THE ALPINE
NUTRIENT TRADING PROGRAM
SUGAR CREEK WATERSHED, OHIO

Environmental Trading Network Workshop

Cincinnati, Ohio
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Why is the Alpine Case Important?

- It is based on a single NPDES permit and expanding to add other permit holders. There are 3420 public and industrial wastewater treatment NPDES permits in Ohio as of April 2005. There are another 8000 general NPDES permits.
- The value of the externalities to the local community are worth more than the value of the trades.
- The broker is the SWCD. The university is a mediator/facilitator.
- The plan is a partnership between the factory, the local SWCD, and the university with rebates for all partners depending on the amount of phosphorus credits generated.
Alpine Case: An Appendix to a 5 year NPDES Permit

- The nutrient trading plan is part of the permit. The Alpine Cheese Company will reduce its phosphorus from 220ppm to approximately 3ppm using ATS Engineering consultants. The function of the trading plan from the company's view is:
  - The president of the company wanted a solution to the problem that would help the local community.
  - Cost effectiveness. The cost of the last 10ppm is approximately equal to the cost from 220ppm to 10ppm.
  - Promoting local infrastructure for the dairy industry.
  - Flexibility for future plan production was desired.
Alpine is a Trading Partnership

- The sellers and buyer of credit have some contact. The broker knows both the buyer and seller of credit.
- Ecosystem function is valued. Overall sustainability of the farm and BMPs that produce P are compared. $30/#/P farm cap is used. BMPs are selected from off CNMP list.
HOW DO WE MEASURE SUCCESS OF THE PLAN?

- The degree to which the Sugar Creek water quality is improved.
- The degree to which Alpine Cheese Company meets its 5 year NDPES permit obligation (5500# P of which comes from the plan)
- Cost of the phosphorus per pound over time. (over 5 years, 10 years, etc.)
- The amount of stimulation to the local economy (new jobs and local demand for products)
- The degree to which ecological farming can be accomplished.
ALPINE PLAN: PART OF THE SUGAR CREEK METHOD
HOW THE SUGAR CREEK METHOD EMERGED IN THE UPPER SUGAR CREEK FARMER TEAM

1 TEST SITE PER SQ MILE EVERY 2 WEEKS

HOT SPOTS

INVITATION TO HOT SPOT FARMERS TO JOIN TEAM

CORRELATION OF HOT SPOTS WITH PRIMARY HEADWATERS

DISTRUST OF EPA DATA

MORAL DILEMMA ABOUT GOOD STEWARD SELF-CONCEPT

SOCIAL RESPONSIBILITY BASED WQ TESTING
HOW THE ALPINE PLAN EMERGED IN THE MIDDLE FORK OF SUGAR CREEK

DISTRUST OF EPA BY ALPINE CHEESE

EPA WANTED 3RD PARTY MEDIATOR

OSU SUGAR CREEK PROJECT CONTACTED

CHOICE OF HOLMES SWCD AS TRUSTED BROKER AND OSU AS MEDIATOR

Start date for credit banking: April 2006
Start date for NPDES permit: Jan.1, 2007
Sugar Creek

In 1995 the Ohio Environmental Protection Agency identified Sugar Creek as one of the most degraded watersheds in the state. Poor water quality in Sugar Creek is due to acid mine drainage, agricultural activities, and point-source pollution. Acid mine drainage was caused by mining and mining-related activities that disturbed the soil and exposed iron-rich rocks to acidic waters. Agricultural activities contribute to sediment and nutrient runoff, which also impacts water quality. Point-source pollution includes wastewater discharges from industrial facilities and sewage treatment plants.

Stream Habitat
Most Sugar Creek streams are small, isolated tributaries, and are characterized by riffles, runs, and pools. Several stream types are present, including riffle, run, and pool habitats. These habitats provide a diverse range of conditions for aquatic organisms, including fish, invertebrates, and plants.

Chemical Water Quality
Sugar Creek has been classified as a Class III water body, which means it meets the state's water quality standards for recreation and some aquatic life use. However, the stream is not yet fully restored, and efforts continue to improve water quality.

Biological Integrity
Sugar Creek was assessed using the Bioassessment Program (BAP) methodology. The stream was rated as "moderate" in biological integrity, indicating that it supports a moderate level of native biota.

Acid Mine Drainage
Acid mine drainage is a critical issue in Sugar Creek. This type of pollution is caused by the oxidation of sulfide minerals in coal mines, which releases sulfuric acid into the water. The acid can be transported long distances, affecting both surface and groundwater quality. Efforts are ongoing to address this problem, including the installation of acid-neutralizing structures and the use of alternative mining methods that minimize acid production.
Nutrient Trading for Agriculture and Industry

- Creative nutrient trading to promote cleaner water
- Saving pollution remediation costs to industry
- Improving the bottom line for farmers
- Creating local jobs

The Problem:
Alpine Cheese Company had phosphorus levels of 225ppm. The EPA goal for the permit was 1ppm. There was a much lower cost associated with filtering the first 221ppm than the last 3ppm. Alpine’s NPDES permit was preventing plant expansion. The factory wanted to expand, creating 12 new jobs and local milk demand of 250,000#/day.

NPDES 5 year

Jarsberg products wheel, loaf & lite loaf form.

Alpine Cheese Factory
### The Solution:

The factory filtered their phosphorus down to 3 ppm and pays the farmers to reduce phosphorus on their farms. A trading ratio favors more phosphorus being removed than if the factory filtered it by itself. Other nutrients being recycled are a plus. Farms save fertilizer costs. Extra incentives are included for the factory, local farmers, the Holmes Soil and Water Conservation District, and OARDC at The Ohio State University.

The community solution includes OARDC partnering with Holmes Soil and Water Conservation District, Holmes County Commissioners, Ohio EPA, Ohio DNR, OSUE and Local Congressional Representatives.
<table>
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<th>Subwatershed</th>
<th>Existing Conditions</th>
<th>Percent Reduction</th>
<th>TMDL</th>
<th>TMDL Allocations</th>
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<td>NPS</td>
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<td></td>
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<td><strong>Total Phosphorus (kg/day)</strong></td>
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<td>Discharger</td>
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<td>Existing P Load (kg/day)</td>
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A March through November

B Proposed expansion flow

* At proposed expansion flow or design flow
NITROGEN AND PHOSPHORUS EXPORT TO STREAMS FROM AGRICULTURE

- CORN BELT
- MIXED DAIRY
- HILLY APPALACHIAN

Bar graph showing nitrogen and phosphorus export (kg/ha) for different ecoregions:
- EC-55
- EC-57
- EC-61
- EC-70

- Nitrogen
- Phosphorus
P Flows on Farms: Calculating nutrient loading…

<table>
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<th>Input</th>
<th>Crop</th>
<th>Dairy</th>
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<td>Fertilizer</td>
<td>20</td>
<td>10</td>
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<tr>
<td>Feed</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Output</td>
<td>−18</td>
<td>−13</td>
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<tr>
<td>Balance</td>
<td>+2</td>
<td>+17</td>
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Crop=75-acre cash crop farm growing corn and alfalfa.
Dairy=100-acre dairy farm with 65 dairy holsteins averaging 14,500 lb milk/cow/yr, 5 dry cows, and 35 heifers. Crops were corn for silage and grain, alfalfa, and rye for forage.

A Nutrient Trading Program that Creates Synergy at the Local Level

- 12 new jobs at the local factory
- New milk demand through factory expansion
- One new job at the local SWCD
- More phosphorus and nitrogen removed than if company did it alone
- Rebate to company if additional credits generated
- Long-term approach
- Equality among partners: cheese factory, local SWCD, university (equal credit rebates)
WHY IS THE PLAN GOOD FOR ALPINE CHEESE COMPANY?

- Flexibility in planning.
- Good relationships and trust with milk producers.
- Improves the quality of the milk received and supports the local milk quality.
- Good community relations and PR.
- Supports the community infrastructure.
COST OF THE PLAN(1)

(AMOUNT TO BE PAID BY ALPINE CHEESE COMPANY=$800,000)

- OSU—$300,000 ($60,000/yr for 5 years) for monitoring, research, agency liaison, planning, education.
- Holmes SWCD--$200,000 ($50,000/yr. for 5 years) for conservation measure cost-share and incentives
- Holmes SWCD--$300,000 for staff, brokering, education
COST OF THE PLAN (2)

- Initial Cost for Alpine =$800,000
- Rebate for Alpine (sale of surplus credits if 2X credits are generated) = $200,000
- Rebate for Alpine (if N is sold) =?
- Total Cost per $P = $600,000/5500# = $109-1/3 N credits sold
CURRENT STATUS OF CREDITS

• 1 MILK HOUSE WASTE CASE
  – Biofilter finished and collecting 50+ credits/yr.
• 2 CNMPs finished and 2 in progress
  (CNMP must be finished within 18 months after signing contract)
• 2 Grazing Plans in progress
WHAT’S IN IT FOR THE FARMER?

• Financial Benefit: A premium of $2 per pound of phosphorus reduced per year. If it is a targeted farm, it may also receive an additional $.50 incentive.

• Ecological Benefit: Farmers are interested in passing down the farm in good condition to the next generation. Our program provides a means to make holistic improvements to the farm rather than a shot-gun approach to get credits.

• We promote farmers working with neighboring farmers and increasing social and natural capital.
WHY INTENSIVE WATER QUALITY MONITORING?

- Local effect of raising awareness. Biweekly with 1 site per 2 square miles.
- Each subwatershed has different social and natural conditions
- We are researching headwaters as a key factor in improving water quality through habitat improvement.
WHY THE COUNTY SWCD IS THE BROKER?

- A high level of trust in the watershed
- Has led a team of farmers in the South Fork previously
- Excellent relations between NRCS and SWCD at the county level
- A need to create local level budget funding
- We are planning to have a watershed level trading program to begin in 2007.
Size of the Trading Area

- OEP A welcomed combining the three 11 digit watersheds called Sugar Creek.
- We had prior water quality achievements in the northern part of the greater watershed so were reluctant to risk the whole watershed in the plan so restricted it to the southern half of the watershed.
- Now that the plan appears to be successful, we are expanding it based on requests by additional point source permit holders as well as the farmer groups and SWCDs.
HURDLES WE ENCOUNTERED
Trading Across Subwatersheds

- The Cheese Factory was located in the only subwatershed that was in attainment.
- The adjacent subwatershed called the South Fork, had many Alpine producers and was in non attainment.
WHAT ARE THE HEADWATERS WORTH?

- Soil redeposition approach (headwaters worth less)
- Ounce of prevention is worth a pound of cure? (headwaters worth more)
Ratios

Our ratios are 1:1 for BMPs which reduce milkhouse and feedlot waste (if they directly discharge) and 2:1 (upstream of the factory) to 8:1 for BMP reductions in soil erosion depending on estimated sediment delivery ratio (SDR) to point source (PS) or confluence point.

A 1:1 multiplier is used for point source (PS) into attaining waters (AW) and 1.5:1 into impaired waters (IW).

Draft Ohio rules for trading state 3:1 ratio for PS:NPS
In early discussions EPA wanted milk house waste to be treated as a point source violation because it often discharged directly into ditches and streams. This approach, however, would have alienated the entire farming community, so it was proposed to proactively deal with it without fining. OEPA accepted this approach.
BMP’S: Milk House Waste

- Makes cultural sense—no brainer… (cheese factory and dairy farmers)
- High concentration of phosphorus
- Proactive solution
- Leads to comprehensive solution to farm management (CNMP)
- Cost is about $4000 per tank—pumped out onto field or $3000 for sawdust biofilter.
Milk House Waste
Small Farm Institute’s
2006 Family Farm Day
At the Jerry Miller Farm
Biofilter Used at the Jerry Miller Farm
MOU on Site Inspection

- EPA and Holmes SWCD created an MOU for site selection.
- Ohio DNR had a system in place for spot checking SWCD/NRCS conservation measures.
- Amish farmers trusted SWCD and wanted a low level of outsiders on their farms. This was a “deal breaker” for Alpine Cheese and ATS Engineering, the consulting firm for Alpine Cheese.
SOUTH FORK (AMISH)
Finding Phosphorus Using Land Use Patterns
SOME BMP’s Used

- Conservation Tillage (No-till)
- Contour Farming
- Cover Cropping
- Filter Strips
- Cow exclusion from stream (fencing)
- Milk House Waste
- CNMP
Comprehensive Nutrient Management Plans (CNMP)

- Takes 80 hours of work for the technician from the county NRCS (Natural Resources Conservation Service)
- Must be carried out if manure management is involved
- A holistic plan listing BMPs (Best Management Practices) for the farm sustainability.
# Ohio DNR Load Reduction Spreadsheet

## Milking Center Wastewater

Please fill in the gray areas below.

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<th>Project Information (complete all applicable fields)</th>
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<td>Owner / Operator</td>
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<td>319 Project Name</td>
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<td>OEPA Project Number</td>
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### Estimate | Example
---|---
Number of cows | 0 | 80
Avg. cow weight (lbs) | 0 | 1400
*Description of milking system
1. Milk house only
2. Milk house and parlor
3. Milk house, parlor and holding area (holding area scraped and flushed - manure excluded)
4. Milk house, parlor and holding area (holding area scraped and flushed - manure included)

**Total wastewater, manure and milk entering the waste treatment handling system**

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<tr>
<td>Phosphorous (lb/year)</td>
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<tr>
<td>Nitrogen (lb/year)</td>
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Source: NRAES-115, Guideline for Milking Center Wastewater
BMP’s: Livestock Exclusion

- Makes economic sense because milk premiums go up with lower somatic cell counts.
- Herd health seems to improve as well (mastitis rates are reported to decrease)
- We have a history of successful cases of livestock exclusion in this area.
- Fences can be put up using group labor as the cost-share.
- Cost is about $2.40 per linear foot and yields 3#P/acre excluded.
Cow Crossing and Exclusion Fencing

Milk somatic cell count dropped from 300 before fencing to 75 after.

Decrease in mastitis
Environmental Value-adding

GREENFIELD AMISH ORGANIC FARMS—40 FARMS IN 2006 WITH MANY MORE WAITING TO JOIN.
THANK YOU!!

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