

**A Plan to Reduce Phosphorus Loading and Improve Stream
Ecological Function in the Middle Fork and Adjoining Watersheds
of the Sugar Creek Watershed: Joint Recommendations for the
Alpine Cheese Phosphorus Nutrient Trading Plan**

Sugar Creek Project of the OARDC/Ohio State University

Holmes Soil and Water Conservation District

Alpine Cheese Company

January 1, 2006

Alpine Cheese Phosphorus Nutrient Trading Plan

Page 2 of 49

Table of Contents

Summary.....	p. 3
Key Elements of The Water Quality Nutrient Trading Plan.....	p. 3
Sugar Creek Watershed Water Quality Nutrient Trading Credit Program for the Alpine Cheese NPDES Permit.....	p. 9
Bibliography	p.21
Appendix A: Alpine Cheese Costs for the 5 Year Plan.....	p.22
Appendix B: Holmes SWCD and Ohio EPA Memorandum of Understanding.....	p.23
Appendix C: Contractual Agreement between Alpine Cheese Company and Holmes Soil and Water Conservation District (SWCD)	p.29
Appendix D: Ohio State University and Alpine Cheese Company Agreement for Services.....	p.31
Appendix E. Nutrient Trading Calculation Examples.....	p.45

Acknowledgements: This document was a collaborative effort between the Sugar Creek Project of OARDC/Ohio State University (Richard Moore, David McCartney, Lance Williams) in partnership with the Agroecosystem Management Program and ATECH, Holmes Soil and Water Conservation District (Michelle Wood, Joe Christner), Ohio EPA (Paul Anderson, John Kwolek), and the Alpine Cheese Company (Robert Ramseyer, and ATS Consultants Scott Ankrom and Dan Miklos). Special thanks also go to the following individuals for their help: Jim Currie, David Gobey (ATECH/OARDC/OSU), Lois Grant, Deana Hudgins, Scot Long, Jason Parker, Krishna Prasad, Ben Stinner, (AMP/OSU); William Long, Chuck Reynolds, Merle Swartzentruber (Holmes SWCD/NRCS); George Elmaraghy, John Januska, Dennis Lee, Keith Riley, Bill Skowronski, (OEPA); Hans Ramseyer (Alpine Cheese Company), John Kessler, Jeff Van Loon, (ODNR); Dean Slates (OSUE); Larry Antosh (Ohio Farm Bureau); Kevin Elder (Ohio Department of Agriculture), and Bob Gibbs (Ohio House Representative District 97).

Alpine Cheese Phosphorus Nutrient Trading Plan

Page 3 of 49

A Plan to Reduce Phosphorus Loading and Improve Stream Ecological Function in the Middle Fork and Adjoining Watersheds of the Sugar Creek Watershed: Joint Recommendations for the Alpine Cheese Phosphorus Nutrient Trading Plan

*Sugar Creek Project of the OARDC/Ohio State University
Holmes Soil and Water Conservation District
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Summary

This nutrient trading plan is being submitted to the Ohio EPA for approval and includes a description of the pollution abatement strategies to be employed, a schedule for their implementation, and a monitoring plan to identify potential remediation sites and to gauge success of the project over time. The plan will also identify parties responsible for each part of the implementation process.

Key Elements of the Water Quality Nutrient Trading Plan

1. The reduction of phosphorus loading in the Middle Fork and adjoining Indian Trail, Walnut Creek and South Fork Headwaters will be part of a NPDES 5 year renewal permit and therefore will be signed off by the Director of Ohio EPA.
2. The plan includes a description of the nature of the phosphorus problem using baseline monitoring to show the sources and sinks of phosphorus.
 - a. Water Nutrient Monitoring
 - b. Habitat and Biota Monitoring
3. The location of trades for this plan includes the following Hydrologic Unit Codes (HUC) for watersheds in the Middle Fork and South Fork (Middle Fork 05-040001-120 and South Fork 05-040001-110):
 - a. HUC 05040001-110-010-South Fork Sugar Creek above E. Branch, Subarea= 22,412 Acres
 - b. HUC 05040001-110-040-Walnut Creek [except Indian Trail Cr., Subarea= 20,271 Acres
 - c. HUC 05040001-110-050-IndianTrailCreek, Subarea= 10,491 Acres

Alpine Cheese Phosphorus Nutrient Trading Plan

Page 4 of 49

- d. HUC 05040001-120-010-Middle Fork Sugar Cr. above Crabapple Cr., Subarea= 10,509 Acres
- e. HUC 05040001-120-020-Crabapple Creek, Subarea= 7,226 Acres
- f. HUC 05040001-120-030-Middle Fork Sugar Cr. below Crabapple Cr. to Sugar Cr., Subarea= 12,500 Acres

4. The plan includes "Reasonable Assurances" that the project will succeed.

- a. Documentation of actual sites and actual work done on those sites will be performed by Holmes SWCD personnel according to The Memorandum of Understanding between Holmes SWCD and Ohio EPA (see Appendix B)
- b. Locations where the BMPs are to be installed will be documented using a system of HUC watershed code, Stream name and mile, GPS coordinate, Farmer Name and NRCS BMP #. An example would be 05040001-110-010, Brush Run (0.3) of South Fork(18.94) of Sugar Creek(12.3), 40.4639N81.6933W, D.Yoder_NRCS326B (Conservation Tillage/No-till).
- c. The voluntary sites are targeted using a combination of variables. The total amount of P pollution that will be reduced within the named watersheds will be at least the 2.51lbs(1.14 kg)/d needed to account for the difference between the proposed 3.74 lbs/d (1.7 kg/d) permitted P and the 1.23lbs(0.56 kg)/d P that would be allowed for a flow of 0.140 MGD at 1 ppm P as per the TMDL target for point source P for the Middle Fork. This will be based on site by site evaluations of BMP impacts on P losses by Sugar Creek Project/OSU and SWCD personnel and calculated according to the ODNR Load Reduction Spreadsheet <http://www.dnr.state.oh.us/soilandwater/downloads.htm>. If all reductions are from NPS BMP's, it would result in phosphorus loading reductions ranging from 5.02lbs/d (2.28 kg/d) to 30.10 lbs/d (13.68 kg/d) P at the NPS sites dependent upon the location of the selected sites for implementation. The reduction targets from the TMDL for the Sugar Creek Watershed are shown in Tables 1 and 2.

Alpine Cheese Phosphorus Nutrient Trading Plan

Table 1. Total Maximum Daily Load (TMDL) conditions for the Middle Fork Sugar Creek (OEPA, 2002)			
	Source	P Loading (kg/day)	P Loading (lbs./day)
1998 Conditions	Non Point Source (NPS)	39.0	85.9
	Point Source (PS)	11.2	25.7
	Total	50.0	110.1
Total Maximum Daily Load (TMDL)	All	30.0	66.1
Percent Reduction	----- 40% -----		
TMDL Targets	Natural	5.0	11.0
	Waste Load Allocation (PS)	1.0 (Alpine Cheese = 0.08) ¹	2.2
	Load Allocation (NPS)	24.0	52.9
¹ Assumes 1.0 mg/l P @ 0.02 MGD			

- d. A schedule will show how long it will take to implement and when monitoring will occur.
- e. The plan calls for voluntary biological and chemical stream monitoring in addition to required monitoring efforts that are anticipated to be part of the Alpine Cheese NPDES permit. Monitoring sites are included in figures found in Figure 4, Exhibit A of Appendix D.

Alpine Cheese Phosphorus Nutrient Trading Plan

Page 6 of 49

Table 2. Summary of phosphorus loading scenarios relating to the Alpine Cheese nutrient trading program to meet TMDL targets.			
	Source/ Loading Scenario	P Load (kg/day)	P Load (lbs/day)
TMDL Targets	Total Load to Middle Fork Sugar Creek	30	66.1
	All Point Sources Point Sources Middle Fork Sugar Creek	1.00	2.2
	Alpine Cheese (1 mg/l @ 0.02 MGD)	0.08	0.18
Alpine Cheese Expansion to 0.14 MGD	Permit Limit = 1.0 mg/l	0.56	1.23
	Requested Permit Limit = 3.2 mg/l	1.70	3.74
NPS Loading Reductions Required to Meet TMDL Targets	Total Effective NPS Reduction	-1.14	2.51
	Target NPS Reduction Through Nutrient Trading Plan ¹	2.28 - 13.68	5.02-30.13

¹Assuming that all Phosphorus load reductions are through NPS controls.

- f. The plan will include a Water Quality Nutrient Trading Credit Program using ratios from 1:1 to 12:1 for computing P redeposition based upon the source of P loading and its location in the watershed relative to the Alpine Cheese discharge location.
- g. If a practice fails, standard SWCD policies for practice failure will be used. Contract totals will require 20% extra P reduction for total P beyond Alpine Cheese's NPDES requirement as a safety factor to provide for reasonable assurance to insure against BMP failure, underestimates of BMP remediation, and guarantee that the Plan produces a net reduction in Phosphorus.

Alpine Cheese Phosphorus Nutrient Trading Plan

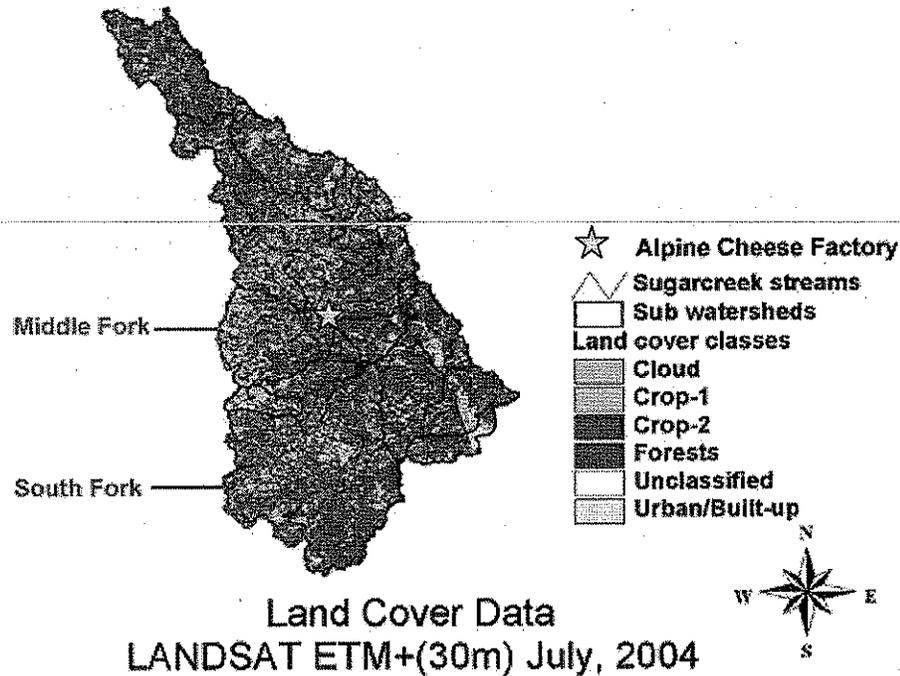
Page 7 of 49

- h. A targeted approach with backup strategies is as follows. Plan A is targeted at Streams 18-31 of the South Fork where there is a high concentration of dairy farms and agricultural crops. Holmes SWCD and Sugar Creek Project/OSU have a history of working with farms in the area of South Fork streams 23-30 shown in Figure 4, Exhibit A of Appendix D. There is also a high concentration of dairy farms producing milk for Alpine Cheese located on these targeted streams. If Plan A has inadequate progress anytime after the 1st year, Plan B will start concurrently. Plan B consists of an open enrollment of any farms located in the eastern 1/3 of Holmes County in the targeted Sugar Creek watersheds.

The Landsat 7 map of Sugar Creek shown in Figure 1 and figures in the TMDL indicate that most conservation efforts would be more productive in the South Fork than the Middle Fork. These row crop areas are shown in red. Pasture/hay is shown as pink.

5. Reports will be submitted semi-annually to EPA. The plan will remain dynamic and will be evaluated and modified as required every six months. The semi-annual report will follow the outline below:
 - a. Progress summary of Targeted Plan A and B.
 - b. List of farms participating and BMPs implemented and in progress.
 - c. Brokering report including P calculation trades in kilograms and acres of BMPs.
 - d. The results of voluntary monitoring and data-sharing.
 - e. Proposed changes and plans by the advisory team for the next 6 months.
6. The plan includes procedures on how Alpine Cheese will meet the target reduction for phosphorus which is equivalent to an NPDES permit effluent limitation of 1 ppm P at 0.140 MGD by the end of the 5 year period. TMDL targets are based on in-stream response signatures. However, since phosphorus loading is affected by factors other than the discharge of wastewater from Alpine Cheese, success or failure is based on those factors listed in the nutrient trading plan. If Ohio EPA is of the opinion that there has been reasonable success after the 5 year period, the plan can be fine tuned for the next NPDES renewal period.

Figure 1: Landsat Image of Sugar Creek Watershed



6. The plan includes procedures on how Alpine Cheese will meet the target reduction for phosphorus which is equivalent to an NPDES permit effluent limitation of 1 ppm P at 0.140 MGD by the end of the 5 year period. TMDL targets are based on in-stream response signatures. However, since phosphorus loading is affected by factors other than the discharge of wastewater from Alpine Cheese, success or failure is based on those factors listed in the nutrient trading plan. If Ohio EPA is of the opinion that there has been reasonable success after the 5 year period, the plan can be fine tuned for the next NPDES renewal period.
7. Contact persons in each of the organizations will be:
 - a. Alpine Cheese: Robert Ramseyer, Tel. (330)674-6451
 - b. Sugar Creek Project/OSU/:Dr. Richard Moore, Tel. (330)202-3538
 - c. Holmes SWCD: Michelle Wood, Tel. (330)674-2811

Alpine Cheese Phosphorus Nutrient Trading Plan

Page 9 of 49

Sugar Creek Watershed Water Quality Nutrient Trading Credit Program for the Alpine Cheese NPDES Permit

Water quality nutrient trading credit is based on the 2003 EPA nutrient trading policy (<http://www.epa.gov/owow/watershed/trading.htm>). The Clean Water Act (CWA), 33 U.S.C. § 1251, et seq. and its implementing regulations establish a legal basis and authority for trading to achieve and maintain water quality standards. The legal framework of water quality credit trading is two fold. First, it is based on water quality standards (Section 303 (c) that establish a level of water quality must be attained and protected. The second criterion is the CWA requirement that NPDES permits contain water quality-based effluent limits as stringent as necessary to meet water quality standards (CWA Section 301(b)(1)(C)). The baselines for point sources to trade derive from these water quality-based effluent limitations. A baseline is the level below which a reduction is made to create a pollutant reduction credit. The Water Quality Trading Policy encourages sources to create pollutant reduction credits by making reductions greater than required to meet a regulatory requirement. Under a trading program approved by a state or USEPA, other sources may then purchase these pollutant reduction credits to meet their own water quality-based regulatory limit.

All water quality-based effluent limitations, including alternate or variable limits that may apply where trading occurs, are subject to CWA Section 301(b)(1)(C). EPA has promulgated regulations specifying when such water quality-based effluent limitations are necessary and how such limitations are to be derived. Among other things, EPA's regulations require the permitting authority to ensure that:

- (A) The level of water quality to be achieved by limits on point sources established under this paragraph is derived from, and complies with all applicable water quality standards; **and**
- (B) Effluent limitations developed to protect a narrative water quality criterion, a numeric water quality criterion, or both, are consistent with the assumptions and requirements of any available wasteload allocation for the discharge prepared by the State and approved by EPA pursuant to 40 CFR 130.7. (40 C.F.R. § 122.44(d)(1)(vii)).

Because the Sugar Creek Watershed is under a TMDL completed in 2002 (Ohio EPA, 2002), the TMDL sets the cap for the necessary level to meet water quality standards. In the case of Alpine Cheese, the cap for the Middle Fork Watershed of 30 kilograms per day (24,090 pounds per year) phosphorus has been established by the TMDL (OEPA, 2002, p.63).

Alpine Cheese is in the process of a scheduled NPDES permit renewal. The TMDL for the Sugar

Alpine Cheese Phosphorus Nutrient Trading Plan

Page 10 of 49

Creek Basin recommended that Alpine Cheese meet a 30-day concentration limit of 1 mg/l for phosphorus. Alpine Cheese has applied to the Ohio EPA for a total discharge volume of 0.14 mgd. The total volume includes 0.08 mgd of process wastewater and 0.06 mgd of "cow water" from the double reverse osmosis system used to dewater whey. At a phosphorus concentration of 1 mg/l (per the TMDL), and a total wastewater volume of 0.14 mgd, the 30-day loading limit would be 1.23 lbs/d (0.56 kg/d).

Rather than the 30-day concentration limit of 1 mg/l for phosphorus recommended by the TMDL, the combined flow of 0.140 MGD will be assigned a 30-day phosphorus limit of 3.2 mg/l (3.74 lbs/d or 1.7 kg/d) in the NPDES Permit. To address the discrepancy between the TMDL recommended phosphorus load and the NPDES Permit load, Alpine Cheese proposes to finance a remediation plan intended to reduce phosphorus from nonpoint and other sources to the Middle Fork and adjoining Indian Trail, Walnut Creek and South Fork Headwaters watersheds. The target reduction from nonpoint and other sources will be at least the 2.51 lbs/d (1.14 kg/d).

It should be noted that the permitted phosphorus load of 3.74 lbs/d (1.7 kg/d) represents a 14.96 lbs/d (6.8 kg/d) reduction from the 1998 OEPA stream study that showed the Middle Fork Sugar Creek in full attainment of the applicable biological criteria when it was exposed to a phosphorus load of 18.37 lbs/d (8.35 kg/d) from Alpine Cheese. However, the Sugar Creek mainstem was not in attainment at the time of the 1998 study. Though the Middle Fork was in attainment of applicable criteria, the TMDL recommended reduction in the phosphorus load to the Sugar Creek basin is intended to address nonattainment issues throughout the entire Sugar Creek basin. The remediation plan will address those concerns by reducing nonpoint and other sources of phosphorus throughout the basin in addition to the anticipated reduction in the phosphorus load from Alpine Cheese.

Unit of trade: The unit of trade for the trading will be pounds (kilograms) of phosphorus that is prevented from discharging into the Sugar Creek watershed's rivers and streams as a result of an activity undertaken voluntarily. Water quality credits may be purchased by regulated dischargers (that become eligible buyers) for the purpose of complying with regulations related to the particular nutrient for which the credit is generated.

The plan includes a Water Quality Trading Credit Program administered by Holmes SWCD with the assistance of the OARDC to quantify the P load reductions. Various examples of P credits ratios depending on upstream and downstream locations are given in Table 5. For example, P

Alpine Cheese Phosphorus Nutrient Trading Plan

Page 11 of 49

credits from NPS Best Management Practices (BMP's) applied to the watershed immediately upstream from the Alpine plant discharge will be applied to the required P reduction at a 1:2 ratio (#P credited/#P remediated) to account for P redeposition from this area which is less than 2 mi². P credits from NPS Best Management Practices (BMP's) applied to the local watersheds not immediately upstream from the Alpine plant discharge will be applied to the required P reduction at a 1:8 ratio to account for P redeposition from these @16 mi² areas. Effluent P reductions at point sources below permit requirements will be applied to the required P reduction at a 1:1 ratio to account for no P redeposition. Example descriptions of the methodology for implementation of the nutrient trading plan are provide in Appendix E.

Types of Activities that Generate Credit: P reduction will be accomplished through two means: traditional NRCS approved best-management practices (BMPs) and Sugar Creek Project/OSU /Holmes County SWCD/OEPA approved "Innovative Practices" in consultation with the local NRCS staff.

Traditional NRCS Best Management Practices The exact P reduction values of these BMPs are calculated based on the approved ODNR / EPA spreadsheet:

<http://www.dnr.state.oh.us/soilandwater/downloads.htm>.

- A. Residue Management No-Till or Strip Till (329A)
- B. Conservation Crop Rotation (328)
- C. Cover- Green Manure Crop (340)
- D. Nutrient Management (590) Soil Tests Manure Analysis
- E. Waste Utilization (633)
- F. Waste Storage Facility, Manure , Milkhouse, and Waste Water (313)
- G. Roof Runoff Structures (558)
- H. Prescribed Grazing (528A)
- I. Fencing (382)
- J. Watering Facility (614)
- K. Stream Crossing(728)
- L. Use Exclusion (472)
- M. Access Road (560)
- N. Livestock Use Area Protection (757)
- O. Filter Strip Area (393)
- P. Composting Facility (317)
- Q. Wetland Creation

Alpine Cheese Phosphorus Nutrient Trading Plan

Page 12 of 49

AMP /OARDC /OSU, SWCD, NRCS, OSU Extension, Farmer “Innovative Practices”.

These practices are essential because a large portion of the farms in these watersheds are Amish and do not participate in traditional conservation programs. Several of these “Innovative Practices” will function exclusively as educational and participation enhancement aids and will not have nutrient credits associated with them. Non-Amish farmers may also show increased conservation activity if allowed to use practices that they feel provide the most “bang for the buck” on their farm even though they do not fully meet NRCS specifications. These practices will need to be approved by the EPA and the advisory group in order to qualify for cost-sharing from the Alpine Cheese conservation practice support fund. Many scientific articles provide guidance as to appropriate nutrient credit estimates for “Innovative Practices” that do not fully meet NRCS specifications.

- a) Utilize Holmes SWCD’s simplified MMP for calculation of appropriate manure application rates.
- b) Educate farmers as to how applying P when P soil test levels are above 100% crop sufficiency needs always increases environmental and economic losses
- c) Promote fencing program through education and testimonials on milk bacterial count improvement and subsequent higher milk premiums.
- d) Prioritize conservation practices cost-sharing based on P remediation.
- e) Familiarize farmers with the benefits of creating small-stream buffer zones on primary headwater. Currently NRCS buffers are targeted at large streams so 30’ minimum buffers are used. Filter strips of 20’ with native wetland grasses/shrubs along bank edges can provide small stream cover while not shading crops and the filter strip can be harvested. P reduction will be calculated as a filter strip.
- f) On controlled grazing of riparian zones, calculate P reduction according to improvements in lateral recession rate (LRR) from the ODNR spreadsheet.
- g) Establish prioritized (high P) tributary incentives.
- h) Offer high participation tributaries (75% of farms and residences participating) incentives.
- i) Promote new members through a sign-up incentive.

Alpine Cheese Phosphorus Nutrient Trading Plan

Page 13 of 49

Method of Selecting the Trading Program Sites:

- 1) An advisory group consisting of one representative of the following groups will suggest criteria for the target sites for trading and who will provide oversight of the project.
 - a) Holmes County Soil and Water
 - b) Holmes County NRCS
 - c) Sugar Creek Project/OARDC/Ohio State University
 - d) OSU Extension
 - e) Alpine Cheese
 - f) Ohio Farm Bureau
 - g) USDA
 - h) Ohio DNR
 - i) Ohio EPA

- 2) The criteria to be used are based on ecological principles and consist of the factors listed below. Figure 2 shows an example of how sites are selected by comparing 2 social science factors (church districts and Alpine Cheese producer parcels) and 1 natural science factor (land use).
 - a) TMDL goals
 - b) Effectiveness of BMPs and Innovative Practices
 - c) Landsat Land Use Images from August 2004
 - d) Video Footage taken by Helicopter October 5, 2004.
 - e) NRCS and SWCD maps of highly erodable land
 - f) Alpine Cheese producer location maps
 - g) Amish Church and School District Maps

What is a trade?

A trade occurs when the Holmes SWCD, as the broker, acquires (by written agreement) water quality credits and sells them (by written agreement) to an eligible buyer for their use in achieving compliance with their discharge permit. The agreement with Alpine Cheese is attached in Appendix C.

Where may trades occur? Trades will occur in the Middle Fork through South Fork Watersheds.

Alpine Cheese Phosphorus Nutrient Trading Plan

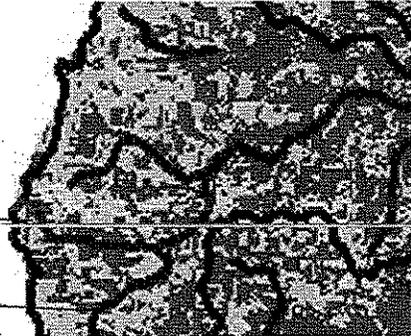
Page 14 of 49

Figure 2 Landsat Land Use and Social Organization Mapping Used in Process of Targeting Parcels for P Remediation in the Middle Fork and South Fork

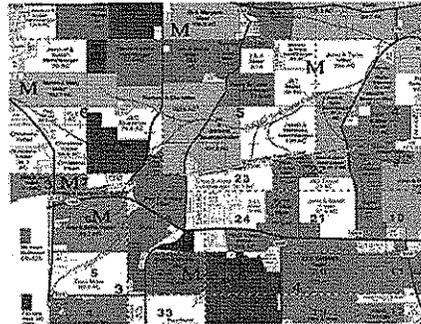
**Middle Fork Landsat
Streams 20-25
Pink=hay/pasture
Red=row crops**

Stream 22

Stream 20



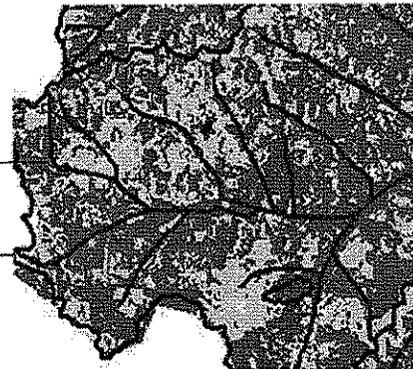
**Middle Fork Parcels
Amish Church Districts (colors)
Alpine Producers (M)**



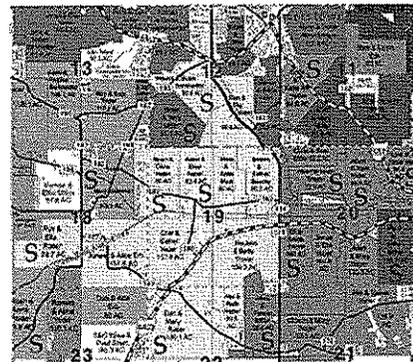
**South Fork Landsat
Streams 13-25
Pink=hay/pasture
Red=row crops**

Stream 19

Stream 17



**South Fork Parcels
Amish Church Districts (colors)
Alpine Producers (S)**



Alpine Cheese Phosphorus Nutrient Trading Plan

Page 15 of 49

How does Alpine Cheese "acquire" credits?

Alpine Cheese can market and sell phosphorus water quality credits to raise money to fund additional credit-generating projects to the extent that they pay for the adopted BMP's used to generate the credits and after their NPDES commitments are fulfilled. Final credits will only be available for trading after it has been documented and concurred by Ohio EPA that adequate phosphorus has been removed from the Sugar Creek basin to meet Alpine Cheese's NPDES permit requirements. Any additional final credits will be held in escrow by Holmes SWCD as the broker for credits generated by this project. An increase in phosphorus loading at the Alpine Cheese plant, above that stated in the plan, would need to be requested as a permit modification and might require an anti-degradation review by the Ohio EPA.

Final Credits: Credits that were generated during a nutrient management project that has already been completed are called "*final credits*". Trading ratios, shown in Table 3, illustrate the pounds required to be reduced through a best-management practice in comparison to the pounds of reduction that would be required by the treatment plant using on-site treatment upgrades. Trading ratios vary depending on the quality of the water into which the water quality credit buyer is discharging with impaired waters requiring 1.5 times the nutrient reduction per credit. Trading ratios also reflect the differences in credit sources. Nutrient management projects that are contracted from a non cropping or non sedimenting source having a direct discharge to waters of the state are credited at a 1:1 ratio consistent with the treatment of these pollutants within the TMDL process. Non cropping or non sedimenting sources having an indirect discharge to waters of the state will be addressed using the same methodology as cropping nonpoint sources. Nutrient management projects that are contracted from non-point sources that are upstream of the credit purchasing point source are credited at ratios consistent with the sediment delivery ratio (SDR), calculated according to U.S. Department of Agriculture Soil Conservation Service (1983. Sediment. Section 3, Chapter 6. National Engineering Handbook) of the watershed above the point source then rounded to the closest values of 2 (<2mi²), 4 (2-32mi²) or 8 (>32mi²). Nutrient management projects that are contracted from non-point sources that are not upstream of the credit purchasing point source are credited at an 8:1 ratio.

Alpine Cheese Phosphorus Nutrient Trading Plan

Table 3: Buyer Ratios according to P Source¹

Credit Type	Ratio (lbsP credited/lbsP remediated) for Buyer with Discharge to Fully Attaining Waters (Middle Fork)	Ratio (lbsP credited/lbsP remediated) for Buyer with Discharge to Impaired Waters
Non cropping or Point Source with direct discharge to waters of the state)	1:1	1.5
Cropping		
Upstream Non-Point Source	2:1	3:1
(<2 mi ² drainage area)	4:1	6:1
(2-32 mi ² drainage area)	8:1	12:1
(>32 mi ² drainage area)	8:1	12:1
External Non-Point Source (Any drainage area)		

(1) The ratios are based on redeposition ratios according to the above USDA Soil Conservation Service standard ratios. In this scenario, sediment distance traveled is the key variable. The advisory team will reexamine these ratios after year two of the plan to see how accurately they correspond to the actual monitoring. Any proposed changes to the buyer ratios during the implementation period must be approved by the Ohio EPA.

How will the verification of final credit values occur?

Holmes SWCD in conjunction with the Sugar Creek Project/OSU personnel has the expertise to determine appropriate P credits utilizing the ODNR/EPA spreadsheet. Ohio EPA will make final determination of P credits based on documentation provided. Farmers will contractually agree to follow through with BMPs in return for incentives determined by the advisory group and paid for by the BMP fund established by Alpine Cheese and/or other funding sources."

Role of the Third-Party Broker

Holmes SWCD will broker, maintain records of project signup, progress and completion needed for credit book keeping. The broker also has the right to gain carbon, sediment, and nitrogen

Alpine Cheese Phosphorus Nutrient Trading Plan

Page 17 of 49

credits from the same conservation measures being installed if a buyer, and documentation can be arranged. However, such credits would be separate from this plan which is directed at only phosphorus and such credits would be shared equally between Sugar Creek Project/OSU and Alpine Cheese Company.

What happens if both the primary project fully achieve its predicted results?

This is the best case where final credits are generated at the rate predicted. When this occurs, the permit holder meets its compliance obligations through the specific project referenced in its permit. The excess final P credits held in escrow may then be sold by the broker to generate money for more projects by Holmes SWCD and Sugar Creek Project/OSU. In this event, the revenue from these P sales will be equally divided between Alpine Cheese (as a rebate), Holmes SWCD, and Sugar Creek Project/OSU.

How will the number of credits for a specific project be determined? How will the kilograms of target phosphorus be determined?

The Holmes SWCD will use the standard ODNR spreadsheet formulas unless alternatives are specifically approved by the Ohio EPA.

What will be the criteria for success of this plan?

Success of the plan will be achieved if 1) Biotic function of the Middle Fork watershed at the points sampled below and above the Alpine Cheese effluent is maintained at those levels as documented in Year 1, Year 3, and Year 5 evaluations required in the NDPES permit; and 2) Phosphorus loading in year 5 from the Alpine Cheese plant does not exceed the 1.23 lbs/d (0.56 kg/d) that a 1 ppm P standard would allow after accounting for final nutrient trading credits achieved through this for plan sponsored reductions. Measurable criteria are listed as follows:

1. Number and types of BMPs adopted.
2. Acres of BMPs installed.
3. Kilograms of P reduced from each participating farm.
4. BMP adoption rates measured by percent participation on targeted streams.

Ancillary information collected during the implementation of the nutrient trading plan may also prove useful in the evaluation of the effectiveness of the program. This information may include any of the following:

1. The P reduction in the specific tributaries

Alpine Cheese Phosphorus Nutrient Trading Plan

Page 18 of 49

2. Phosphorus measurement improvement in streams.
3. Cost of #P/dollar in the trade.
4. Improved scores on biological indices.
5. Degree of attainment of Ohio water quality standards.
6. Attendance of local citizens at educational activities.

5 Year Timetable:

2005 April OARDC (ATECH)-Alpine Cheese Matching Grant (\$100,000) starts; meeting of the Alpine dairy producers and other farmers to introduce the opportunities. Advisory committee meets to determine target tributaries; research begins on 10 Amish farms to ascertain estimates for P levels from their residences, septic systems, and farms; habitat monitoring begins.

Year 1 (Semi-Annual Period 1)

Alpine Cheese NPDES permit approved, Alpine Cheese starts funding the remediation plan ; Monitor water quality (WQ) in Middle Fork and adjoining watersheds. Advisory committee meeting for Site Prioritization and Nutrient Trading Signup starts. Start purchasing milkhouse waste storage tanks, fence, etc. Start educational activities including media releases.

Year 1 (Semi-Annual Period 2)

Develop Conservation Plans for new cooperating farms. Start to implement BMP's. Continue WQ monitoring, advisory, signup and educational activities. Semi-annual report due.

Year 2 (Semi-Annual Period 3)

Advisory committee meeting; Nutrient Trading Signup at 20% of target P reduction, practices at 10%. Develop Conservation Plans for new cooperating farms. Start to implement BMP's. Continue WQ monitoring, advisory, signup and educational activities. Semi-annual report due.

Year 2 (Semi-Annual Period 4)

Advisory committee meeting; Nutrient Trading Signup at 20% of target P reduction, practices at 10%. Develop Conservation Plans for new cooperating farms. Start to implement BMP's. Continue WQ monitoring, advisory, signup and educational activities.

Alpine Cheese Phosphorus Nutrient Trading Plan

Page 19 of 49

Semi-annual report due.

Year 3 (Semi-Annual Period 5)

Advisory committee meeting; Nutrient Trading Signup at 30% of target P reduction, practices at 20%. Develop Conservation Plans for new cooperating farms. Start to implement BMP's. Continue WQ monitoring, advisory, signup and educational activities. Semi-annual report due.

Year 3 (Semi-Annual Period 6)

Advisory committee meeting; Nutrient Trading Signup at 45% of target P reduction, practices at 30%. Develop Conservation Plans for new cooperating farms. Start to implement BMP's. Continue WQ monitoring, advisory, signup and educational activities. Semi-annual report due.

Year 4 (Semi-Annual Period 7)

Advisory committee meeting; Nutrient Trading Signup at 60% of target P reduction, practices at 45%. Advisory committee progress midway review; determine if backup plan is necessary. Develop Conservation Plans for new cooperating farms. Start to implement BMP's. Continue WQ monitoring, advisory, signup and educational activities. Semi-annual report due.

Year 4 (Semi-Annual Period 8)

Advisory committee meeting; Nutrient Trading Signup at 75% of target P reduction, practices at 60%. Develop Conservation Plans for new cooperating farms. Start to implement BMP's. Continue WQ monitoring, advisory, signup and educational activities. Semi-annual report due.

Year 5 (Semi-Annual Period 9)

Advisory committee meeting; Nutrient Trading Signup at 90% of target P reduction, practices at 75%. Develop Conservation Plans for new cooperating farms. Start to implement BMP's. Continue WQ monitoring, advisory, signup and educational activities. Semi-annual report due.

Year 5 (Semi-Annual Period 10)

Advisory committee meeting; Nutrient Trading Signup at 120% of target P reduction,

Alpine Cheese Phosphorus Nutrient Trading Plan

Page 20 of 49

practices at 105%. Develop Conservation Plans for new cooperating farms. Start to implement BMP's. Continue WQ monitoring, advisory, signup and educational activities. Semi-annual report due. Final Report due within 90 days following Semi-Annual Period 10 completion.

Water Quality Monitoring

Water quality, habitat, fish assemblage and aquatic arthropod monitoring will be conducted above and below the Alpine Cheese factory discharge point by the Alpine Cheese Company as part of their NDPEs permit separately from this plan. Voluntary additional monitoring not required by the NDPEs permit will include water quality, habitat, fish assemblage and aquatic arthropod data that will be collected for the following tributaries of the Middle Fork and South Fork (HUC Watersheds 05-040001-120 Middle Fork and 05-040001-110 South Fork) in a separate contract between Alpine Cheese and OSU in order to establish baseline conditions, document improvements, and promote community involvement. Detailed information concerning their location and maps showing their location are included in Exhibit A of Appendix D.

Water chemistry analysis alone does not provide a complete representation of stream health and may only present a limited account of the causes and effects of recurrent pollutant loads on stream condition (Yoder and Rankin 1998). A complete assessment of stream health involves the evaluation of biotic communities, aquatic habitat, adjacent riparian condition, and the linkages among these features in addition to chemical analysis (Yoder and Rankin 1998). Unlike chemical sampling that only reflects the immediate condition at the time of collection, monitoring aquatic communities and habitat can reveal long-term effects of anthropogenic disturbances over larger spatial and temporal scales.

At priority stream sites associated with high BMP adoption, we will in years 1, 3 and 5 conduct a habitat survey using the Qualitative Habitat Evaluation Index (QHEI) (Rankin 1989), sample the fish assemblage using electroshocking, compute the Index of Biotic Integrity (IBI; Karr 1981), and sample for aquatic arthropods. The IBI is a multi-metric index that scores a stream based on the condition of the fish assemblage. As an addition to these indices, we will collect other quantitative data (i.e., discharge, dissolved oxygen, turbidity, conductivity, water temperature, and pH) to include in multivariate analyses (e.g., nonmetric multidimensional scaling and canonical correspondence analysis) that will relate the fish assemblages to habitat and other conditions in the streams. Multivariate analyses have an advantage in that complex community

Alpine Cheese Phosphorus Nutrient Trading Plan

Page 21 of 49

data are not reduced to a single number (e.g., IBI score) and thus, ecological relationships among variables can be explored to identify potential causal mechanisms influencing biota and their response to disturbance (Williams et al. 2003). Personnel collecting samples will be trained and supervised by senior researchers to promote quality assurance in the monitoring program.

Bibliography

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Appendix A

Alpine Cheese Costs for the 5 Year Plan¹

Table 4 Summary of Alpine Cheese Costs for the 5 Year Plan.

	Year 1	Year 2	Year 3	Year 4	Year 5
Sugar Creek Project/OSU	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000
Holmes SWCD					
Personnel	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000
Conservation Measures	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000
Subtotals	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000

Total \$800,000

(1) These costs may be lowered through a rebate resulting from excess credits generated by the broker or by additional grants.

**COOPERATIVE AGREEMENT
BETWEEN
HOLMES SOIL AND WATER CONSERVANCY DISTRICT
AND
OHIO ENVIRONMENTAL PROTECTION AGENCY**

The purpose of this document is to establish an Cooperative Agreement between the Holmes Soil and Water Conservation District (SWCD) and the Ohio Environmental Protection Agency (Ohio EPA) to define the expectations of both parties with respect to verification of implementation of "A Plan to Reduce Phosphorus Loading and Improve Stream Ecological Function in the Middle Fork and Adjoining Watersheds of the Sugar Creek Watershed: Joint Recommendations for the Alpine Cheese Phosphorus Nutrient Trading Plan." The plan has been developed by the Ohio State University Sugar Creek Project/OSU (R. Moore, Principal Investigator) and the Holmes SWCD, as part of a watershed nutrient trading plan for the Alpine Cheese Co., U.S. Rte. 62 E., Winesburg OH. The nutrient trading plan shall be an integral component of the NPDES wastewater permit for the Alpine Cheese Co., and is therefore subject to final approval by Ohio EPA.

The parties desire to enter into this Cooperative Agreement because of the working relationship that already exists between Holmes SWCD and the predominately Amish population that will likely participate in the nutrient trading program and because of the efficiencies to be gained by having Ohio EPA team with the Holmes SWCD in verifying the implementation and maintenance of best management practices (BMPs) as part of the nutrient trading program. Both parties further agree that each party has a critical role to play in providing for the enhancement and protection of the surface water resources found in the Sugar Creek watershed and pledge to work together to achieve these goals. As part of this plan, the Holmes SWCD has the responsibility to act as the broker of the water quality trading credits. Coordination of effort between Holmes SWCD and Ohio EPA shall include, but is not limited to, semi-annual reports to Ohio EPA from the Holmes SWCD which shall provide details regarding all projects enrolled in the program, verification activities by Ohio EPA which may include periodic visits to

Alpine Cheese Phosphorus Nutrient Trading Plan

Page 24 of 49

actual project sites by both parties, and exchange of information regarding the effectiveness of BMPs relative to reducing non-point phosphorus loading to streams within the Sugar Creek Basin.

COORDINATION BETWEEN HOLMES SWCD AND OHIO EPA

For a successful nutrient trading program, coordination of effort between Holmes SWCD and Ohio EPA shall be necessary in a number of areas related to program development, monitoring and verification of BMP implementation.

Specific responsibilities of Holmes SWCD and Ohio EPA include:

- 1) Both parties agree to continue to promote participation in the nutrient trading program to community officials and the public.
- 2) As the broker, Holmes SWCD shall be responsible for entering into agreements with producers through conservation plans and cost-share contracts to implement BMPs.
- 3) The Holmes SWCD shall oversee the implementation (planning, design and construction/installation) of BMPs according to accepted protocols utilized for USDA-Natural Resources Conservation Service (NRCS) programs. All conservation practice designs drawn by Holmes SWCD personnel are verified for accuracy and compliance with NRCS standards and signed by an NRCS engineer before construction begins. NRCS personnel verify construction is to standards during construction and after the construction is completed. All management practices prescribed by a comprehensive nutrient management plan (CNMP) are checked and signed by two different people, including a federal certified planner. In addition to these accepted protocols, the site locations and BMPs implemented shall be mapped in ArcView on Holmes County orthophotography using GPS receivers for location. These maps shall be available to Ohio EPA.
- 4) Conservation practices shall be subject to verification as part of the annual NRCS Area 3 office review of agronomic and engineering practices. During this inspection, 5% of every different type of practice is randomly inspected by an NRCS engineer and/or resource conservationist to ensure that the practice meets state NRCS standards. The NRCS engineer and resource conservationist shall provide a review summary to Ohio EPA of their audit.
- 5) Holmes SWCD agrees to conduct follow-up visits at each BMP for which nutrient credits may be assigned. The visits shall be performed on a quarterly basis the first year following installation of the BMP and semi-annually thereafter. The status of each BMP identified at the time of the follow-up visits shall be provided to Ohio

Alpine Cheese Phosphorus Nutrient Trading Plan

Page 25 of 49

EPA in the semi-annual reports. Nutrient credits may be assigned in part, based on the observations made during these sight visits.

- 6) Holmes SWCD shall prepare and submit semi-annual reports to Ohio EPA and Alpine Cheese containing the information specified in the Alpine Cheese nutrient trading plan and a summary of any additional activities in the 6-months prior to the report. Reports shall be prepared in both hard-copy and electronic formats, and shall be due to Ohio EPA no later than July 31st and December 30th of each calendar year.
- 7) Following the review of the semi-annual reports regarding the implementation of the nutrient trading plan, Ohio EPA or Holmes SWCD may request a meeting to facilitate additional review of documentation regarding the nutrient trading plan and field verification activities. Ohio EPA and Holmes SWCD shall ensure that appropriate staff is available for these meetings, which shall be held at a mutually acceptable time and place (generally at the Holmes SWCD office). The meetings shall be used to provide an opportunity for questions and answers regarding the progress of the nutrient trading program, discussion of issues relating to planning, implementation, and verification of the program, credit allocation protocols conducted in conjunction with the nutrient trading plan, and the scheduling of additional Ohio EPA verification activities.
- 8) Ohio EPA is authorized to conduct activities that ensure the implementation of BMPs, including but not limited to, file reviews, remote observation site tours and on-site visits to participating farms. The mutually acceptable parameters for these activities are described below:
 - a) File Reviews: Holmes SWCD shall ensure that all files, plans and documentation related to projects participating in the nutrient trading plan are available for review by Ohio EPA. Except for situations beyond the control of Holmes SWCD, these files shall be available for review on the dates when semi-annual review meetings between the parties are scheduled. Ohio EPA may also request access to files on dates other than during the semi-annual review meeting. Such file reviews shall be conducted at Holmes SWCD office at mutually acceptable times.
 - b) Remote Observation Site Tours: Upon request from Ohio EPA, Holmes SWCD staff shall be made available to accompany Ohio EPA staff on a visual roadway viewing of installed BMP's. The scope and timing of such tours shall be mutually agreed to by the parties. However, because Ohio EPA routinely conducts other business in this part of the county, Ohio EPA may conduct unaccompanied roadside tours on occasion as part of the routine compliance monitoring for the Alpine Cheese NPDES permit. Ohio EPA shall make every effort to include Holmes SWCD staff in these activities whenever possible.
 - c) On-Site Farm Visits: The goals of any site visits shall be to either verify the

Alpine Cheese Phosphorus Nutrient Trading Plan

Page 26 of 49

BMP was installed ; the effectiveness of installed BMPs, the validity of requested nutrient credits, and to gain further understanding of the use of BMPs with respect to watershed protection.

- i) Ohio EPA agrees that it shall be most efficient to work through Holmes SWCD in contacting Amish farmers in the nutrient trading program directly to gain access to their property or to otherwise request information pertaining to the program.
- ii) Ohio EPA and Holmes SWCD agree that a Holmes SWCD staff member shall accompany the Ohio EPA representative on any on-site visit, and that Ohio EPA shall not conduct an on-site visit without a Holmes SWCD staff member, unless Holmes SWCD waives this restriction. Holmes SWCD shall make staff reasonably available to accompany staff from Ohio EPA for site visits. Ohio EPA further agrees to allow two (2) weeks for the Holmes SWCD to contact property owners prior to conducting site visits unless Ohio EPA requests a shorter notice and circumstances show that a shorter prior notice is warranted. No site visit shall be conducted without the property owner's permission. Refusal to allow a visit by Ohio EPA may eliminate the trading credit associated with the property, unless verification can be justified by other methods.
- iii) Ohio EPA and Holmes SWCD shall work together with the primary goal of establishing a mutually acceptable list of potential sites to be visited. Ohio EPA may request that Holmes SWCD arrange a site visit for any property participating in the nutrient trading program for verification or training purposes. Ohio EPA may request visits for up to 20% of the removal credits proposed each semi-annual reporting period. The visits shall be conducted according to a schedule agreed to by the parties each time a final list of site visits is developed.
- iv) Holmes SWCD may object to the inclusion of any property for an on-site visit by stating the grounds for excluding the property. The objection may be made in writing to the Manager, Ohio EPA Division of Surface Water, Northeast District Office, 2110 East Aurora Road, Twinsburg Ohio 44087, and shall include a) a description of the items in dispute, b) the specific reasons for the objection, c) a description of efforts made to resolve the issue, and d) a proposed method of resolution. If staff from the two parties cannot resolve an objection, Holmes SWCD and Ohio EPA may enter into dispute resolution as stated below.
- v) Ohio EPA and the Holmes SWCD shall jointly assess the status of

site access and inspections semi-annually, once the program is implemented. In the event that the parties determine that a significant number of farmers are unwilling to allow site access, the Holmes SWCD shall present alternatives to Ohio EPA for review regarding compliance verification. Such proposed alternatives may include videotape or photographic evidence of BMP implementation from inspections conducted by Holmes SWCD, aerial flyovers, etc. Ohio EPA shall review information submitted on alternative strategies and issue a determination to Holmes SWCD as to whether such alternatives are acceptable to verify BMP compliance.

BMP IMPLEMENTATION VERIFICATION

The nutrient trading program is a compliance requirement of the Alpine Cheese NPDES Permit, as an alternative to more stringent permit limits necessary to achieve the recommended nutrient loading of the Sugar Creek TMDL. In acknowledgment of this, Holmes SWCD understands that Ohio EPA has sole and final discretion with respect to the allocation of nutrient trading credits as part of the Alpine Cheese Co. nutrient trading plan. In addition, Holmes SWCD further understands that if Ohio EPA is not provided with access to information necessary to verify the implementation of the nutrient trading plan, the specific properties or activities in question shall be ineligible for nutrient trading credits.

RESOLVING DISPUTES BETWEEN HOLMES SWCD AND OHIO EPA

In the case of disputes between Holmes SWCD and Ohio EPA Northeast District Office staff with respect to activities associated with this Cooperative Agreement, the Holmes SWCD may enter into dispute resolution by writing to the Manager, Ohio EPA Division of Surface Water, Northeast District Office, 2110 E. Aurora Rd., Twinsburg, OH 44087 to request a meeting with the Chief of the Division of Surface Water to resolve the issue(s). Prior to any such meeting, the Holmes SWCD shall provide, in writing, a description of the item(s) in dispute, a history of the efforts made to resolve the issue, and a proposed method of resolution of the issue. If the matter cannot be resolved with the Northeast District Office, the above written request shall be forwarded to the Chief of the Division of Surface Water, 122 S. Front St., Columbus, Ohio 43215. Ohio EPA shall make every effort to resolve any disputes in a mutually acceptable manner.

DURATION OF COOPERATIVE AGREEMENT

This Cooperative Agreement shall be effective as of the date this Cooperative Agreement is signed by the Chief, Division of Surface Water, Ohio EPA and shall stay in effect for five years from the date of approval of the nutrient trading program through the Alpine Cheese NPDES permit. The Cooperative Agreement may be extended with mutual concurrence of both Holmes County

Alpine Cheese Phosphorus Nutrient Trading Plan

Page 28 of 49

SWCD and Ohio EPA.

This Cooperative Agreement may be terminated for any reason by either party upon giving 60 days prior notice to the other party. The Cooperative Agreement shall be deemed terminated on the sixtieth day after notice is given, unless the notice is withdrawn by the party giving notice.

~~This Cooperative Agreement applies only to the implementation of the Alpine Cheese trading program and review of sites as part of the implementation of the Alpine Cheese trading program. None of the terms or restrictions contained in this Cooperative Agreement shall govern or restrict any other aspect of the enforcement by Ohio EPA of Ohio's environmental laws at any site that is, or becomes, subject to the terms of this Cooperative Agreement.~~

**APPROVED AND ACCEPTED
DIVISION OF SURFACE WATER
OHIO ENVIRONMENTAL
PROTECTION AGENCY**

**APPROVED AND ACCEPTED
HOLMES SOIL AND WATER
CONSERVANCY DISTRICT**

Name

Name

Print or Type Name

Print or Type Name

Title

Title

Date

Date

REV: October 17, 2005

Appendix C

Contractual Agreement between Alpine Cheese Company and Holmes Soil and Water Conservation District (SWCD)

This contract is to establish an agreement between Alpine Cheese Company and the Holmes Soil and Water Conservation District to define the roles of these parties as referenced in "A Plan to Reduce Phosphorus Loading and Improve Stream Ecological Function in the Middle Fork and Adjoining Watersheds of the Sugar Creek Watershed: Joint Recommendations for the Alpine Cheese Phosphorus Nutrient Trading Plan" written by the Ohio State University Sugar Creek Project (R. Moore, Principal Investigator) and Holmes Soil and Water Conservation District.

Alpine Cheese Company agrees to pay the Holmes County commissioners \$50,000 by May 30, 2005, and then by January 15 of each year for four more years (total of five years of funding) to fund a Holmes SWCD technician position dedicated to furthering the goals of the referenced nutrient trading plan. This payment covers employee salary, benefits, vehicle, office overhead and related expenses. This technician will be based in the Holmes SWCD office and act as a liaison between Alpine Cheese and the nutrient trading program. The technician will be instrumental in the education and public information aspects of the program, and will encourage producers' participation. This technician will write conservation plans, nutrient management plans, monitor the progress of the plans and inspect each management practice to verify its success. The technician will also participate in water quality monitoring with OARDC personnel on a limited basis. In the event of a management practice failure, the technician will utilize the expertise of NRCS and ODNR to make recommendations as to the remediation necessary to correct the situation.

Alpine Cheese will also provide \$50,000 by May 30, 2005 and by January 15 of each year for four more years (total of five years of funding) to Holmes SWCD to fund cost-share practices or equipment to promote conservation practices that will reduce the amount of phosphorus going into the Sugar Creek watershed from agricultural practices. A separate financial account from

Alpine Cheese Phosphorus Nutrient Trading Plan

Page 30 of 49

current SWCD accounts will be established to track this money. Any unspent cost-share money at the end of each year will continue to carry over into subsequent years and accumulate. At the end of year five, any unspent cost-share money will be returned to Alpine Cheese. Holmes SWCD shall keep any interest generated by this account as an administrative fee.

~~Any additional income or grants generated by the nutrient trading program will be accounted for separately from the Alpine Cheese cost-share account.~~

As part of this agreement, Holmes SWCD will also act as the broker of the water quality trading credits. As part of that responsibility, Holmes SWCD will:

- Track and issue reports on the nutrient trading program management
- Enter into agreements with producers through conservation plans and cost-share contracts to implement conservation practices
- Promote the nutrient trading program
- Prepare and submit annual reports to Ohio EPA and Alpine Cheese.

The excess final phosphorus credits generated by the escrowed project(s) may then be sold by Holmes SWCD as the broker to generate money for more projects by Holmes SWCD and Sugar Creek Project/OSU. In this event, the revenue from these phosphorus sales will be equally divided among Alpine Cheese (as a rebate), Holmes SWCD and Sugar Creek Project (R. Moore, Principal Investigator)/OSU.

This agreement can be modified at any time by mutual consent of all parties or can be terminated by any party giving 60 days written notice to the other parties. This agreement will be reviewed at least annually by all parties or at the request of any party involved.

Alpine Cheese Company
District

Holmes Soil and Water Conservation

By: _____ By: _____

Title: _____ Title: _____

Date: _____ Date: _____

Appendix D

Ohio State University and Alpine Cheese Agreement For Services

Agreement For Services

This Agreement is made and entered into this ___ day of ___ January __, 2006, by and between The Ohio State University, through its Ohio Agriculture Research and Development Center (OARDC), located at 1680 Madison Avenue Wooster, Ohio 44691, ("Ohio State") and Alpine Cheese Company, located at 9444 SR 39 Millersburg, Ohio 44654, ("Company").

WHEREAS, Ohio State University Sugar Creek Project (Dr. Richard Moore, PI)/ATECH/OARDC; and

WHEREAS, Company desires to utilize the services of Ohio State;

NOW, THEREFORE, in consideration of the promises and mutual agreements herein, Ohio State and Company agree as follows:

1. Services Provided By Ohio State

- a) Ohio State hereby agrees to provide research required to perform water quality, biota and habitat monitoring and analysis as well as other natural and social science required to further the development of the Alpine Cheese nutrient trading plan including EPA level 3 credible data evaluations of habitat and biota above and below the Alpine Cheese effluent as required by their NPDES permit, (the "Services") in accordance with the Scope of Work attached as Exhibit A, the terms of which are incorporated into this Agreement.
- b) The Services will be provided on the duration of the NDPEs permit for five years at Alpine Cheese Nutrient Plan Sites (see Exhibit A).

2. Fees

- a) Company will compensate Ohio State for its services in the following manner:
Alpine Cheese agrees to remit a payment to OARDC for \$60,000 by May 30, 2006, and then by January 15 of each year for four more years (total \$300,000).

-
-
- b) Ohio State will deliver an invoice to Company [Invoices will be mailed to Company on April 25, 2006, December 10, 2006, December 10, 2007 and December 10, 2008 to reflect the payments due] . Company agrees to pay each invoice within 30 days of receipt.

3) **Intellectual Property** *[For contracts in which we are providing reports.]*

- a) All documents, text, graphics, maps, software, computer code, magnetic disks, CD ROM's, photographs, videotapes, and data or information in any other tangible medium of expression that is delivered to Ohio State by Company for use in connection with the Services, ("Company Materials"), shall remain the sole property of Company. Company hereby grants to Ohio State a nonexclusive license to use the Company Materials for providing the Services and for no other purpose. Company grants Ohio State a license to incorporate Company Materials into the Contract Deliverables as defined below. Company warrants that it is the owner of the Company Materials or that it is authorized to deliver the Company Materials to Ohio State for use in connection with the Services.
- b) All reports, summaries and analyses developed as deliverables under this Agreement ("Contract Deliverables") as well as any other documents, text, graphics, maps, software, source code, object code, magnetic disks, CD ROM's, photographs, videotapes, and data or information in any other tangible medium of expression and any copyrights, patents, trademarks service marks that are developed by Ohio State in connection with the Services (collectively, the " Ohio State Materials"), shall not be considered "works-for-hire". Ohio State shall be the exclusive author and owner of the Contract Deliverables and the Ohio State Materials. Company agrees that the Contract Deliverables and the Ohio State Materials shall not be considered derivative works of the Company Materials. Ohio State hereby grants to Company a perpetual, unrestricted, royalty-free license to use the Contract Deliverables for any legal purpose.

4. **Term**

- a) This Agreement shall be effective as of _____ and shall terminate on _____, unless this Agreement is terminated earlier as provided herein, or extended pursuant to express written agreement of the parties.

5. Termination

- a) Either party may, at any time, and for any reason, terminate this Agreement by giving 30 days written notice to the other party.
- b) In the event that this Agreement is terminated by Company, Ohio State shall be entitled to reimbursement of all expenses associated with the preparation or delivery of the Program which were incurred prior to receipt of the notice of termination.

6. Notices

- a) Notices required to be given under this Agreement shall be sent to the persons set forth below.

For Ohio State:

Dr. Richard H. Moore, Sugar Creek Project /ATECH/OARDC
1680 Madison Ave.
Wooster, Ohio 44691

For Company:

Robert Ramseyer, President
Alpine Cheese Company
9444 SR 39 Millersburg, Ohio 44654

7. Independent Contractor Status

- a) The parties agree that in performing its responsibilities under this Agreement, Ohio State shall have the status of an independent contractor. Nothing herein shall be deemed or construed to create a joint venture, partnership, agency or employer/employee relationship between the parties for any purpose, including, but not limited to the payment of taxes or employee benefits. Ohio State will be solely responsible for the payment of all compensation, taxes, withholdings and insurance for its employees.

8. Use of Name

- a) Neither party shall be authorized to use the name of the other party in any advertisement, promotional materials, press release or other public

statement unless it first obtains the express written permission of the other party.

9. Indemnification

- a) Company agrees to indemnify Ohio State, and its trustees, officers and ~~employees for any claim, lawsuit, settlement, judgement, attorneys' fees,~~ costs, or losses of any kind that may arise out of or relate in any way to the products or services manufactured or sold by Company.

10. Limitation of Liability and Disclaimer

- a) **DISCLAIMER.** OHIO STATE DOES NOT MAKE ANY WARRANTY, EXPRESS OR IMPLIED, WITH RESPECT TO THE SERVICES RENDERED BY ITS PERSONNEL OR THE RESULTS OBTAINED FROM THEIR WORK, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL OHIO STATE BE LIABLE FOR CONSEQUENTIAL, INCIDENTAL, SPECIAL, OR INDIRECT DAMAGES, OR FOR ACTS OF NEGLIGENCE WHICH ARE NOT INTENTIONAL OR RECKLESS IN NATURE, REGARDLESS OF WHETHER IT HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.
- b) Company agrees that Ohio State's liability hereunder for damages, regardless of the form of action, shall not exceed the total amount paid for services under the applicable estimate or in the authorization for the particular service if no estimate is provided.
- c) Ohio State shall not be liable to Company for any failure or delay caused by events beyond Ohio State's control, including, without limitation, Company's failure to furnish necessary information, sabotage, failures or delays in transportation or communication, failures or substitutions of equipment, labor disputes, accidents, shortages of labor, fuel, raw materials, or equipment, or technical failures.

11. Complete Agreement

- a) This Agreement sets forth the entire understanding between the parties and supersedes all prior agreements, whether oral or written. This Agreement may not be modified or amended except by the mutual written agreement of the parties. No waiver of any provision of this

Alpine Cheese Phosphorus Nutrient Trading Plan

Page 35 of 49

Agreement shall be effective unless it is in writing and signed by the party against whom it is sought to be enforced.

12. Governing Law

- a) This Agreement shall be governed by and construed in accordance with the laws of the State of Ohio.

SIGNATURE PAGE TO IMMEDIATELY FOLLOW

Alpine Cheese Phosphorus Nutrient Trading Plan

Page 36 of 49

IN WITNESS WHEREOF, the parties have duly executed this Agreement as of the dates set forth below.

The Ohio State University

William J. Shkurti
Senior Vice President for Business and Finance

Date

[Alpine Cheese Company]

Robert Ramseyer
President, Alpine Cheese Company

Date

Date

APPENDIX D Exhibit A: Water Quality Monitoring Sites

The following list of the fifty-one sites and maps show the approximate location of monitoring sites separate from those required in the NDPES permit that will be used as voluntary monitoring sites in the project as part of the contract between OSU and Alpine Cheese Company. A sampling procedure will include the frequency of sampling and where the samples are to be taken and these data will be included in an annual report. Figures 1-8 show the location of the proposed sampling sites on the Middle Fork, Walnut Creek, Indian Trail, and South Fork. Water quality sampling will be conducted twice monthly and will include the following parameters: phosphate-P, nitrate plus nitrite-N, ammonia-N, Total N, Total P, temperature, pH, conductance, turbidity, dissolved oxygen, time of sampling, unusual observations and a digital photograph. OSU reserves the right to change the voluntary monitoring site location and sampling frequency according to research requirements.

Site ID# / STORET# / Latitude/Longitude / Landmark

05040001-110-010-South Fork Sugar Creek above E. Branch

52.	/ R05S41	/ 402836/814351	/ CR 114
53.	/ NA	/ 402803/814424	/ TR 180
54.	/ NA	/ 402753/814523	/ TR 183
55.	/ NA	/ 402815/814508	/ TR 184
56.	/ NA	/ 402802/814353	/ TR 181
57.	/ NA	/ 402759/814205	/ SR 643
58.	/ NA	/ 402819/814042	/ SR 93
59.	/ NA	/ 402907/813852	/ TR 350
60.	/ R05W20	/ 403003/813814	/ CR 47
61.	/ NA	/ 403125/813650	/ CR 75
62.	/ R05W38	/ 403055/813724	/ TR 355
63.	/ NA	/ 403108/813648	/ TR 355
64.	/ R05S66	/ 402750/814126	/ TR 171
65.	/ R05S68	/ 402604/814222	/ Shrock Rd
66.	/ R05S64	/ 402912/814033	/ SR 93
67.	/ R05S63	/ 402945/813914	/ CR 71
68.	/ NA	/ 402816/814101	/ SR 643
69.	/ NA	/ 402842/814304	/ SR 557

Alpine Cheese Phosphorus Nutrient Trading Plan

Page 38 of 49

70. / NA / 402749/814423 / TR 180

05040001-110-040-Walnut Creek [except Indian Trail Cr.]

71. / R05W23 / 403509/813910 / TR 66

72. / R05W22 / 403341/814032 / CR 172

73. / NA / 403350/814053 / CR 172

74. / R05S44 / 403223/814126 / TR 444

75. / R05P19 / 403242/814138 / TR 419

76. / NA / 403159/814155 / CR 144

77. / R05P18 / 403153/814307 / Old SR 39, CR 145

78. / NA / 403057/814412 / CR 114

79. / NA / 403148/814436 / TR 371

80. / NA / 403125/814503 / TR 402

05040001-110-050-Indian Trail Creek

81. / R05W26 / 403556/813823 / TR 416

82. / R05W24 / 403604/813838 / CR 95

83. / R05W25 / 403557/813937 / TR 66

84. / NA / 403618/813944 / TR 95

85. / NA / 403619/814017 / TR 95

86. / R05S45 / 403523/814223 / SR 515

87. / NA / 403525/814335 / TR 414

88. / R05S50 / 403512/814432 / TR 412

05040001-120-010-Middle Fork Sugar Cr. above Crabapple Cr.

05040001-120-020-Crabapple Creek

05040001-120-030-Middle Fork Sugar Cr. below Crabapple Cr. to Sugar Cr.

89. / R05W30 / 404110/813642 / Welty Rd

90. / NA / 404107/813729 / Stone Ave SW

91. / R05S75 / 404033/813819 / TR 314

92. / R05S77 / 403932/814011 / TR 659

93. / NA / 403819/814033 / Dist Alpine Cheese

Alpine Cheese Phosphorus Nutrient Trading Plan

Page 39 of 49

94.	/ NA	/ 403758/814041	/ TR 662
95.	/ R05S72	/ 403826/814032	/ TR 606
96.	/ R05S78	/ 403830/814134	/ TR 606
97.	/ R05S79	/ 404005/814335	/ TR 357
98.	/ R05S73	/ 403820/814301	/ TR 669
99.	/ NA	/ 403834/814405	/ TR 606
100.	/ NA	/ 403735/814457	/ TR 656
101.	/ R05S74	/ 403735/814457	/ OFF TR 656
102.	/ NA	/ 403715/814454	/ CR160

Figure A1 Middle Fork Water Quality Sampling Sites.

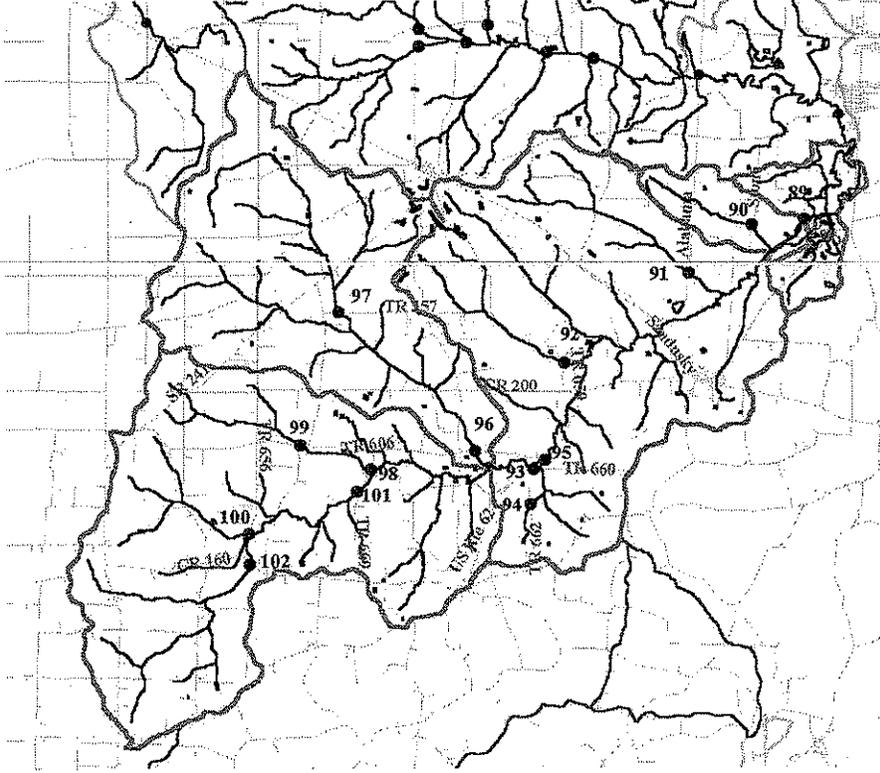


Figure A2 Middle Fork Water Stream ID's (yellow) and OEPA TSD Sites (Red).

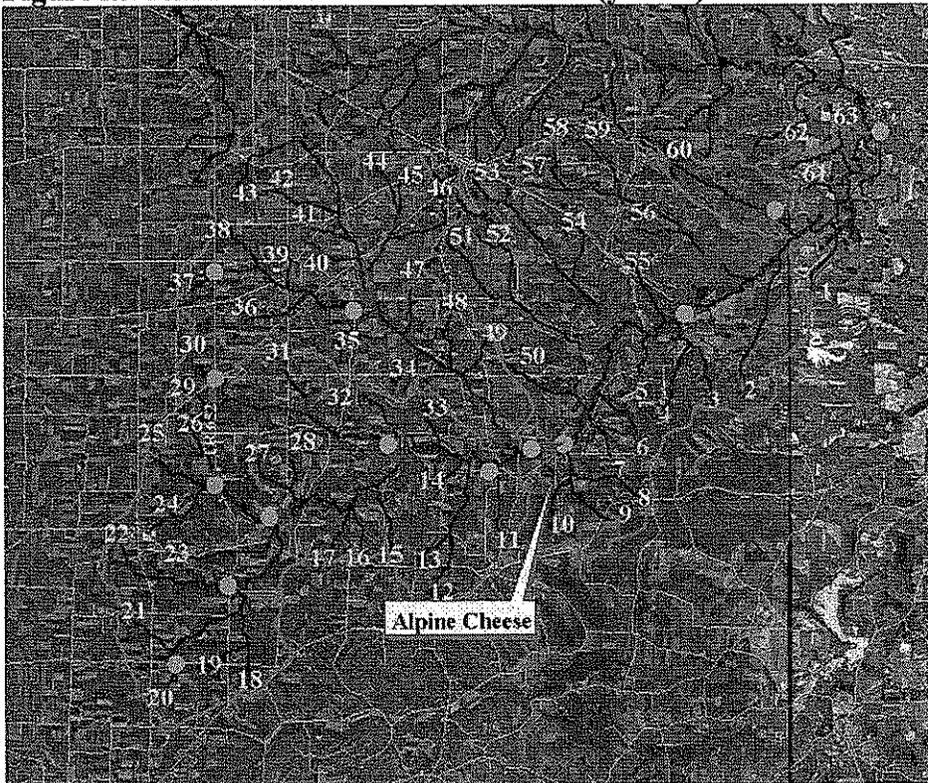


Figure A3 South Fork Water Quality Sampling Sites

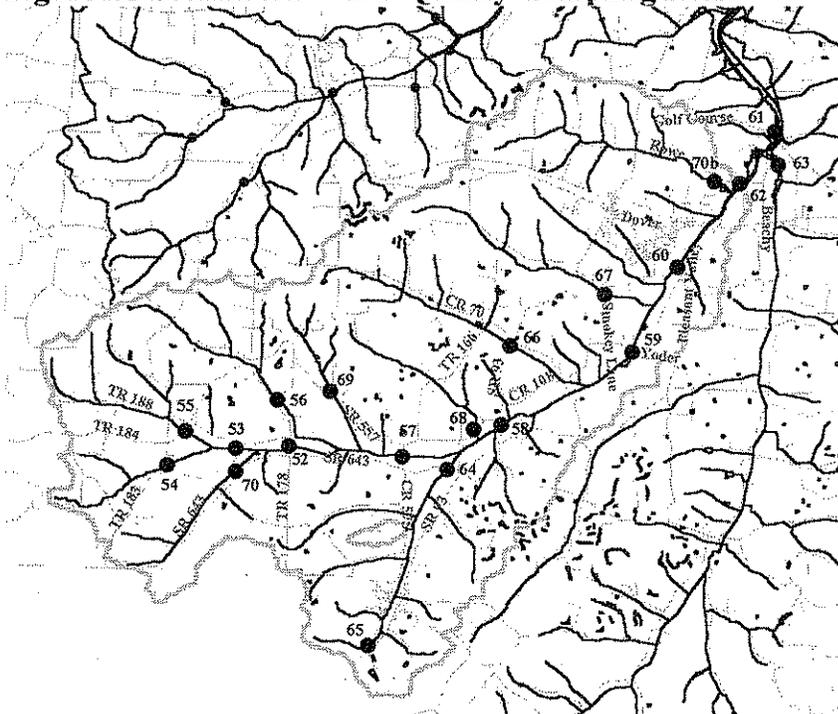


Figure A4 South Fork Stream ID's (Yellow) and OEPA TSD Sampling Sites (Red)

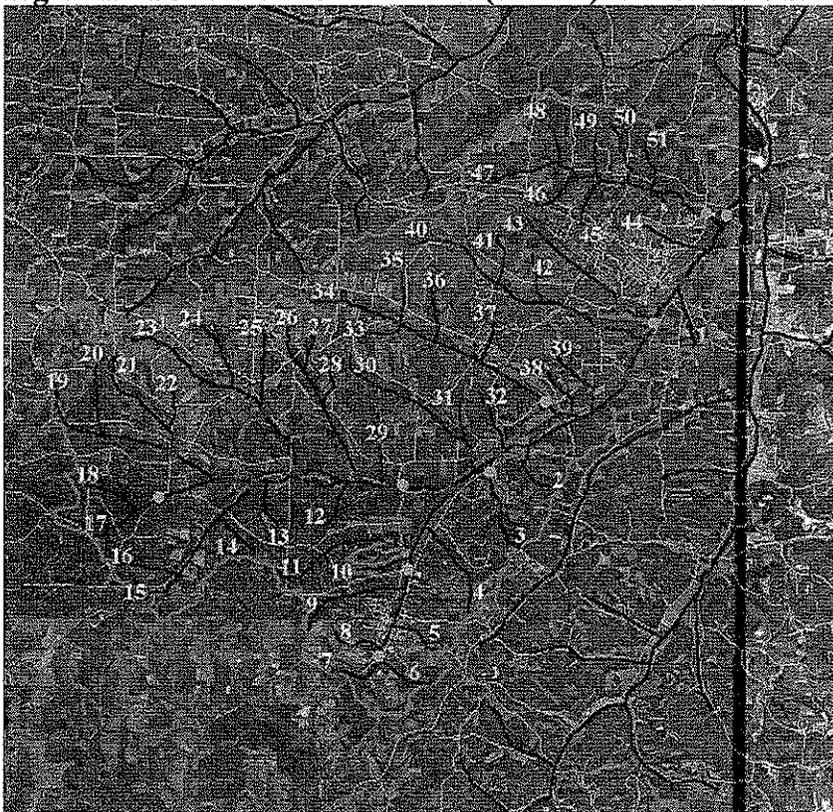


Figure A5 Walnut Creek Water Quality Sampling Sites.

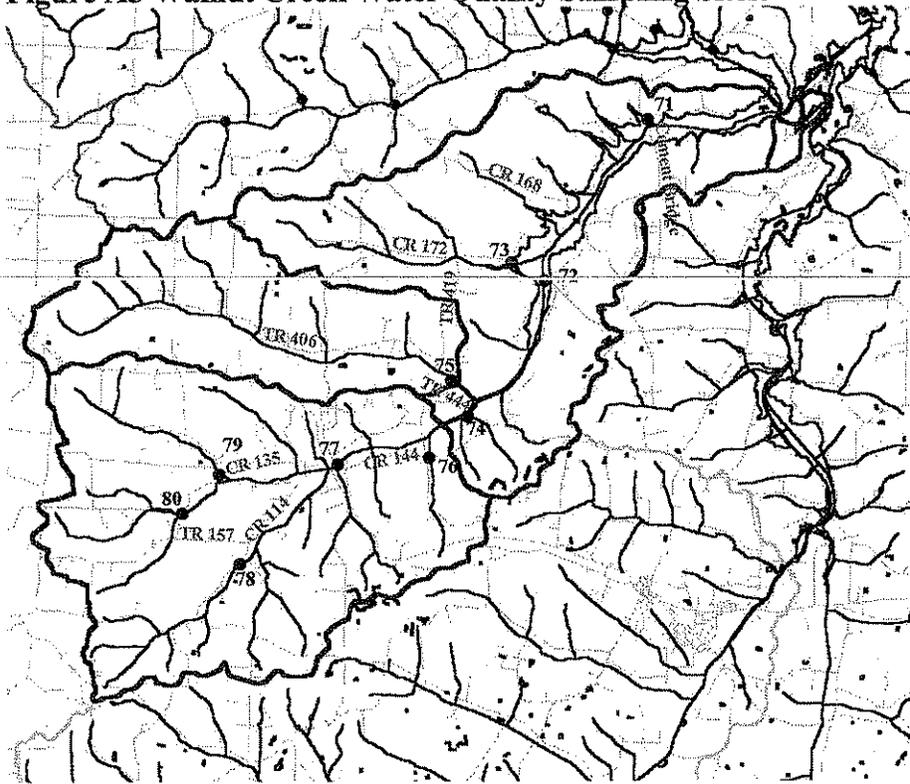


Figure A6 Walnut Creek Stream ID's.



Figure A7 Indian Trail Water Quality Sampling Sites.

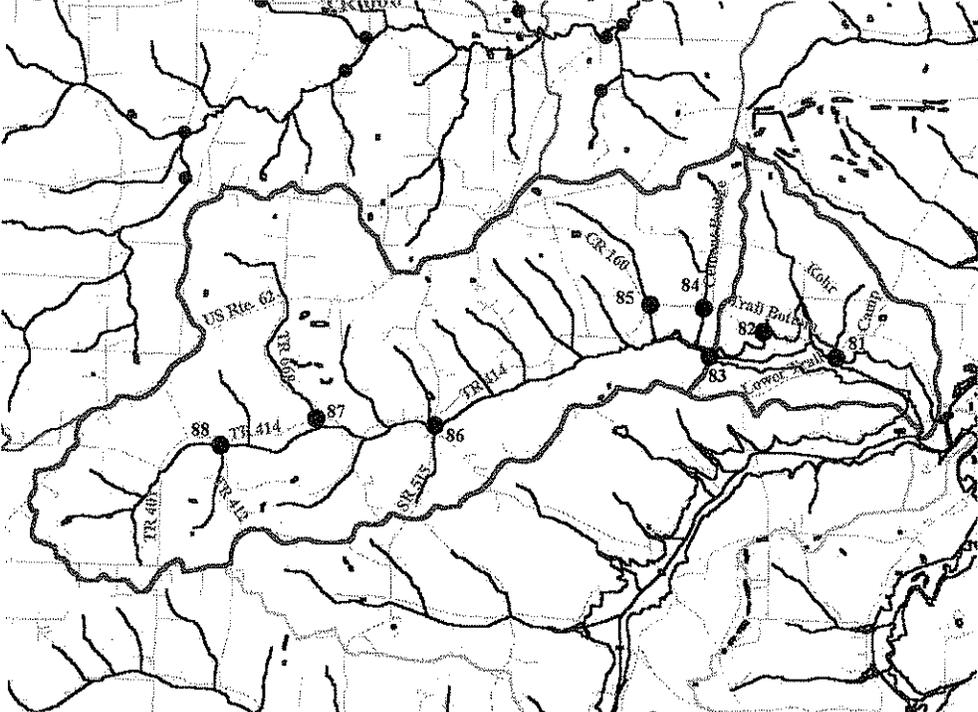


Figure A8 Indian Trail Stream ID's.



Figure A9 Water Quality Sampling Sites 52-80 on Topozone Map



Figure A10 Water Quality Sampling Sites 81-102 on Topozone Map



Appendix E. Nutrient Trading Calculation Examples

The TMDL for the Middle Fork calls for reducing the current 110lbs(50 kg)/d to 66lbs(30 kg)/d of phosphorus discharge. Of this 44lbs(20 kg)/d reduction, Alpine Cheese will lower its phosphorus load at the plant from 18.7lbs(8.5 kg)/d to 3.7lbs(1.7 kg)/d for a reduction of 15.0lbs(6.8 kg)/d. The remaining 29.0lbs(13.2 kg)/d or 10.600lbs(4,818 kg)/yr required for the TMDL reduction would need to come principally from non-point sources. It is estimated that there are the following row crop and hay/pasture acreages in the Middle Fork and adjoining Indian Trail, Walnut Creek and South Fork Headwaters:

Row crop = 16531 acres, Hay/pasture = 44988 acres, Forest/woodland = 17945 acres.

Most of this cropland is farmed by the Amish. The average size of a South Fork Amish farm supplying milk to Alpine Cheese is 104 acres and has a herd of 40 cows. Typically these farms have @30% of their total farm acreage in row crops, 45% in hay/pasture and the balance as woodlands. Eastern Holmes County has predominately 6-12% slopes on its crop acreage. We estimated, using the ODNR spreadsheet, current farm P losses and the impact of our most acceptable practices assuming typical Holmes County soil types, topography, and farming practices: silt loam soil; 9% slope; 300 foot slope length; a 5 year rotation of corn silage after hay, corn grain, oats with alfalfa hay, hay, hay with spring plowing prior to annual crops and 75% farms contouring; field size of 10 acres; BMP's of contour rows, no-till annual crops, cover cropping, filter strips, conservation plan including nutrient management and exclusion fencing along 1000 feet of pasture stream frontage. Since contouring is highly effective at minimal cost and already highly accepted, we assumed that it would be fully adopted. Holmes SWCD will develop conservation and nutrient management plans for all participating farms. We further assumed that farmers would choose either no-tillage or filter strips, but not both since the diminishing returns on their cumulative effectiveness makes it cost-prohibitive for both to be adopted. A number of Amish dairies are not comfortable with herbicides and may also be joining an organic marketing cooperative and no-tillage would not be an option for them. Corn after corn silage has such high soil and P loss rates that we expect cover cropping to be a common additional BMP choice. P loss reductions for nutrient management were calculated after other practices to reflect the lower confidence in the efficiency estimate in <http://www.epa.gov/owow/nps/MMGI/Chapter2/table214.gif>.

The following farm production scenarios suggest potential reductions in P. These are general examples only and may vary under specific situations. Cropping system sources refer to conservation practices applied to row crop areas where corn or other grain such as oats, wheat, or barley are grown. Dairy farms typically use a rotation system for a field so that different crops are grown in succession. Non cropping refers to conservation practices that are not dependent on the crop grown ~~so therefore include items such as milk house waste, fencing, manure management, septic systems, roof run off, etc.~~

Cropping System Source 1

Corn silage after hay: $C = 0.11$; 7.2lbsP/A with no BMP's, 4.4 lbsP/A assuming existing BMP's.

With Contouring ($P=0.4$, 60% P loss reduction (PLR)) and Nutrient Management (35%PLR): P loss = 3.25.

Plus one of the following:

Conservation Tillage (CT, 80% cover, $C = 0.01$, 90% PLR) or Filter Strip (0.25A, 75% PLR):

P loss = 0.5 - 0.9 lbs P/A. P Savings = 37lbs/Yr. Cumulative efficiency = 80-90% .

Cropping System Source 2

Corn grain after corn silage: $C = 0.34$; 17.5lbsP/A with no BMP's, 10.6 lbsP/A assuming existing BMP's.

With Contouring ($P=0.4$, 60% P loss reduction (PLR)) and Nutrient Management (35%PLR): P loss = 7.9 lbs P/A.

Plus two of the following:

Conservation Tillage (20% cover, $C = 0.12$, 60% PLR), Filter Strip (75% PLR), Cover Crop (+20% cover to CT, $C = 0.07$ with CT, 0.18 without, 45% PLR) :

P loss = 0.3 - 0.9 lbs P/A P Savings = 100 lbs/Yr. Cumulative efficiency = 90-95%.

Cropping System Source 3

Oats after Corn grain: $C = 0.08$; 5.6 lbs P/AP/A with no BMP's, 3.4 lbsP/A assuming existing BMP's.

With Contouring ($P=0.4$, 60% P loss reduction (PLR)) and Nutrient Management (35%PLR): P loss = 2.85 lbs P/A.

Plus one of the following:

Alpine Cheese Phosphorus Nutrient Trading Plan

Page 47 of 49

Conservation Tillage (CT, 80% cover, C = 0.008, 90% PLR) or Filter Strip (75% PLR):
P loss = 0.3 - 0.6 lbs P/A. P Savings = 30 lbs/Yr. Cumulative efficiency = 80-90% .

Cropping System Source 4

Hay: C = 0.005; 0.7 lbsP/A with no BMP's.

With Filter Strip (75% PLR) and Nutrient Management (35%PLR):

P loss = 0.1 lbs P/A. P Savings = 12lbs/Yr. Cumulative efficiency = 85% .

Cropping System Source 5

Pasture with 2000 feet of stream bank: 50% fenced, 50% with moderate to severe lateral recession rate (LRR = 0.25'/yr); 64 lbsP/Yr.

With Exclusion Fencing (10% PLR/Yr):

P loss = 57.6 Yr1 declining to 0 Yr10. P Savings = 32 Yr5. Cumulative efficiency = 10%/Yr.

Non-Cropping System Source 1

Milking Parlor Waste from 40 cow herd; 80 lbsP/Yr.

With Waste Storage Facility (10% PLR/Yr):

P loss = 0 lbs P. P Savings = 80 lbs P.

Non-cropping System Source 2

Feedlot Waste from 40 cow herd in 0.25 acre barnyard; 120 lbsP/Yr.

With Roofing and hay field diversion: P loss = 0 lbs P. P Savings = 120 lbs.

The P from an average farm is estimated to total 410 lbsP/yr of which 210 lbs/P is from non point sources. Assuming an 8 fold reduction for redeposition which includes field edge P loss calculated in the ODNR spreadsheet plus redeposition beyond field boundaries, this average farm would contribute approximately 42 lbsP to Alpine Cheese's 10980 lbs P reduction.

The P from the milkhouse waste and feedlot runoff having a direct discharge to waters of the state would not require any adjustments for redeposition. If all the above reductions could be achieved on every farm, then only 5 farms at 242lbs P credits per would be required to meet Alpine Cheese Company's obligations. The actual number of farms required could easily be 15 to 20, given that not all interested farms will have all potential

Alpine Cheese Phosphorus Nutrient Trading Plan

Page 48 of 49

sources fully present or be willing to participate in some rather than all options or incentives presented. The Holmes SWCD has no-till planters and there are additional planters available from private and commercial sources. If interest in no-tillage exceeds available equipment, then Holmes SWCD will consider the purchase of additional planting units. An estimate of 0.2 miles of fence per farm translates to approximately 4 miles of fence. Square 10 acre fields would be around 650 ft to a side. With one edge bordering a waterway, a 20 ft filter strip is 0.25 acres and 2.5% of the field. Tables E1 and E2 illustrate a fully funded case scenario using 20 farms implementing conservation measures. Table E3 shows incentives.

Table E1 Costs of Proposed Crop Conservation Measures¹

Conservation Measure ²	Cost Per Acre ⁴	Acres	Total Cost
Conservation Tillage (No-till) (329)	\$13	1050	\$13,650
Contour Farming (#330)	\$19	220	\$4,180
Cover Cropping (#585)	\$14	260	\$3,640
Filter Strips (#393)	\$247	12.5	\$3,088
Total		1445	\$24,558

(1) These are our current estimates for the leading conservation measures. Final results will depend on actual farm conditions such as slope and soil type in addition to voluntary acceptance rates by the residents.

(2) NRCS Best Management Practice Code Number

(3) Sources: USEPA publication – EPA-840-B-93-001c; www.epa.gov/owow/nps/MMGI/ and <http://www.dnr.state.oh.us/soilandwater/downloads.htm>.

(4) Costs are calculated from state NRCS website for Holmes County (includes design, installation, and checkout) See <http://www.tsp-nte.nrcs.usda.gov/> for details.

Alpine Cheese Phosphorus Nutrient Trading Plan

Page 49 of 49

Table E2 Costs of Proposed Non-Cropping Conservation Measures

Conservation Measure	Cost Per Unit	Units	Total Cost
Animal Waste Facility (#313) Milk House Waste	\$4000	20	\$80,000
Roof Runoff Structures (558)	\$4.10/ft	4400 feet	\$18,040
Spring Development/Watering Trough(#554)	\$1440	10	\$14,400
Exclusion Fencing (#382)	\$2.40/ft.	20,000 ft	\$48,000
Grassed Waterways (#412)	\$600	25	\$15,000

Table E3 Cost of Incentives¹

Incentive Category	Number Units	Cost per Unit	Total Cost
1. Priority Streams	7 streams	\$5 per pound P	\$5400/yr
2. High Stream Participation Incentive (75% farms cooperating)	3 streams X 6 farms per stream	\$2.5 per pound P	\$3520/yr
3. New Member Sign-up Bonus	10	\$2.5 per pound P on new farm	\$1080/yr
TOTAL			\$50,000

These incentives are for the broker's internal use and will be used to market the BMPs in a culturally sensitive manner. For example, they could be just incorporated into the BMP payment itself or presented to the group.