

NONPOINT SOURCE 319(h) PROJECT PROGRESS REPORT FORM

Version 1.5

Federal Fiscal Year of project:

TODAY'S DATE:

HAS THE WORKPLAN BEEN AMENDED SINCE THE LAST GRTS REPORT?: Yes No

Please select which reporting period.

MIDYEAR REPORT?:

ANNUAL REPORT?:

QUARTERLY REPORT?:

PROJECT TITLE:

REPORT DATES: FROM:

TO:

STATE NAME:

ADDRESS:

ADDRESS:

CITY: STATE: ZIP:

PHONE: EXT:

FAX: EMAIL:

PREPARED BY:

MILESTONES COMPLETED

Task	Unit	Planned	Completed
Establish sites	VTS sites	5	5
Characterize flows	Samples	612	72
System simulations	Simulations	10	10
Economic Evaluations	Sites	5	0
I&E, Outreach	Presentations, papers, stories,	26	8
Vegetation management	Samples	368	66

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OVERALL PROJECT ACCOMPLISHMENTS

Since the establishment of the project to evaluate vegetated treatment systems (VTS's), stakeholders meetings have been held, in December 2004, January 2005, February 2005, August 2005, and November 2005. Representatives of the following groups have attended one or more of the stakeholder meeting: SDSU, SD Farm Bureau, SD Cattlemen's Association, DENR, SD Dept of Ag, Moody County Conservation District, and NRCS. A consulting engineer with a

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private consulting firm in SD that does many animal waste system designs has also asked to be included in the stakeholders meetings.

The first graduate student has completed her thesis studying the use of the VTS and ELG simulation models. She was granted a Master of Science in Engineering in August 2006. Her results indicated VTA performance sensitivity to soil characteristics sand and clay content and bulk density and engineering parameter sediment basin retention time.

A web site has been established to foster communication among investigators, stakeholders, and the public.

The two pre-existing sites (Miner and McCook) are being monitored. The Meade Co site is complete and monitoring commenced in 2006. Earthwork at the Roberts County site is complete. Pumping facilities will be installed and monitoring will commence in early 2007. The Haakon County site is currently under construction.

A multi-state add-on project has already been funded by USDA NRCS Conservation Innovation Grant program via the Iowa Cattlemen's Association and a state Conservation Commission grant. It is proposed that two VTS sites will be established at CAFO's in SD in 2007 and monitoring at those locations will begin shortly thereafter. One additional VTS is built in Minnesota and will be monitored beginning in 2007. It is expected that another will be built in MN in 2007.

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OBJECTIVES/TASKS ACCOMPLISHMENTS

OBJECTIVE 1: CHARACTERIZE AND ESTABLISH THE PILOT AFOs THAT WILL BE USED TO TEST THE EFFECTIVENESS OF VTAs AS AN ALTERNATIVE ANIMAL WASTE MANAGEMENT SYSTEM BMP.

TASK 1. CHARACTERIZE AND ESTABLISH FIVE VTA SITES.

The pre-existing sites in McCook and Miner Counties in SE SD are being monitored. The data from 2005 indicated that system modifications would be advantageous. Gated irrigation pipe was added to the Miner County site in early 2006 and visual indicators show that the additional spreading caused by the gated pipe was effective at spreading the water and preventing release from the VTA.

The Meade Co site is completed and monitoring was established in 2006. This system was designed by NRCS.

Earthwork at the he Roberts Co site is complete as of late 2006. Pumps will be installed early in 2007 and monitoring will commence shortly thereafter. This system was designed by NRCS.

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The fifth and final site in Haakon County is under construction. The Miner SCD has procured grant funds from the SD Conservation Commission to be used as cost-share for construction of the Haakon site. That grant expires at the end of 2006.

Work planned for next six months: Monitoring at the Miner and Meade sites will continue in 2007. The final installations will take place then monitoring will commence at the Roberts site. The Haakon site construction will be finalized and monitoring will commence. We will make every effort to catch the spring thaw events in 2007. Monitoring in 2005 indicated that the systems that were previously built would benefit from system modifications in 2006 so early monitoring was not attempted in 2006. However, monitoring the early events will be a priority in 2007.

This task is behind schedule, based on the final construction/installation details not expected to be completed until early 2007.

OBJECTIVE 2: MEASURE THE SURFACE WATER QUALITY IMPACTS OF VTA'S AT THE SITES

TASK 2: CHARACTERIZE WATER, NUTRIENT, SALT, SEDIMENT, AND FECAL COLIFORM BACTERIA FLOWS AT EACH SITE.

Sampling during 2005 indicated that there were some discharges of water, nutrients, and coliforms from the Miner VTS. The outlet from the sediment basin to the VTA has been modified for the 2006 growing season to try to reduce or eliminate any further VTA discharges. Gated pipe was added to the outlet of the sediment basin to spread the water laterally across the VTA. Visual monitoring indicated this effort was successful. Laboratory analyses of samples have not yet been received from the lab so we are unable to address the nutrient flows at this time.

Work planned for next six months: Surface water monitoring will continue at three sites in 2006 and will commence at the remaining two sites. Runoff sample analysis will continue. Mass flow rates will be analyzed and summarized. Special efforts will be made to monitor the spring thaw and any events that might occur then. We expect that initial soil samples will be collected at the Roberts and Haakon Co sites.

This task is behind schedule because monitoring has not yet commenced at the final two sites.

OBJECTIVE 3: COMPARE THE PERFORMANCE AND FINANCIAL FEASIBILITY OF EACH VTA TO A WASTEWATER BASIN AT THE SAME SITE.

TASK 3: COMPARE PERFORMANCE OF VTA SYSTEMS TO SIMULATED PERFORMANCE OF BASINS AT ALL SITES.

Progress: The graduate student completed her simulation study of the VTS's and basins at the five research sites. She received a Master of Science degree in Engineering in Summer 2006.

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The VTS model is used to simulate discharge of water, nutrients, and solids (among other things) from the VTA, based on input soil, feedlot, and VTS parameters and weather data.

Discharge of solids and water are sensitive to change of input parameters such as soil bulk density and sand and clay content but not sensitive to parameters such as available water content and hydraulic conductivity (Fig. 1). Thus, soil sampling to obtain accurate estimates of parameters such as bulk density and sand and clay content would be result in the greatest increase of simulation accuracy.

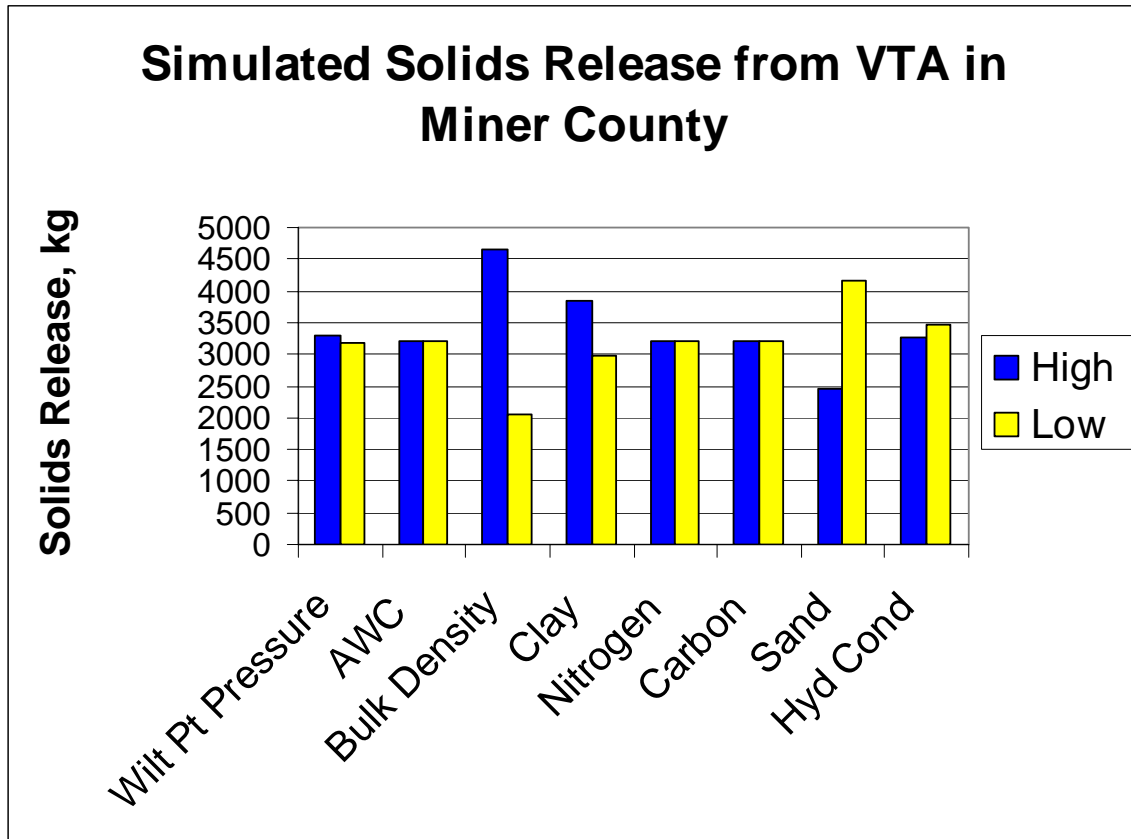


Figure 1. Sensitivity of simulated solids released from the Miner County VTS as related to soil parameters.

rs. If both bars of a pair are nearly the same length, the simulated solids release is not sensitive to change of that parameter.

Simulations also have been used to show that discharge from the VTA is sensitive to the water release rate from the sediment basin. A slower release from the sediment basin results in greater infiltration in the VTA and reduces runoff (discharge) from the VTA. This is important because rate of release from the sediment basin is relatively easy to adjust (lengthen or reduce) by changing sediment basin outlet sizes. For a simulated storm at the Miner County site, simulated water discharged from the VTA was reduced from 31019 to 7432 to 0 ft³ by reducing the outlet pipe size from 8-inch to 5-inch to 4.5-inch (Fig. 2).

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Simulations have been run to compare simulated VTS performance to simulated basin performance for all sites in the study. Simulated ELG (basin) releases are greater than simulated VTS releases (Fig. 3) except for the Haakon Co site (both N and S sides).

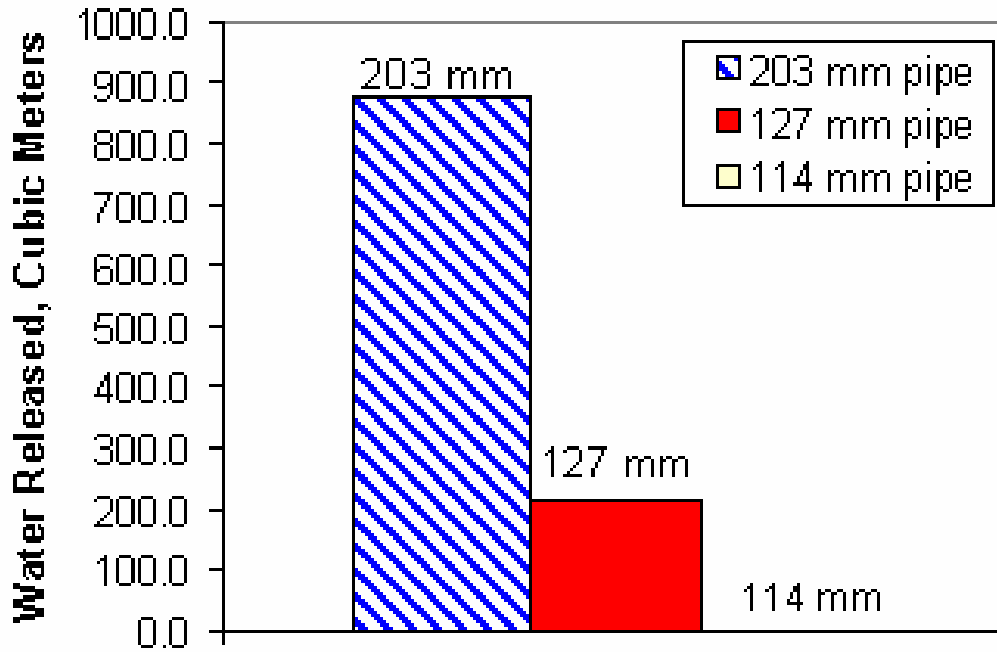


Figure 2. Simulated water release from the VTA for three sediment basin outlet pipe sizes.

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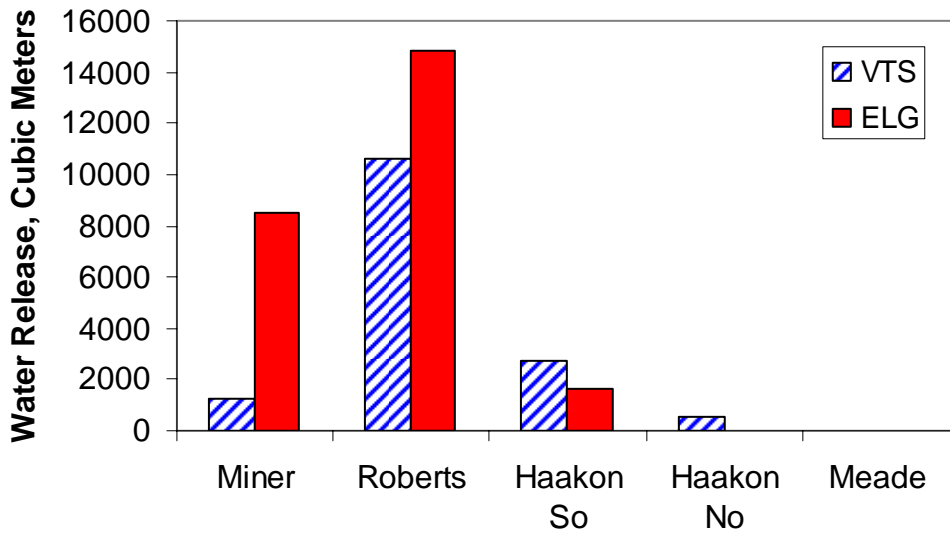


Figure 31. Cumulative water released from each site from the VTS and basin from 1988 to 2004.

This task is complete.

TASK 4: COMPLETE ECONOMIC COMPARISONS OF SYSTEMS AT ALL SITES.

No progress to report.

Work planned for next six months: Activity addressing this task will commence in 2007, beginning with the identification of the economics graduate student. The first task will be to collect cost information for all systems to form the basis of the economic comparisons.

This task is on schedule.

TASK 5: INFORMATION TRANSFER (I&E)

Press releases from SDSU announced the establishment of the project and outlined the objectives. Press releases were in both print and audio formats. Two examples of publication of the published press releases are in the Rapid City Journal (<http://www.rapidcityjournal.com/articles/2005/10/06/news/agnews/ag05.txt>) and the TriState Neighbor (http://www.tristateneighbor.com/articles/2005/10/06/tri_state_news/top_stories/news26.txt).

A web site dedicated to this project has been established. It is located at <http://abe.sdstate.edu/vts>. Initial project information is listed and results will be published there

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as they become available and as they are appropriate. Other information that will be contained at the web site includes announcement and minutes of meetings, contact information for the investigators, overviews of the locations, and links to related information.

A story covering the Miner County site was run on Today's Ag on May 26, summer 2006. The archived show can be found at <http://www.todaysag.com/page.cfm?page=Watch>. Technical presentations were given at the statewide groundwater conference in Pierre in spring 2006 and will be presented at the first annual Eastern South Dakota Water Conference in November 2006. An MS thesis in Agricultural and Biosystems Engineering was completed in summer 2006.

Work planned for next six months: Film/video presentations of project objectives and the remaining four sites will be developed. Field days will be planned for all five sites. Further planning for print, audio, and video releases will take place with media personnel at SDSU. The web site will be updated as appropriate.

This task is on schedule.

OBJECTIVE 4: DEVELOP RECOMMENDATIONS FOR MANAGING PERENNIAL GRASSES USED AS THE VEGETATION COMPONENT OF A VTA BASED AWMS.

TASK 6: EVALUATE THE EFFECTS OF VEGETATION HARVEST SYSTEMS ON THE ABILITY OF THE VTA TO MAINTAIN FILTERING CAPABILITES AND PRODUCE HIGH QUALITY FORAGE.

This task was appended to the project in August 2005.

Smooth brome plots at the Miner site were monitored again in 2006. Data will be presented in the spring progress report.

Work planned for the next six months: Samples will be collected and analyzed during the growing season of 2007. Nutrient content of the vegetation will be analyzed to calculate N and P removal from the VTA. Plots will be established at the newly-built sites (Roberts, Haakon).

This task is on schedule.

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CONCLUSIONS

The project generally is on schedule but the final bits of construction remain for 2007. The dry mid-summer of 2006 impeded runoff sample collection but fall rains provided some samples for analysis. Visual signs indicate that system modifications have reduced or eliminated discharge from the VTA at the Miner site. Further sampling and analyses are needed to estimate mass flow rates and thus evaluate the effectiveness of the VTA. Harvest of smooth brome grass at the Miner site showed increased dry matter for more than one harvest during the growing season and has

