ARRA Green Wastewater Project ~ Phase 2

Left Fork Watershed of the Mud River

~ FINAL REPORT ~

Lincoln County Commission ~ WV DEP Cooperative Project

Project Dates: **February 2010 through February 2011**

Total Budget: **$718,626.**
Individual decentralized wastewater systems installed: **20**
New jobs created: **4**; Jobs sustained: **5**
Buy American Component: **97.8%** of installation materials were made in the USA

Septic tank, pump tank, and peat modules waiting Commission inspection

BACKGROUND

The ***ARRA Green Wastewater Project*** (Phase 2) built on the success of the cooperative agreement between the Lincoln County Commission and the US Environmental Protection Agency. From 2005 to 2010, that agreement funded a multi-year national decentralized wastewater demonstration project. It was located in the Left Fork watershed of the Mud River, a low income, rural community. Through the project, 40 homes received new alternative wastewater systems, replacing old, failing ones. One of the project's primary goals was to protect public

health and improve water quality. The ***ARRA Green Wastewater Project*** (Phase 2) installed another 20 home systems in the same watershed. These new systems also replaced old failing systems.

MOST IMPORTANT LESSONS

The project is more involved in ongoing maintenance and troubleshooting than most normal installations. The project's sampling and testing components give new insight about how rural low income home situations impact wastewater systems. What we find also helps frame discussions about critical installation and maintenance procedures. Finally, this knowledge impacts how these technologies should be adapted to make them more effective in rural, low income areas.

The Left Fork is one of the county's most rural and low income areas

Support of Lincoln County Commission. From the beginning of Phase 1 in 2005, the Commission has actively supported the project with advanced funding, thoughtful analysis, commitment to developing local leadership, attendance at local meetings, and support at the state and national level. Without their leadership and commitment, these installations would not have happened.

Collaboration with WV DHHR and WV DEP. Both of these state agencies have regulatory roles in home wastewater systems. The DEP was the funding partner for Phase 2. Both agencies and their personnel have been integral in moving the project forward. DHHR District Sanitarian, Ryan Harbison, has been especially valuable, spending time in the watershed helping to trouble shoot, and overseeing installation and maintenance. Working cooperatively with state agencies and maintaining close contact with them has been important to the project's success. In addition, agencies also gained new insights through the project.

Local Community Involvement and Long Term Maintenance. The local Left Fork Community has spent thousands of hours moving these projects forward. Since 2005, local people have come to monthly meetings to help prioritize installations, participate in awarding bids, holding workshops on various technologies, and analyzing systems' effectiveness. Currently the community is finalizing work on a non-profit wastewater management organization to insure these new systems will be properly cared for. Community buy-in and leadership have been critical cornerstones to the project.

Partnering with a Cooperative, Knowledgeable Installer. TR Davis, Inc., a local installer, put in all twenty systems for Phase 2. His experience and willingness to look critically at issues the project faced directly contributed to the project's success.

Involvement with Systems Manufacturers. Having a technology manufacturer that is engaged in the project and willing to help solve problems is very, very valuable and important. Prior to Phase 2, there were instances where manufacturers were hesitant or slow to come to the watershed to look at problems. Yet, without manufacturer commitments, we have found that systems won't work properly. The ongoing involvement in Phase 2 of Bord na Mona (the secondary peat technology manufacturer) has been pivotal to the project's success.

Sampling and Analysis. Ongoing tributary and system discharge sampling, though costly and labor intensive, is critical to analyzing the effectiveness of systems. Visual inspections of components can uncover some problems but test results for bacterial levels give a much more accurate picture of systems' health.

Raw sewage ponding under house before installing a new system to replace failing one

RESEARCH and TESTING

Length of Direct Discharge Pipes. The Project believes that the distance from UV light to final discharge into the tributary does not have significant impact on bacterial counts. Some technology engineers and manufacturers involved in Phase 1 suggested that longer discharge lines could allow bacteria to regenerate or grow inside those lines. Phase 2 set up experiments at two installations to see if there were differences in bacterial counts in longer discharge lines. At one site (Hess) the distance from the UV light to the final discharge was 10 feet; at another (Adkins), 150 feet. Each had a sampling port immediately after the UV light. Samples taken from the port were compared to samples from the end of the discharge line. At both sites for every sampling, the bacterial counts were the same.

Home	***Sampling Date***	***E. coli colonies at Port***	***E. coli colonies at Final Discharge***
Hess (10 feet between Port and Final Discharge)	8/3/2010	**<10**	**<10**
Hess (10 feet between Port and Final Discharge)	2/23/2011	**<10**	**<10**
Adkins (150 feet between Port and Final Discharge)	8/3/2010	**<10**	**<10**
Adkins (150 feet between Port and Final Discharge)	2/23/2011	**<10**	**<10**

Direct Discharge Sampling. Direct discharge sampling at the final drop into tributaries demonstrated the effectiveness of the system technology used for Phase 2 (Infiltrator polyethylene tanks, Infiltrator transducers instead of floats, Bord na Mona Puraflo Peat Biofilters, and Salcor UV bacterial disinfection). During eight months of direct discharge sampling, 55 different samples were taken from 18 different home wastewater systems. **None** of the samples were over the 200 E. coli colonies per 100 mL limit set as the project's benchmark. In fact, 78% of these 55 samples had less than 10 E. coli colonies per 100mL.

All direct discharge sites have NPDES permits and signs.

Tributary Sampling. Installing newer, more effective alternative, decentralized systems has positively impacted bacterial counts in the tributaries of the watershed. During Phase 2 in which 20 systems were installed, there were fifty sampling incidents at eight tributary locations in the watershed. Twenty-nine or **58%** of these samples were positive and under the 200 E. coli colonies per 100 mL limit set by the project. Compare these results with results from Phase 1 in which 40 systems were installed. From November 2005 through October 2009, seventy-nine samples were taken during Phase 1, at nine locations in the watershed. Only twenty-one or **27%** of these samples had under 200 E. coli colonies per 100 mL limit. Clearly as more and more new systems are installed, the health of the watershed improves.

Sampling occurs during all seasons of the year in various watershed locations

ARRA PROJECT FINANCES

The budget for the 13 month Phase 2 project was **$718,626**. This included:

- **$629,400** ~ for 20 new home **wastewater systems** including system components, installation at prevailing wage rates, plumbing and electrical upgrades for some of these homes
- **$56,290** ~ for 3 part-time **project staff** (including the Commission's required fringe costs)
- **$15,300 ~** for NPDES **direct discharge permits** issued by WV DEP and WV DHHR
- **$4,800** ~ for **percolation tests** to determine if effluent could be inground rather than directly discharged into tributaries
- **$1,952 ~** for **analyses** of both tributary and direct discharge samples

Typical narrow hollows present multiple problems for appropriately sighting systems

RECOMMENDATIONS

➔ Increase technology-specific standards for maintenance inspections, especially for direct discharge systems.

➔ Support new, lower cost technologies which would have final discharge in ground rather than into tributaries. Support could include state/federal funds for research and development, as well as technology manufacturers warranting and absorbing maintenance costs on experimental systems for 5 years.

➔ Consensus grows about the importance of protecting ground water and drinking water supplies. Investigate requiring inspections of all onsite wastewater systems, both inground and direct discharge. A challenge will be finding funding and insuring that low-income communities don't bear large financial burdens.

For additional information or questions contact:

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