Resource Concerns & Dairy Manure Management

John R. Ramsden, P.E.
State Conservation Engineer
USDA-Natural Resources Conservation Service
Madison, Wisconsin

Major Resource Concerns

- Humans
- Surface Water
- Subsurface Water

NRCS Conservation Practice Standards Updates

- 629 Waste Treatment
- 634 Waste Transfer
- 635 Vegetated Treatment Area
- 313 Waste Storage Facility

Human Concerns

Worker Safety

- Machinery and moving parts
- Suffocation by gasses
- Explosions
- Drowning

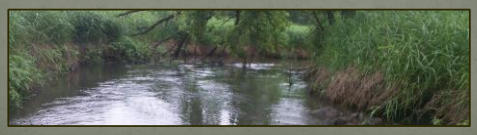
Human Concerns

Atmospheric Conditions

- Fine particulates
- Greenhouse gasses
- Odors

Surface Water Concerns

- Nutrients to streams and lakes
- Loss of aquatic habitats
- Reductions in game fish
- Adverse impacts on recreation



Sources of Surface Water Concerns

- Runoff from open animal lots
- Leachate and runoff from feed storage
- Land application of wastes
- Milking center wastewater

Subsurface Water Concerns

- Contamination of drinking water
- Contaminates that re-emerge to surface water

Sources of Subsurface Water Concerns

- Open animal lots
- Feed storage
- Milking center wastewater
- Waste storage facilities with inadequate liners or poorly constructed liners
- Land application of wastes

How do recent revisions to NRCS standards address these resource concerns?

http://efotg.sc.egov.usda.gov/treemenuFS.aspx

Items Common to All Standards

- Safety around system components
- Alerts to confined spaces
- Management assessment
- Site assessment
- Most revisions address subsurface water concerns

Standard 629, Waste Treatment

Storage liner criteria:

Table 3
Concrete Feed Storage Area Liner System

	Concrete	Concrete-Soil Composite	
1. Soils (Directly Below Liner)			
• % Fines Passing The #200 Sieve	---	≥20%	≥20%
• Plasticity Index	---	≥7	---
• Thickness	---	≥1.5 feet	≥3 feet
• Compaction of Placed Material	WI Spec. 204	WI Spec. 204	WI Spec. 204

Standard 629, Waste Treatment

- The collection of all leachate
- Various percentages of "first flush" collection

Standard 634, Waste Transfer

- Transfer pipe options based on use
- Thrust protection criteria
- Joint restraint requirements

Standard 313, Waste Storage Facility

Soil liner properties - percent fines and Plasticity Index (P.I.)

- In-place earth as a liner
- Clay liner
- Soil composite with another liner

Standard 313, Waste Storage Facility

Table 5
Concrete Liner Criteria for Impoundments

	Concrete - Soil Composite			
1. Soils (Directly Below Liner)				
% Fines	≥ 20%	≥ 20%	≥ 40%	Foundry Sand
Plasticity Index (PI)	≥ 7	—	≥ 12	—
Thickness (bottom and sides)	≥ 1.5 ft.	≥ 3 ft.	≥ 8 Inches	≥ 1.5 ft.
Compaction of Placed Material	WI Spec 204	WI Spec 204	WI Spec 300	WI Spec 204

Standard 313, Waste Storage Facility

Concrete Liners

- Increased steel reinforcement

Standard 313, Waste Storage Facility

Concrete Liners

- Increased steel reinforcement
- Continuous inspection of concrete placement around embedded waterstops

Standard 313, Waste Storage Facility

Concrete-Soil Composite Liners Options Added

- Foundry sand (contains bentonite)
- Higher quality soil liner ($P_{200} \geq 40\%$ and P.I. ≥ 12)

What was the reasoning for the soil properties changes?

Waste Characteristics

Liquid Percentage Is Increasing

- Milking center wastewaters
- Feed storage runoff
- Solids are separated

What does the future hold?

Concrete criteria?

- ACI 318 vs. ACI 350

Water quantity issues?

- Reduce
- Recycle
- Sustain