acres
	<i>Mosier farm</i>	<i>RFME Mosier Converse</i>			
	<i>Reindel Farm, Culler</i>	<i>Culler Converse North B</i>			
		<i>Culler, Converse Na</i>			
		<i>Culler, Converse, S</i>			
		<i>RFCG Culler Greenville</i>			
		<i>RFCWL Culler, Wren</i>			
		<i>Landeck</i>			
	<i>Reindel Farm, Shaffer</i>	<i>Reindel Shaffer</i>			
	<i>Reindel, Glaze</i>	<i>Reindel Farm Glaze</i>			
	<i>Reindel, Joe Wright</i>	<i>Reindel Farm, Wright 1-4a</i>			
		<i>Reindel Farm, Wright, 6</i>			
		<i>Reindel Farm, Wright-7A</i>			
		<i>Reindel Farms, Wright, 7</i>			
		<i>Wright Farm - 5</i>			
		<i>Wright RFW1-4</i>			
Total Area for Riendel, Louis					103.18 Acres



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Client	Farm	Field	Township	Legal	Area
Sawmiller Bros.	Sawmiller Farms	SFS1			81.05 Acres
		Total Area for Sawmiller Farms			
Total Area for Sawmiller Bros.					81.05 Acres
Libert Farms	Bob Yahl	SFYAHL			
		Carl McMichael	SFCM1		
			SFCM2		33.93 Acres
			SFCM3		75.70 Acres
Total Area for Carl McMichael					109.63 Acres
Dan Henne		SFDH1			40.47 Acres
		SFDH2			
		Total Area for Dan Henne			
G. Daugherty		SFGD1			15.13 Acres
		SFGD1A			
		Total Area for G. Daugherty			
G. Truesdale		SFGR1			50.03 Acres
		SFGT1			62.44 Acres
		Total Area for G. Truesdale			
Granny		SFG1			26.79 Acres
		Total Area for Granny			
H. Zimmerman		SFHZ1			
		SFHZ2			
Home RS		SFRS1			
		SFRS2			



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Client	Farm	Field	Township	Legal	Area
		SFRS3			29.57 Acres
		SFRS4			32.41 Acres
		SFRS5			44.45 Acres
Total Area for Home RS					106.43 Acres
<i>Homer Hise</i>		SFHH1			
		SFHH2			
<i>Howe</i>		SFHO1			37.51 Acres
		SFHO2			39.41 Acres
Total Area for Howe					76.92 Acres
<i>Hugh Seibert</i>		SFHS1			
		SFHS2			
		SFHS3			19.51 Acres
		SFHS4			49.50 Acres
		SFHS5			
		SFHS6			10.38 Acres
		SFHS7			30.03 Acres
Total Area for Hugh Seibert					109.42 Acres
<i>Lois & Harold</i>		SFLH1A			12.43 Acres
		SFLH1B			29.34 Acres
		SFLH2A			5.46 Acres
		SFLH2B			12.17 Acres
		SFLH3			
Total Area for Lois & Harold					59.4 Acres
<i>M. Becker</i>		SFMB1			
		SFMB2			
<i>Mack Malo, 14</i>		MALO14			



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Client	Farm	Field	Township	Legal	Area
Mack W		JMP			7.05 Acres
		JMP1			12.43 Acres
		JMW1			57.43 Acres
		JMW2			36.88 Acres
		JMW3			10.49 Acres
Total Area for Mack W					124.28 Acres
Mack, Malo		MALO1			25.66 Acres
		MALO16B			
		MALO2			
		MALO3			38.50 Acres
		MALO4			
		MALO5			
Total Area for Mack, Malo					64.16 Acres
Mack, Malo 7		MALO7			38.18 Acres
Total Area for Mack, Malo 7					38.18 Acres
Mack, Malo Home Farm		MALO12			
		MALO12A			
		MALO13			
		MALO8			
		MALO9			14.18 Acres
		MALOH10			21.88 Acres
Total Area for Mack, Malo Home Farm					58.55 Acres
Malo Farms, 15		MALO15			
Malo West Farm 16.17		Malo 16A			
		MALO16			



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Client	Farm	Field	Township	Legal	Area
		Malo1698			81.31 Acres
		MALO16B			
		MALO17			
Total Area for Malo West Farm 16.17					81.31 Acres
Moore Farm		SFMF1			29.45 Acres
		SFMF2			
Total Area for Moore Farm					29.45 Acres
PG4		SFPG4			
Phyliss Fell		SFPF1			
		SFPF2			
R. Becker, North		SFRBN1			39.89 Acres
Total Area for R. Becker, North					39.89 Acres
RC, Walters Farm		SFRC1			61.90 Acres
		SFRC2			90.06 Acres
		SFRC2A			35.84 Acres
		SFRC3			
Total Area for RC, Walters Farm					187.8 Acres
Richard & Anna		SFRA1			7.59 Acres
		SFRA2			
		SFRA3			12.95 Acres
Total Area for Richard & Anna					20.54 Acres
Richard & Raymond		SFRR1			42.84 Acres
		SFRR2			27.25 Acres
		SFRR3			



List for Client Root

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Client	Farm	Field	Township	Legal	Area
Total Area for Richard & Raymond					70.09 Acres
	Sharon Counts	SFSC1			62.74 Acres
		SFSC2			12.04 Acres
Total Area for Sharon Counts					74.78 Acres
	Vernie	SFVERN1			40.62 Acres
		SFVERN2			
Total Area for Vernie					40.62 Acres
Total Area for Seibert Farms					1486.31 Acres
Smith Bros.	Smith	SMB117			70.50 Acres
		Total Area for Smith			
Total Area for Smith Bros.					70.5 Acres
Stoner, Bruce	Bruce Stoner Farms	BSB			33.42 Acres
		BSFHW West			8.03 Acres
		BSFN Home North			23.20 Acres
		BSHE			9.65 Acres
		BSHNE			12.96 Acres
		BSRB River Bottom			108.58 Acres
		BSRS			51.19 Acres
		YAHL			30.00 Acres
		Total Area for Bruce Stoner Farms			
Total Area for Stoner, Bruce					277.03 Acres
Unerferth Farms	Jones Rd.	UNVJR			27.86 Acres
		Total Area for Jones Rd.			
	Unerferth Farm, Cemetery	UFCW Cemetery West			



List for Client Root

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Client	Farm	Field	Township	Legal	Area
	Unerferth Farms, Southwest	Southwest			80.09 Acres
	Unerferth Farms, Southwest	UNVSW1			80.09 Acres
	Total Area for Unerferth Farms, Southwest				80.09 Acres
Total Area for Unverferth Farms					107.95 Acres
Unerferth Farms	Armstrong	VFA1			38.12 Acres
	Total Area for Armstrong				38.12 Acres
	Dan	18.54VFDAN			18.54 Acres
	Total Area for Dan				18.54 Acres
	Dave's Farm	VFDF1			5.27 Acres
		VFDF2			64.15 Acres
	Total Area for Dave's Farm				69.42 Acres
	DICKMAN	VFDM			74.12 Acres
	Total Area for DICKMAN				74.12 Acres
	Grandpa	VFGR1			52.78 Acres
		VFGR2			23.35 Acres
		VFGR3			20.41 Acres
	Total Area for Grandpa				96.54 Acres
	Home Farm	VFH2			60.20 Acres
		VFHF1			30.21 Acres
	Total Area for Home Farm				90.41 Acres
	Mike	VFM1			12.50 Acres
		VFM2			20.84 Acres
		VFM3			14.13 Acres
	Total Area for Mike				47.47 Acres
	UNCLE JOHNS	VFUJ1			49.24 Acres



List for Client Root

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Client	Farm	Field	Township	Legal	Area
		VFUJ2			24.31 Acres
		VFUJ3			31.42 Acres
		VFUJ4			24.77 Acres
Total Area for UNCLE JOHNS					129.74 Acres
	Vernon	VFV1			39.26 Acres
		VFV2			58.08 Acres
Total Area for Vernon					97.34 Acres
	VFC Cliffs	VFCL			77.40 Acres
Total Area for VFC Cliffs					77.4 Acres
	Wright	VFW1			39.62 Acres
Total Area for Wright					39.62 Acres
Total Area for Vogel Farms					778.72 Acres
Welker, Marvin	MarJan Farms	Marjan 1			
		MW19			92.60 Acres
		MW6			33.43 Acres
		MWE2			40.17 Acres
		MWE3			82.67 Acres
		MWE4			10.67 Acres
		Mwec			29.09 Acres
		MWS1 Smith Farm			36.47 Acres
Total Area for MarJan Farms					325.1 Acres
Total Area for Welker, Marvin					325.1 Acres



List for Client Root

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Client	Farm	Field	Township	Legal	Area
Agler, Marvin	Home	MA34			16.97 Acres
		Total Area for Home			
Total Area for Agler, Marvin					16.97 Acres
Bollenbaucher, Don	Don Bollenbaucher Farm	DBF7071			
		DBF7072			
		DBF7073			
		DBF7074			
		DBFP PURDY RD.			
		DBFW			
		DBFW1			
		DBFWIL			
Total Area for Bollenbaucher, Don					
Bransteter, Jim	Home	JBRW1			41.20 Acres
		JBRW2 W-2			19.85 Acres
		JBRW3 W-3			52.67 Acres
		JBRW4			36.50 Acres
		JBRW5 W-5			22.02 Acres
		JBRW6 W-6			23.71 Acres
		JBRW7 W-7			12.58 Acres
		Total Area for Home			
Total Area for Bransteter, Jim					208.53 Acres
Clouse, Bill	Bill Clouse Farm	BCH HOME			88.55 Acres
		Total Area for Bill Clouse Farm			
Total Area for Clouse, Bill					88.55 Acres
Doug Huffman	Doug Huffman Farm	D1-2			
		DHFD3			
		M4-7			
		M4A			
		M8			



List for Client Root

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Client	Farm	Field	Township	Legal	Area
Frahm, Ron	Ron Frahm Bilter	RFB15			38.78 Acres
		RFB810			46.98 Acres
		RFB911			50.70 Acres
	Total Area for Ron Frahm Bilter				
Frahm, Ron	Ron Frahm Farm Cross	RFC1820			
		RFC2225 CROSS 22-25			
		RFFC17 CROSS 17			
		RFFC21			
		RFFC34			
		RFFC4NE			
		RFFC4S			
RFFCED					
Frahm, Ron	Ron Frahm Farm D	RFD34			34.26 Acres
		RFD6 D-6			12.50 Acres
		RFD7			3.23 Acres
		RFFD5			22.74 Acres
		Total Area for Ron Frahm Farm D			
Frahm, Ron	Ron Frahm, Home	Frahm, B-12			
		Frahm, B-13, B-14			
		Frahm, B-16			
		Frahm, H2			
		RFH1 Home 1			
Total Area for Frahm, Ron					209.19 Acres
Harner, Mike	MIKE HARNER FARM	MHFH			
		MHHE			38.67 Acres



List for Client Root

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Client	Farm	Field	Township	Legal	Area
Total Area for MIKE HARNER FARM					38.67 Acres
Jack Powell	<i>Jack Powell Farm</i>	JP1			38.97 Acres
		JPS			8.46 Acres
		JPW			21.30 Acres
		Total Area for Jack Powell Farm			
Total Area for Jack Powell					68.73 Acres
Koontz, Charlie	<i>Charlie (Homer) Koontz Farm</i>	H-2			29.63 Acres
		HKFB12			29.63 Acres
		KC4H1W3			69.78 Acres
		KFB1314			69.78 Acres
		KFC5			69.78 Acres
		KFR6R8			69.78 Acres
		KFT10			69.78 Acres
		KFT11			69.78 Acres
		KFT9			69.78 Acres
		Total Area for Charlie (Homer) Koontz Farm			
Total Area for Koontz, Charlie					99.41 Acres
Larry Johnson	<i>Larry Johnson HBT</i>	LJHBT14			
		LJHBT5			
		LJHBT6			
	<i>LARRY JOHNSON HL</i>	LJHL12			
	<i>Larry Johnson W</i>	LJW13			
		LJW4E			
		LJW4W			



List for Client Root

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Client	Farm	Field	Township	Legal	Area
Marvin Shindeldecker	Marvin Shindeldecker Farm	Granger G31			24.91 Acres
		MSG32			31.48 Acres
		MSG33			
		MSM22			9.62 Acres
		MSM23			
		MSM24			6.68 Acres
		MSM25			2.64 Acres
		MSM26			2.80 Acres
		MSM27			27.91 Acres
		MSW16			34.91 Acres
		MSW17			
Total Area for Marvin Shindeldecker Farm					140.95 Acres
Total Area for Marvin Shindeldecker					140.95 Acres
Putman Farms	New Farm	PFFNF			74.63 Acres
		Total Area for New Farm			
Total Area for Putman Farms					74.63 Acres
Riley Farms	Riley Farms	Riley Farm 10			85.96 Acres
		Riley Farm 1-2			
		Riley Farms 3			
		Riley Farms 49			
		Total Area for Riley Farms			
Total Area for Riley Farms					85.96 Acres
Tom Rogers, Tom	Tom Rogers Farm	TRW17			48.52 Acres
		Total Area for Tom Rogers Farm			
Total Area for Rogers, Tom					48.52 Acres
Jon Sidenbender, Jon	Jon Sidenbender Farm	JSB1112			



List for Client Root

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Client	Farm	Field	Township	Legal	Area
		JSH2122			
		JSH23			
Smalley, Robert	BOB SMALLEY Romilda	BSR31			28.95 Acres
		BSR32			9.86 Acres
	Total Area for BOB SMALLEY Romilda				38.81 Acres
	Daughtery	RSDE			53.10 Acres
	Total Area for Daughtery				53.1 Acres
	Figley Farm	RSF1112			77.08 Acres
		RSF15			106.61 Acres
		RSF15r			
		RSF678			116.51 Acres
		RSF678r			
		RSF910			58.11 Acres
	Total Area for Figley Farm				358.31 Acres
	Lee Linton Farm	RSLL13 Linton			12.93 Acres
		RSLL20 Lee Linton 20			20.34 Acres
		RSRL30 Ramilda Linton 30			30.28 Acres
	Total Area for Lee Linton Farm				63.55 Acres
	Robert Smalley Farm	BSD41			60.30 Acres
		BSD43			58.97 Acres
		DMS D M SMALLEY			18.77 Acres
		DSB40 BEHYMER 40			39.64 Acres
		RSFH HOME			
	Total Area for Robert Smalley Farm				177.68 Acres
Total Area for Smalley, Robert					691.45 Acres
Other Farms	HOME	BSFR1112			107.01 Acres



List for Client Root

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Client	Farm	Field	Township	Legal	Area
		BSH2			
	Total Area for HOME				107.01 Acres
	Stober Farms	STFD27			6.03 Acres
		STFE26			92.58 Acres
		STFT40			78.35 Acres
	Total Area for Stober Farms				176.96 Acres
Total Area for Stober Farms					283.97 Acres
Tom Sidenbender	Tom Sidenbender Farm	TSFH1			
		TSFH2			
		TSFH3			
		TSFH45			



List for Client Root

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Client	Farm	Field	Township	Legal	Area
	Czartoski, North	BCM			20.44 Acres
	Czartoski, North	BCN			18.14 Acres
		BCS			27.18 Acres
	Total Area for Czartoski, North				65.76 Acres
	Home	BCZH			19.79 Acres
	Total Area for Home				19.79 Acres
Total Area for Czartoski, Bernie					117.94 Acres
Dale Inkrott	Dale Inkrott Farm	1, 96 Wheat			
		DIFD			
		DIFH			
Total Area for Dean Koehler					306.52 Acres
Dean Koehler	Dean Koehler Farm	DKW Walters			110.66 Acres
		DKZ Zimmerman			190.41 Acres
		DKZ1			5.45 Acres
Total Area for Dean Koehler Farm					306.52 Acres
Total Area for Dean Koehler					306.52 Acres
Larry Prill	Home	LDHN			65.16 Acres
		LDHS			21.01 Acres
	Total Area for Home				86.17 Acres
	Matthews	LDM1			53.45 Acres
		LDM2			51.28 Acres
Total Area for Matthews					104.73 Acres
	Prill	LDP1			36.34 Acres
		LDP2			7.14 Acres
		LDP3			6.36 Acres
		LDP4			3.00 Acres
		LDP5			



List for Client Root

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Client	Farm	Field	Township	Legal	Area
Total Area for Nieman Farm					35.48
	Waltz Farm, Waltz 5	Waltz Farm, Waltz 5			
	Waltz Farms, Clay	Clay 3 Waltz Farms, Clay			
	Waltz Farms, Elder	Waltz Farms, Elder 2 Waltz Farms, Elder, 1 Waltz Farms, Elder, 3			25.00
Total Area for Waltz Farms, Elder					25
	Waltz Farms, Morris, 1	TWM1			56.96
Total Area for Waltz Farms, Morris, 1					56.96
	Waltz Farms,Mounts	Mounts/Allen Field 1,3 Tim Waltz Farm, Mounts, Alan 3 Tim Waltz Farm, Mounts, Alan 4 Tim Waltz Farm, Mounts Brooks Tim Waltz Farm,Mounts Home 1 Tim Waltz Farm,Mounts Home 2 Tim Waltz Farm Mounts Alan 1 Tim Waltz Farm Mounts Home 2 Waltz Farm,Mounts,Alan,2 Waltz Farm,Mounts,W1 Waltz Farms, Mounts - 6			32.20
Total Area for Waltz Farms,Mounts					32.2
Total Area for Waltz Farm					190.22
annamacher,	Wannamacher Farms	MWHE			36.42 Acres
		MW-HW			29.18 Acres

Lake Erie Protection Fund

Final Accounting

	Budgeted Amount	Amount Expended	Amount Not Expended	Matching
A. Salaries and Wages	<u>\$ 30,000.00</u>	<u>\$ 30,800.86</u>	<u>\$</u>	<u>\$37,056.54</u>
B. Fringe Benefits	<u>\$</u>	<u>\$</u>	<u>\$</u>	<u>\$</u>
C. Total Personnel Costs	<u>\$ 30,000.00</u>	<u>\$ 30,800.86</u>	<u>\$</u>	<u>\$37,056.54</u>
D. Permanent Equipment	<u>\$ 17,000.00</u>	<u>\$ 16,050.36</u>	<u>\$</u>	<u>\$ -0-</u>
E. Expendable Supplies & Equip.	<u>\$ 30,000.00</u>	<u>\$ 30,158.61</u>	<u>\$</u>	<u>\$21,929.20</u>
F. Travel	<u>\$ -0-</u>	<u>\$</u>	<u>\$</u>	<u>\$ -0-</u>
G. Publications & Presentations	<u>\$ 1,000.00</u>	<u>\$ 990.17</u>	<u>\$</u>	<u>\$ -0-</u>
H. Other Costs	<u>\$ -0-</u>	<u>\$</u>	<u>\$</u>	<u>\$ -0-</u>
I. Total Direct Costs (C through H)	<u>\$ 78,000.00</u>	<u>\$ 78,000.00</u>	<u>\$ -0-</u>	<u>\$58,985.74</u>
J. Indirect Costs	<u>\$ 4,850.00</u>	<u>\$ 4,850.00</u>	<u>\$ -0-</u>	<u>\$ -0-</u>
TOTAL COSTS (I+J)	<u>\$ 82,850.00</u>	<u>\$ 82,850.00</u>	<u>\$ -0-</u>	<u>\$58,985.74</u>

CERTIFICATION

I certify that the grant expenditures listed and the description of the charges are true and accurate to the best of my knowledge. These expenditures represent approved grant costs that have been previously paid for and for which complete documentation is on file.

	SIGNATURES	DATE
PROJECT DIRECTOR	<u><i>Clifford Houston</i></u>	<u>10/26/99</u>
AUTHORIZING OFFICER	<u><i>Patricia M. ...</i></u>	<u>10/26/99</u>
FISCAL AGENT	<u><i>Dennis Vecchi</i></u>	<u>10/26/99</u>

In Kind Contributions

For work on: The Precision Nutrient Application Project
Grant Period: 1997-1999

Date	Provider	Amount
5/1/97	Mileage	91.90
7/21/97	Agris Consultation	760.00
8/3/97	Mileage	44.30
8/23/97	Mileage	56.80
9/23/97	Agris – software support	600.00
12/1/97	BCR – computer repair	970.50
12/2/97	Mileage	127.90
12/22/97	Agris training – software	903.63
12/27/99	ATV	2575.00
12/31/97	Trailer	1939.90
1/2/98	Anhydrous applicator	6000.00
1/13/98	BCR computer repair	195.00
2/5/98	Agris training meeting	200.00
2/2/98	Agris software training	395.00
2/8/98	Mileage	21.20
3/10/98	Mileage	74.00
3/12/98	Mileage	32.20
3/31/98	Mileage	52.30
4/7/98	Agris software update	160.00
4/6/98	Software Training (Agris)	150.00
5/2/98	Digital equipment	1532.27
5/30/98	Mileage	127.30
6/12/98	Trimble discount	799.00
7/2/98	BCR – video card	249.00
7/8/98	Laptop mobile computer	3348.00
8/24/98	Mileage	104.00
10/15/98	BCR – computer training	60.00
12/4/98	Agris system training	150.00
6/6/99	Agris Systems	160.00
7/8/99	Cross Streets	50.00
Total in-Kind		\$21929.20
(For Supplies & Equipment)		

George Rapp, RCMS Consulting 9/30/99

In Kind Contributions

For work on: The Precision Nutrient Application Project
Grant Period: 1997-1999

<u>Date</u>	<u>Provider</u>	<u>Amount</u>
1-17-97	Ries – labor for griding	798.92
2-18-97	Ricketts	554.31
3-23-97	B. Evans	306.10
3-23-97	Waltz Farm	91.88
4-2-97	Keber Farms	239.34
4-2-97	Merkle	143.94
4-17-97	Matthews	523.84
4-18-97	Mercer Landmark, Rockford	1013.80
4-18-97	Inkrott Farms	286.87
5-8-97	Evans	227.03
5-8-97	Nussbaum	248.82
5-8-97	Hertel	67.62
5-8-97	Neate	1495.40
5-12-97	B. Evans	363.08
6-12-97	Mercer Landmark, Rockford	695.10
6-26-97	Mercer Landmark, Rockford	1067.16
12-19-97	Ries	717.30
12-19-97	Linton	301.93
12-19-97	Ricketts	268.00
12-19-97	Ricketts	255.95
12-19-97	Hertel	836.50
12-20-97	Allmandinger	672.60
12-23-97	Neate	725.55
12-26-97	WayEllen Farms	333.60
12-31-97	Rogers	548.38
1-6-98	Eickholt	368.93
1-6-98	Rank	785.43
1-12-98	Evans	140.73
1-22-98	Matthews	92.50
1-22-98	Mercer Landmark, Elgin	783.53
1-30-98	Nussbaum	140.63
1-30-98	Oliver	66.83
4-6-98	Vogel Farms	1946.78
5-14-98	Stoner	534.03
6-12-98	CBJ Farms	391.88
6-12-98	Wellman Farms	1558.72
6-12-98	Mercer Landmark, Rockford	1546.47
6-17-98	Neate Farms	548.10
6-17-98	WayEllen Farms	461.78

6-24-98	Mack Farms	321.08
6-24-98	Stoner	83.55
6-24-98	C. Oberlitner	96.10
6-24-98	S. Oberlitner	50.00
6-24-98	Mercer Landmark	1029.42
6-25-98	Mercer Landmark, Elgin	1448.73
6-25-98	Ricketts	75.53
7-2-98	Ricketts	456.97
7-2-98	Seibert Farms	320.18
7-15-98	Waltz Farms	284.22
7-15-98	Bowsher	241.88
8-25-98	Pollock	93.28
8-25-98	Holbein	183.85
8-25-98	Ries	668.60
9-28-98	Eickholt	283.00
9-28-98	Nussbaum	288.18
12-10-98	Rogers Farms	175.28
12-20-98	Ricketts	108.80
12-20-98	C. Oberlitner	270.53
12-20-98	Purmort	801.83
12-20-98	DuVall	497.18
12-29-98	Prill	150.79
12-29-98	Hertel	238.84
12-29-98	Wannamaker	164.00
12-31-98	Reindel	95.45
12-31-98	Runyan	130.90
12-31-98	Stoner	62.50
12-31-98	Wellman Farms	957.74
12-31-98	Mercer Landmark	674.84
1-6-99	Seibert Farms	2200.45
1-6-99	Mack Farms	604.25
1-6-99	Keber Farms	598.72
4-12-99	Honningford	167.08
4-12-99	Eickholt	462.00
7-12-99	Ries Farms	621.43

Total In-Kind - - - - - \$37056.54
(For Labor and Fringes)

George Ross, RCMC Consulting 9/30/1999