



Standards Oversight Council (SOC)

Developing effective technical standards that protect Wisconsin's natural resources

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NRCS 635 Vegetated Treatment Area Standard Team

MEETING NOTES

Wednesday, May 3, 2023 ▲ 9:00am – 12:00pm ▲

Online Meeting

SCHEDULE IN BRIEF

9:00 Welcome (Kate, Team)
9:05 Notes Review (Kate & Team)
9:10 Standard Complications (Chase)
9:25 Setbacks (Bernie)
10:10 VTA Scenarios (Travis and Emily)
10:35 Break
10:45 Runoff Management: Comparison of VTA Standards and Feedlot Modeling (Matt Woodrow)
11:15 Modeling Results (Adam)
11:45 Plan of Action (Kate, Steve)
12:00 END

9:00 Welcome (Kate, Team)

Attendance: **Steve** Becker, Sponsor and Team Leader – NRCS

Bernard Michaud – WDNR

Travis Buckley – DATCP

Justin White – DATCP

Chase Brouillette – Ozaukee Co. LWMD

Emily Micolichuk – Miller Engineers & Scientists

Eric Young – USDA-ARS

Adam Moris – NRCS

Absent: **Mike** Gilbertson – WDNR

Guests: **Matt** Woodrow – DATCP

- Keep in mind that this process is a team collaboration. If anyone has something you'd like to discuss, please speak up or use the chat box.

Notes Review (Kate & Team)

Goal: Review and approve 4/5/23 draft meeting notes.

Draft meeting notes from 4/5 meeting were emailed to the team for review. There were a lot of action items, most of which will be discussed today. One action item that is not a specific presentation today is as follows:

1. Remains open: Eric – review BERT, BARNY and APLE-Lots and Montana VTA standard to assign concentration to the volume. He's done with his homework and may present at a later meeting.

No team comments or questions raised on these notes; Kate will finalize and post online.

Standard Complications (Chase)

Goal: Review areas of the current technical standard that could use clarity or simplification.

Chase looked at the current 2016 VTA standard from the perspective of a new user and identified areas that are difficult to understand and/or overcomplicated (from a newer user's perspective). Some areas:

- Overall this standard has a lot of sections and subsections shifting between # of AUs with animal lot, feed storage, then milkhouse for each and some very similar information repeated. It's generally hard to identify which section you're in when trying to look up something.
- Soil boring section – Wording for minimum depth and locations was confusing. Number of borings not clear related to multiple VTAs on one site (may be needed due to rest days). Requiring rest days in general make planning and design particularly complicated.
- Seems unusual that floodplain installation is allowed and capture is only recommended (as Consideration). It's not clearly stated but this is intended to be 100-yr flood, and is different from 25-year flood protection in waste storage.
- There's no process for the "analysis demonstrating wastewater applied...does not discharge to navigable waters." More information would be helpful.
- Criteria to "Design each VTA to treat $\leq 10,000$ square feet of animal lot area and not more than 98 animal units." It seems like it's in the wrong place (like under 300 - 500 AUs) and there's no context.
- In one section it says wastewater can be applied year-round, but is this true in practice in WI? Seems contradictory to other parts of standard.
- Leachate collection – the collection of first flush could use clarification and confirmation that it matches what's done in practice statewide.
- Considerations seemed contradictory to other parts of the standard and confusing why user would do this extra work.

To alleviate confusion, these areas will be reviewed in the updated standard. The team may also simplify and consolidate some of these as General Criteria rather than small variations under multiple "Additional Criteria" subsections.

Setbacks (Bernie)

Goal: Review history of the vertical and horizontal setbacks used in the current VTA standard. Discuss adjustments and simplifications for the updated standard.

Bernie and **Mike** reviewed some sources of information for existing standard setbacks and AU requirements. Bernie reviews with the team these sources and recommendations for changes:

- EPA was looking closely at CAFOs (>1,000 AUs) around the same time the 2016 VTA was being prepared and they saw that VTAs weren't meeting Clean Water Act.
- Release from a VTA could be a Category 1 discharge, which would also implicate non-CAFOs. However, a properly functioning VTA may have discharge off the end and that wouldn't necessarily be a Cat. 1 discharge.
- Before talking about changing the setbacks, Bernie identifies the purposes of setbacks:
 - Space to further absorb runoff pollutants
 - Safety factor for VTA failures
 - Space to ID and respond to VTA discharges
 - Space for infiltrated runoff to be diluted before receiving water
 - Reduce flood risk to VTA from adjacent water bodies
 - Team doesn't identify any others.
- For background information, Bernie first shares on-screen a 2016 spreadsheet comparing the different setbacks from previous VTA standards, other tech standards (313), and NR codes (151, 243, 214, 812). The 2016 standards used these other sources as the starting point, with some changes and advice from DNR at the time. Previous setbacks were not modeled or calculated but were largely based on other documents.
- Bernie then reviews a list of the setbacks from the 2016 standard, the sources, and his recommendations to keep or alter. Well setbacks are set in stone, and others are requirements under SWQMA nutrient management planning (which don't necessarily apply for VTAs). Most setbacks are up for team discussion, editing and consolidation/simplification.
- Team doesn't yet discuss specific changes but discuss some general thoughts on changes to the setbacks.
 - To simplify setbacks, they could be consolidated mostly in General Criteria with a few other setbacks as Additional Criteria.
 - Team could also identify these as some minimum setbacks, then require setback adjustment to meet a specific score in modeling (e.g. BARNY).
 - Animal units have a place in the standard but team wouldn't want it to impact the design. For example, farm layout may have VTA used by only one of multiple animal lots, or in another example cows in the freestall barn shouldn't count toward AUs in the VTA design. Rather than AUs, standard could have design based on other factors like loading or tributary area.
 - The 500 AU division is not regulatory but it looks like it was added after 2016 public comments and with some DATCP input. Team likes the idea of having the standard just being CAFO or non-CAFO size to meet the regulatory boundary and not keep another middle sizing category. CAFOs wouldn't likely use it anyway since they'd need to also design storage.
For later team discussion: To what extent should this standard reference CAFOs?
 - *For later team discussion:* how/whether to include unmapped watercourses?
- Next step to simplify the setbacks:
 - **Bernie** will send Kate the spreadsheet of sources and recommendations to share with the team. **Team** should let Bernie know if they have any recommendations.

- **Bernie** will synthesize the recommendations for non-CAFO sized farms to present a consolidated list for team discussion at next meeting.

VTA Scenarios (Travis and Emily)

Goal: Review framework for decision-making and hydraulic modeling, e.g. small/medium/large animal feeding operations, small/medium/large feed storage areas, and a milking center scenario.

Time runs out in the meeting today so this topic was not discussed; will be postponed to the June team meeting. **Travis and Emily and Justin** have completed their summary of typical sizing and will send to Eric and Adam for their use in advance of the June meeting.

Break

Runoff Management: Comparison of VTA Standards and Feedlot Modeling (Matt Woodrow)

Goal: Review a comparison of the 2002 CPS 635 Wastewater Treatment Strip and 2016 CPS 635 Vegetated Treatment Area, and an overview of the BARNY, BERT and APLE-Lots models.

Matt Woodrow is the Manager of DATCP's Conservation Engineering Section and the State Soil & Water Conservation Engineer. He presents to the team on runoff management: comparing two previous versions of CPS 635, and present an overview of the comparison of the BARNY, BERT and APLE-Lots models.

ATCP 51 still cites the 2002 version of CPS 635 (then known as Wastewater Treatment Strip) so the presentation was created to discuss differences. There have been multiple (5) versions of CPS 635 since then. Some key points from that comparison:

- 2002 version of CPS 635 did not address feed storage areas; was added in 2012. ATCP 51 has its own feed storage requirements, different from the current (2016) CPS 635.
- The 2002 standard had criteria the same regardless of AUs and included slow rate infiltration process based on soil water holding capacity. Current 2016 standard divides up the requirements by AUs and removes the slow rate infiltration process. For <300 AUs, there are also three different subsets of criteria based on separation distances. Both AUs and distance to a more sensitive feature are used to determine how stringent the criteria are.
- CAFOs need zero discharge for 25-year, 24-hr storm. Because of this, the standard generally has more stringent criteria, although setbacks less because of zero discharge.

Modeling predicted phosphorus runoff:

- ATCP 51 currently has animal lot criteria based on BARNY: 15 lbs P if >1,000 ft to lake or >300 feet to nav. stream; or 5 lbs P if closer than that.
- BARNY model uses variables like climate zone, area of paved to earth lot, animal type and weight, tributary areas, veg buffer size, etc. to estimate average annual P loss (in lbs.) at the edge of lot and based on nutrient reduction from vegetated buffer:
 - Uses constant P concentration.
 - At edge of lot and end of vegetated area.
 - Used to quantify P so used in TMDL and nutrient trading.
 - Simple and easy to use, but not as accurate – only tool.

- BERT developed using same data as BARNY so very similar. It uses single rainfall event.
 - Analyzes depth of flow over the VTA.
 - Considers distance to waters of the state.
 - Estimates P reduction based on vegetated buffer and a rating number. No lbs of P loss but to determine if there is a resource concern or not.
- APLE-Lots model developed by USDA-ARS.
 - Based on more robust, dynamic P loss with both articulate and dissolved, included real-world model testing.
 - More complex inputs and more accurate results.
 - Estimates total P loss in lbs at edge-of-lot, not downstream.

BARNY vs. BERT vs. APLE-Lots

<u>BARNY</u>	<u>BERT</u>	<u>APLE-Lots</u>
☐ Estimates average annual P loss (lbs.) ☐ At edge-of-lot AND ☐ End of vegetated area	☐ Resource concern rating tool (NO P loss) ☐ At edge-of-lot AND ☐ End of vegetated area	☐ Estimates average annual P loss (lbs.) ☐ At edge-of-lot ☐ NO vegetated area option
☐ Credit for settling basin	☐ Credit for settling basin	☐ NO settling basin option
☐ Annual rainfall from 1990 Green Bay data, and adjusted for other areas	☐ Single rainfall event	☐ Annual precipitation AND considers single event
☐ Data (input/output): ☐ Uses constant conc. of P (85 mg/L) ☐ Some outputs credible, some questionable	☐ Data (input/output): ☐ Very similar to BARNY ☐ Allows for additional considerations ☐ Pollution potential	☐ Data (input/output): ☐ More complex inputs ☐ More complex calculations ☐ More accurate results
☐ <u>Too Simple?</u>	☐ <u>No lbs. of P loss</u>	☐ <u>Edge-of-Lot ONLY</u>



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- There are other options in modeling useful for some purposes, though may not always be the best fit. For example, WinSLAMM is a continuous simulation model that could be used with the grass swale acting as VTA.
- NRCS doesn't necessarily want to force the user into modeling so there may also be some lookup reference tables based on team modelling of typical VTA scenarios.

Modeling Results (Adam)

Goal: Review sample hydraulic model results.

Adam started testing out the WinSRFR hydraulic model used for surface flood irrigation. It will be used to simulate VTA dosing and estimate the amount of percolation and end runoff for various treatment scenarios. This model is used for basin infiltration and furrow irrigation; Adam's review for VTAs was using the basin function of WinSRFR.

A summary of the model reviewed by Adam:

- He doesn't have field data right now to do an Event Analysis but looked at Simulation to predict subsurface and surface flow, develop a Physical Design, and see the modeled Operations Analysis.
- The user adds variables like sizing, site soil, vegetation, flow rate, flow depth, tributary area, cutoff time (where there's a managed application that has start and stop). The options increase with Advanced Level of software user.
- Output includes numerous tables, hydrographs and other charts and an animation of infiltration over time.
- There are practical limitations to in-field application from a model, for example, things like fixed flow rate, the actual uniformity to the grade and flow depth, and level spreading abilities.
- As part of this process, this Team will use some simulations to evaluate typical scenarios and come up with a table of basic results so not all users would need to do the WinSRFR modeling.
- As another step to the model preparation, **Adam** will look into border irrigation used in western states and practicalities to applying uniform water.

Plan of Action (Kate, Steve)

Goal: Identify topics and goals for the next team meeting. Review Action Items.

Next meeting is June 7 from 9-noon and will be virtual. Agenda will include:

- **Postponed from today:** **Travis** and **Emily** and **Justin** will review typical VTA dosing scenarios that may be used in modeling the effectiveness of VTA treatments. They will send Kate this information in advance to share with Adam and Eric for their assignments.
- **Eric** will present his findings and recommendations with regard to BARNY, BERT, APLE-LOTS identification of nutrient concentrations. It may not be ready for the next meeting but he'll also work on using APLE-LOTS to get a concentration for a specific scenario (from Travis/Emily/Justin). He doesn't have APLE lots experience nor does anyone else on the team; **Steve** will send Eric a training video to get up to speed.
- Team setback discussion – based on starting points from **Bernie** to kick off the conversation.

Action Items developed today:

1. **Bernie** will send Kate the spreadsheet of sources and recommendations to share with the team. **Team** should let Bernie know if they have any recommendations.
2. **Bernie** will consolidate the setback recommendations for non-CAFO sized farms and prepare to lead team discussion at June meeting.
3. **Travis** and **Emily** and **Justin** will send Kate, Eric and Adam typical volumes for modeling and be prepared to present at next meeting on feedlot volumes for Adam to model.
4. **Steve** – Send Eric APLE-Lots training video.
5. **Eric** – Prepare to present findings with regard to BARNY, BERT, and APLE-LOTS, and presumptive runoff nutrient concentrations. Consider suggesting which model would be most appropriate to assign nutrient concentrations to VTA treatment volumes.
6. **Adam** – review uniform application methods from border irrigation used in western states.

7. **Kate:** prepare draft meeting notes, then reviewed by full **Team**.
8. **Kate** and **Steve:** prepare agenda for June 7. Kate will send to the full team at least 1 week in advance.

12:00 End Meeting ends at 12:06