



Environmental Protection Matters

DNREC Office of Environmental Protection

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Piloting New Technology at Mirror Lake

If you ask them, they will come. And come they did. DNREC staff volunteers came out in full force during November this year to help with an innovative remediation and restoration project at Mirror Lake in Dover.

Mirror Lake's health has been in decline for several decades due to contaminants in bottom sediments that accumulate in fish, stormwater runoff and sedimentation, and invasive plants.

The project, co-managed by DNREC's Site Investigation and Restoration Section's John Cargill and Watershed

Assessment Section's Rick Greene, uses activated carbon – the same technology used in many water filters – to bind contaminants in lake sediments, rendering them unavailable for uptake by biological inhabitants.

With the addition of a new intertidal wetland, the combined remediation and restoration project will help improve the natural beauty of the lake, increase the lake's ecological function, and eventually make the fish there safe for human consumption.

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DNREC project co-manager, John Cargill, uses the "telebelt" to broadcast the SediMite[®]™ into Mirror Lake.

R. Shaner, Watershed Assessment

Piloting New Technology *Continued...*

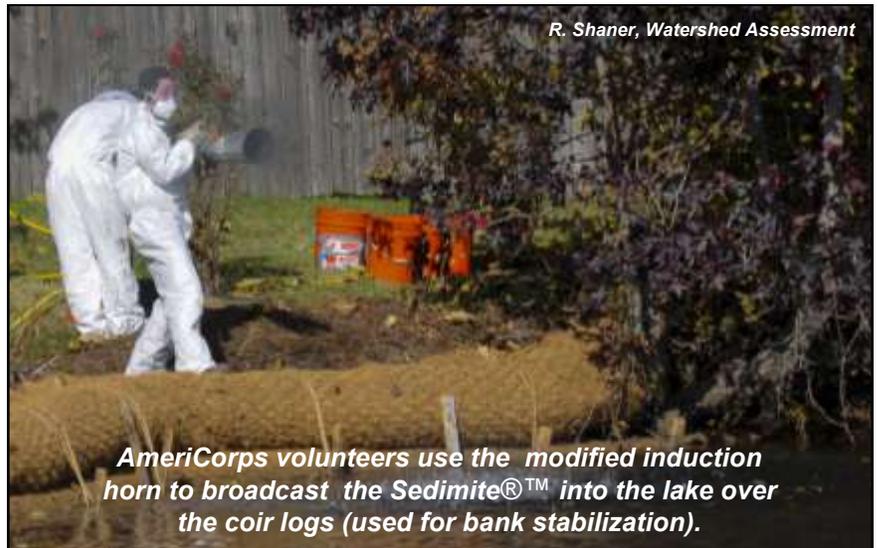
The activated carbon product—SediMite®™— was broadcast into the lake with the use of a telebelt (see photo), by induction horns modified for use with compressed air, and in some cases by hand. Once distributed, the SediMite®™ pellets fall to the lake bottom and are naturally incorporated into the bioactive zone (BAZ) by burrowing bugs and worms that already reside in the sediments.

In total, approximately 160,000 pounds (80 tons) of SediMite®™ were broadcast into the lake and areas downstream to Court Street by over 60 DNREC volunteers in 10 days. The application is expected to result in the reduction or removal of the fish consumption advisory in the project area within 3-5 years. The project is the largest application of SediMite®™ anywhere in the US to date, and the first state-funded sediment remediation project of its kind in the country.

DNREC controlled project costs by using local volunteer labor where possible. Invasive species removal, some general site preparation work, and the filling of thousands of buckets with SediMite®™ were conducted by Delaware's Boot Camp Program, AmeriCorps volunteers, and residents of a local shelter. Approx. 770 hrs. of labor were provided by the three groups.

DNREC partnered with Dr. Upal Ghosh, a world-renowned sediment remediation researcher from the University of Maryland, Baltimore County (UMBC), to develop the remediation plan.

The approximately \$1 million remediation/restoration project was funded primarily by state sources. Over \$73,800 in federal Clean Water Act Section 319 Nonpoint Source grant funds were used for the wetland restoration and coir log installation. The project funding also included Community Transportation Funds from Sen.



R. Shaner, Watershed Assessment

AmeriCorps volunteers use the modified induction horn to broadcast the SediMite®™ into the lake over the coir logs (used for bank stabilization).

Bushweller and Rep. Scott. Project partners included all DNREC Divisions, UMBC, the City of Dover, the Silver Lake Commission, Bright-Fields, Inc., Biohabitats, Inc., local political leaders and many others.

DNREC and UMBC scientists have plans to monitor the effectiveness of the innovative treatment technology by collecting and analyzing sediment, water and fish tissue samples over the next three years. If the technology proves to be successful as expected, then it is anticipated that other impacted rivers, creeks, streams and ponds across the First State may be rehabilitated using activated carbon products, or similar nondestructive and cost-effective technologies in the future.

To learn more about the Mirror Lake project, please see the video on DNREC's YouTube channel at: <http://youtube/gplVE07eUq4> or contact DNREC staff and colleagues involved with the project. DNREC volunteers will be needed again in the spring to plant native species, including flowering varieties, on the newly created intertidal wetland to provide both beauty, habitat and function. Don't miss out on the next opportunity to help!

From DNREC Press Release 11/ 7/13, J. Cargill, SIRS and C. Wirtz, WHS

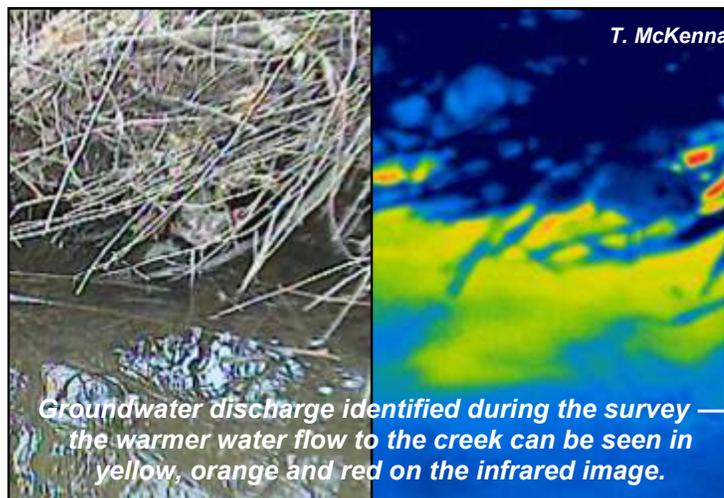
Up a Creek with DNREC and DGS

DNREC is fortunate to have partners willing to help pilot new technologies for environmental investigations. Partners like Dr. Thomas McKenna, Associate Professor at the Department of Geological Sciences, University of Delaware (UD) and Hydrogeologist at the Delaware Geological Survey, who was willing to get up really early on a cold winter morning for the cause. That's 4:30 a.m. early, the time when Forward Looking Infrared (FLIR) thermal imaging works best because of the contrast between warm and cold objects.

FLIR cameras, first used in military and civilian aircraft applications, sense infrared radiation contrast. The environmental applications of thermography were first explored by McKenna a few years ago, when he was studying a coastal marsh in Delaware, examining flow and flooding over time for a long-term study at UD. He and his graduate students cobbled together the necessary equipment and spent three weeks doing a detailed 24/7 monitoring of the land-sea interface. They were able to differentiate the fresh bay water inundation from the more stationary overland flow.

Last Feb., Robert Asreen, a hydrologist with the Site Investigation and Restoration Section (SIRS)

and Dr. McKenna completed the 2nd phase of a detailed thermal energy study on Chestnut Run in Elsmere. It was the contrast between the colder creek bed and warmer groundwater flowing into the creek that was the object of their study. They were performing the early morning survey as part



Groundwater discharge identified during the survey — the warmer water flow to the creek can be seen in yellow, orange and red on the infrared image.

T. McKenna

of a hydrogeological subsurface study upstream from one of the SIRS hazardous substance cleanup sites with a large chlorinated solvent groundwater plume. Low levels of the chlorinated solvent tetrachloroethylene (PCE) were reported in surface water samples collected as part of the routine monitoring of Chestnut Run in December 2011.

Since the groundwater plume from the SIRS site was not known to impact Chestnut Run, Asreen was concerned that there could be a second site contributing to the surface water contamination. The two scientists hoped the thermal imaging would identify the locations of any seeps or groundwater discharge for eventual environmental sampling. Fifteen potential locations were flagged where the groundwater discharged to surface water. Temperature and specific conductivity measurements were recorded, and pore water was sampled with passive diffusion samplers. Flagged locations were later located using a global positioning system (GPS).

PCE and its degradation products were reported in samples collected at five locations. The thermal imaging has led to new areas of investigation, narrowing down the search for the second source of contamination.

Article by R. Asreen, SIRS and C. Wirtz, WHS



Infrared image of the scientists investigating Chestnut Run.

Sonic Well Drilling at the Airport

Next time you catch a Frontier flight from New Castle County Airport, take a good look around the airfield. You might be surprised to see a monitoring well or two located along the side of the runways.

In Sept. 2012, before Frontier Airlines started operating flights from their new location at the airport, DNREC's Division of Waste and Hazardous Substances - Site Investigation and Restoration Section (SIRS) conducted an environmental investigation right smack dab in the middle of the airport.

The airport is owned by New Castle County, however, the Delaware River and Bay Authority oversees operations at the airport. What most people may not know is that the site was used as a U.S. Army airport and training facility in the 1940s and converted to an air force base after World War II. At that time, the site was primarily used for the demobilization of World War II aircraft.

After World War II, the airport returned to civilian use, however, the military, including the Delaware Air National Guard and the Delaware Army National Guard, still maintains a presence at the airport today.

In 1989, a Preliminary Assessment (PA) environmental investigation was conducted at the airport by the USEPA. Based on the results of the PA, the USEPA and DNREC concluded no

further action was needed at the airport portion of the site.

However, new information in recent years has indicated that nearby public drinking water supply wells have been impacted by contamination. DNREC and USEPA decided to perform additional investigation to identify the source: the New Castle County Airport, the Air National Guard, or elsewhere?



A truck-mounted sonic drill rig is used to drill the first of three deep monitoring wells and collect soil cores at the New Castle County Airport.

A subsurface environmental investigation at an operational airport is no easy task. It requires planning and review of detailed maps showing utility corridors and taxiways, as well as flight schedule and airport security coordination.

In addition, the array of monitoring wells needed for the investigation would have to be drilled with speed, accuracy, waste minimization, and above all, protection of existing drinking water aquifers from cross contamination.

(Continued on page 5)

Sonic Well Drilling *Continued...*

SIRS decided to pilot new technology to DNREC – sonic drilling – to meet the rigorous requirements of installing three deep wells at an operational airport. Sonic drilling produces a continuous, relatively-undisturbed core sample through most types of rock and unconsolidated formations. Core recovery is nearly 100% and offers the best sub-surface information available.

The sonic well drilling technology is relatively straight forward. An oscillator at the top of the drill string creates sonic energy or sound waves, which travel along the axis of the drill pipe and create resonance at the drill bit surface. This causes the drill bit to vibrate as it rotates, and translates into additional energy delivered to the face of the formation. Even the friction with the soil immediately adjacent to the entire drill string in the borehole is minimized, resulting in much faster drilling, an estimated 2-3 times faster!

An added bonus is that with minimal disturbance to the surrounding borehole wall, well development is more efficient, resulting in waste reduction of up to 80% over to conventional methods. The drilling is also completed primarily dry, with no water or mud used to circulate the drill cut-



SIRS Environmental Scientists, Stephanie Scholl (left) and Krystal Stanley (right), document each soil core interval collected at the monitoring well location.

tings to the surface. This also helps to minimize waste for offsite disposal.

Using the sonic drilling techniques, DNREC completed the Site Inspection at the New Castle County Airport site and identified contaminants in groundwater near the southeast corner of the site. The primary contaminants included chlorinated chemical compounds, tetrachloroethylene or PCE, and trichloroethylene or TCE and petroleum-related compounds. However, the soil at the airport site appeared to have been minimally impacted by hazardous substances.

The contaminated groundwater identified in the southeast corner of the airport is most likely impacting the nearby public drinking water supply wells. The public water supply is being treated before public consumption. Based on the results, SIRS recommended additional investigation to determine the source and extent of the groundwater contamination in the southeast corner of the airport.



Formation water pours out of the drill pipe and the soil core collection bag.

Article by S. Scholl, SIRS and C. Wirtz, WHS

Kid Power – Recycling 101

“If we do not change our direction, we are likely to end up where we are headed.”

- Ancient Chinese Proverb

When you start your PowerPoint presentation with a Chinese proverb like that, you are bound to grab everyone’s attention right away. You will also keep their attention with stats such as a 75% loss in landfills in the US from 1970 to 2000, from 20,000 to about 5,000 landfills today. Or, landfills being filled at the alarming rate of one per day. Add in the cost of the recent three DSWA landfill expansions at approx. \$100 million, and you’ll have everyone sitting up at attention.

It’s especially disconcerting when you consider that 48% of our landfill material is organic, which could be easily recycled. And the costs just keep adding up, with increasing charges for hauling services, tipping fees, landfill management, and long-term liabilities to our precious environment.

So what can a few middle school kids do about it? Well truth be told, quite a bit! The four students, Eric Long, Max Huhn, Aaron Knestaut, and Elizabeth Nestle, aka the Zero Waste Team, developed a new program to divert organic material in their community. They are finishing their third pilot, and have plans to take it statewide in a few years. Their plan? Convert the existing network for

yard waste collection to collect mixed organics. What could be simpler and more cost effective than using the yard waste trucks to divert the material to organic recyclers? This would come at no incremental cost to residents, and would decrease tipping fees for haulers, as well as decrease the volume in our landfills. It would also provide an opportunity for job creation and produce a local saleable product.

So how do you accomplish this in the shortest timeframe? This generation is smart and tech-savvy—they propose to engineer change from the top down AND bottom up by reaching out to state and municipal officials and using digital resources such as a web page for online training and support for residents, along with resources for teachers and haulers.

It all started locally when they came up with the first residential curbside composting route in Delaware. Their 1st pilot included 16 homes with a diversion rate of 56%. With the 4th pilot next quarter, they will have over 100 households participating, with plans to divert 6.5 tons of organic material in the next calendar quarter!

Definitely no slackers here. Just last summer they won the prestigious \$25,000 Christopher Columbus Foundation Community Grant Award for project expansion. This is a national, community-based science, technology, engineering and math (STEM) program for middle school students, which recognizes students for positive change and innovative solutions to community-based problems.

The Zero Waste Team is the first team from Delaware that made it to the finals in the 17-year history of the competition! For more information on the team, please visit: www.zerowasteteamdelaware.org and like them on Face Book at Zero Waste Team Delaware.

From 10/8/13 Zero Waste Team Presentation by Eric Long, and C. Wirtz, SIRS



State Representatives Deborah Hudson and Mike Ramone pose with (from the left): Aaron Knestaut, Max Huhn, Eric Long and Elizabeth Nestle at an October 8 event recognizing the Zero Waste Team’s accomplishments.

Waste and Hazardous Substances—Employee of the Year

Kudos to the Division of Waste and Hazardous Substances new Employee of the Year: Amy Bryson. Bryson is a Hydrologist III in the Tank Management Section's Corrective Action Group. She was nominated by her management and peers in three categories this year: Achiever, Motivator and Special Teams.

Bryson joined DNREC about 3 years ago after 13 years in the private environmental consulting world. Along with being highly-productive, efficient, and self-motivated, she is also an active traveler. When not working diligently at her desk, you might find her hiking at a national park. She has hiked in nine national parks, from the hills in Shenandoah National Park to the high meadows in Yellowstone and Olympic National Parks.



Bryson, making friends in Cozumel.

She also played volleyball in college and still plays competitively at least 1-2 nights a week. Best of all, she is a local—one of those rare, native Delawareans!

Did You Know?

The Division of Waste and Hazardous Substances' Site Investigation and Restoration Section (SIRS) is responsible for the identification, evaluation and remediation of sites within the state of Delaware that had past releases of hazardous substances. The section manages the hazardous substance release sites in Delaware in accordance with the Hazardous Substance Cleanup Act (HSCA). Delaware enacted HSCA in 1990 to address sites potentially contaminated with hazardous substance releases in the state that would not be addressed under the federal superfund program. Three major programs are administered under HSCA. They are the Voluntary Cleanup Program (VCP), the Brownfields Development Program, and the HSCA Enforcement Program:

- The VCP was developed to assist the responsible parties to voluntarily clean up properties contaminated by the release of hazardous substances. The benefit of participating in the VCP is that it can eliminate the need for costly litigation. To date, 118 VCP sites have been cleaned up in Delaware.
- The Brownfields program allows developers and prospective purchasers who did not contribute to the contamination on their site to clean up their site and not be liable for pre-existing contamination. To date, 80 Brownfield sites have been cleaned up in Delaware.
- The HSCA program requires the responsible party to clean up sites contaminated with hazardous substances and allows DNREC to recover the costs from the responsible party in the event that DNREC must perform the cleanup. It also allows the use of the HSCA fund to cleanup sites where a viable responsible party is not identifiable. Enforcement procedures have been used to initiate cost recovery for cleanup costs for seven sites during 2012-2013.

For more information, please visit the SIRS website:

<http://www.dnrec.delaware.gov/dwhs/SIRB/Pages/default.aspx>

Article by M. Leckie, SIRS and C. Wirtz, WHS

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Visit us on the web!

www.dnrec.delaware.gov



The Division of Waste and Hazardous Substances plans for and responds to, environmental incidents; regulates the handling, transfer, storage and disposal of solid, infectious and hazardous waste; manages the recycling program in Delaware; regulates above and underground storage tanks and boilers; oversees the remediation of sites that have been contaminated by hazardous substances and chemicals; and implements Delaware's Brownfields Development Program.

The Division of Air Quality handles the majority of air issues in Delaware including: monitors and regulates all emissions to the air; issues "permits to construct" and "permits to operate" to air contaminant sources; maintains emission inventories from business and industry; develops the State Implementation Plan as required by the Clean Air Act; adopts new regulations and enforces existing regulations and permits; and inspects asbestos removal sites.

The Division of Water manages and protects water resources through various programs by providing technical assistance, laboratory services, regulatory guidance and implementation, and educational services; and performing applied research.

EASY REFERENCE PHONE NUMBERS

24-Hour Report and Spill Notification Line - 1-800-662-8802

Aboveground Storage Tanks - 302-395-2500

Air Quality - New Castle Office - 302-323-4542

Air Quality - Kent & Sussex - 302-739-9402

Asbestos New Castle - 302-323-4542

Asbestos Kent & Sussex - 302-739-9402

Biosolids Permits - 302-739-9946

Boiler Safety - 302-744-2735

Brownfields - 302-395-2600

Delaware Estuary Program - 302-739-9283 (Delaware Coastal Management Program)

Division of Air Quality Director's Office - 302-739-9402

Division of Waste and Hazardous Substances Director's Office - 302-739-9400

Division of Water Information - 302-739-9950

Dock/Dredging/Bulkheads/Rip-Rap/Wetlands & Subaqueous Lands - 302-739-9943

Emergency Prevention and Response - 302-739-9404

Environmental Crimes Unit - 302-739-9401 or 1-800-662-8802

Environmental Laboratory - 302-739-9942

Hazardous Waste - 302-739-9403

Industrial Stormwater Permits - 302-739-9946

Loans & Grants for Wastewater and Septics (Financial Assistance Branch) - 302-739-9941

Medical Waste - 302-739-9403

Non-Hazardous Liquid Waste Transporters - 302-739-9948

On-site Wastewater Licensing Program - 302-739-9948

Open Burning - 302-739-9402

Outreach Ombudsman - 302-395-2600

Recycling - 302-739-9403

Septic System Permits - Large Systems (Community & I/A) State-wide - 302-739-9948

Septic System Permits - Small Systems for Kent & New Castle Counties - 302-739-9947

Septic System Permits - Small Systems for Sussex County & Holding Tank Compliance Program - 302-856-4561

Site Investigation & Restoration Section (Superfund/Brownfields) - 302-395-2600

Solid Waste - 302-739-9403

Source Water Protection - 302-739-9945

Surface Water Discharge Permits (NPDES) - 302-739-9946

Underground Injection Control & Spray Irrigation - 302-739-9948

Underground Storage Tanks - 302-395-2500

Wastewater Collection, Conveyance and/or Treatment Facility Construction Permits - 302-739-9946

Wastewater Treatment Facility Operators - 302-739-9946

Water Allocation Permits - 302-739-9945

Water Testing - Drinking Water (Division of Public Health) - 302-741-8630

Water Supply - 302-739-9945

Well Driller's License - 302-739-9944

Well Permits & Licensing - 302-739-9944

Wells - 302-739-9945

Wetlands and Subaqueous Lands Section - 302-739-9943