the AQUIFER

Volume 28
Number 3
Winter 2013-2014
©

A PUBLICATION OF THE GROUNDWATER FOUNDATION

▲ *The Assurity Center in Lincoln, Nebraska is a model for other companies looking for ways to ensure environmental sustainability. The Center has been designated as a Groundwater Guardian Green Site in recognition of its groundwater-friendly practices.*

Assuring Sustainability

Lincoln's Assurity Center Highlights Groundwater-Friendly Practices

By Jennifer Wemhoff, The Groundwater Foundation

The Assurity Center in Lincoln, Nebraska was developed with functionality and environmental sustainability in mind. The new headquarters of Assurity Life Insurance Company opened in December 2011 as part of an urban renewal effort in Lincoln's east downtown area. The building's location was carefully selected and purposefully located in an urban area with nearby trail systems and public transit lines to encourage alternative methods of transportation.

The company's objectives for the new facility align with Assurity's corporate values, said Tom Henning, Assurity Chairman, President and CEO. "We are committed to being a leader in corporate sustainability," Henning said. Assurity Center is the first large office building in Lincoln, and among a small number in Nebraska, to receive Gold certification under the Leadership in Energy and Environmental Design (LEED) rating system by the U.S. Green Building Council, he said. "Assurity Center is very progressive in terms of both sustainability and technology," Henning said. "In fact, I would suggest it is one of the most technologically advanced buildings in the country."

The Assurity Center was awarded Groundwater Guardian Green Site designation in 2012 and 2013 in recognition of the site's groundwater-friendly practices.

"The Assurity Center is an example of what a company

Sustainability, *continued on page 3* ▶

INSIDE

Mission of The Groundwater Foundation:

To educate people and inspire action to ensure sustainable, clean groundwater for future generations.

Groundwater Shorts

New Insight on Vulnerability of Public-Supply Wells

Key factors have been identified that help determine the vulnerability of public-supply wells to contamination. A recent USGS report describes these factors, providing insight into which contaminants in an aquifer might reach a well and when, how and at what concentration they might arrive.

About one-third of the U.S. population gets their drinking water from public-supply wells.

The study explored factors affecting public-supply-well vulnerability to contamination in ten study areas across the Nation. The study areas include Modesto, Calif., Woodbury, Conn., near Tampa, Fla., York, Nebr., near Carson City and Sparks, Nev., Glassboro, N. J., Albuquerque, N. Mex., Dayton, Ohio, San Antonio, Tex., and Salt Lake City, Utah.

Measures that are crucial for understanding public-supply-well vulnerability include the sources of the water and contaminants in the water that infiltrate the ground and are drawn into a well, the geochemical conditions encountered by the groundwater, and the range of ages of the groundwater that enters a well.

"Common sense might say that wells located near known contaminant sources would be the most vulnerable, but this study found that even where contaminant sources are similar, there are differences in public-supply-well vulnerability to contamination," said Sandra Eberts, the study team leader.

The study found that conditions in some aquifers enable contaminants to remain in the groundwater longer or travel more rapidly to wells than conditions in other aquifers. Direct pathways, such as fractures in rock aquifers or wellbores of non-pumping wells, frequently affect groundwater and contaminant movement, making it difficult to identify which areas at land surface are the most important to protect from contamination. An unexpected finding is that human-induced changes in recharge and groundwater flow caused by irrigation and high-volume pumping for public supply changed aquifer geochemical conditions in numerous study areas. Changes in geochemical conditions often release naturally occurring drinking-water contaminants such as arsenic and uranium into the groundwater, increasing concentrations in public-supply wells.

Knowledge of how human activities change aquifer conditions that control which contaminants are released to groundwater and how persistent those contaminants are once in the groundwater can be used by water managers to anticipate future water quality and associated treatment costs.

The report, "Factors Affecting Public-Supply-Well Vulnerability to Contamination: Understanding Observed Water Quality and Anticipating Future Water Quality" is available online at http://oh.water.usgs.gov/tanc/NAWQATANC.htm and was done by the USGS National Water-Quality Assessment Program. NAWQA conducts regional and national assessments of the Nation's water quality to provide an understanding of water-quality conditions, where conditions are getting better or worse over time, and how natural features and human activities affect those conditions.

Seashells Help Clean Wastewater

The thousands of tons of waste seashells created by the edible seafood sector in the United Kingdom are being put to use by the UK's University of Bath in a new wastewater cleaning project.

Dr. Darrell Patterson, from the University's Department of Chemical Engineering, used waste mussel shells to create what the university says is a cheaper and more environmentally friendly way of "polishing" wastewater, which could be used to remove unwanted substances like hormones, pharmaceuticals or fertilizers.

The final, or tertiary stage of wastewater treatment further improves the quality of the water before it is released. Photocatalysis of water can be used to remove any final trace contaminants, which normally uses titanium dioxide which is expensive, says the university. By replacing this with a material from the calcium derived from seashells called hydroxyapatite, Patterson is aiming to significantly reduce the cost and reusing a renewable unwanted waste product.

Patterson said "Mussel and other seashell farming is a fast growing industry around the world and the increase in the production of shellfish generates a large amount of shell waste. Shells are a calcium rich resource that can be used to produce calcium oxide (lime). This lime can be used in several different ways in environmental technologies, and our study has shown that the hydroxyapatite formed from them is an effective, green and potentially cost-efficient alternative photocatalyst for wastewater treatment."

The research was carried out using mussel shells, but other types of seashell could feasibly be used to produce photocatalysts, making this technique globally applicable. The project will now go on to look at the wider applicability of this technology and the scaling up of shell-based photocatalysts to industrial level.

For more information, visit http://opus.bath.ac.uk/34853/.

Sustainability, *continued from page 1*

can do in terms of designing a facility with sustainability and the environment in mind, and an approach others can model when looking at ways to improve their practices," said Jane Griffin, Groundwater Foundation President.

garden help capture excess rain water, reducing the stormwater load on local waterways.

The Center's attractive, sustainably designed landscaping receives irrigation from stormwater reuse and an on-site private well rather than the City of Lincoln's public water supply. The plants were chosen with the climate in mind, using those native to or adaptive to Lincoln's conditions, reducing the need for additional water or other inputs while still adding to the Center's appearance and providing habitat.

"Working with our architects before, during and after our move, Assurity set the bar very high on making both the interior and exterior as water conservation-conscious as possible," said Rex Kuhn, Manager, Facilities, for Assurity. "There are several very unique conservation practices implemented here. We continue to explore new technology and consult with our architects to reduce water consumption at this site."

▲ *From left, Assurity Green Team Chair Tammy Rogers, Groundwater Foundation Program Manager Jennifer Wemhoff, Assurity President and CEO Tom Henning, Groundwater Foundation Board Member Warren Arganbright, and Assurity Facilities Manager Rex Kuhn pose with Assurity's Green Site sign and plaque.*

▶ *One of the Assurity Center's green roofs. Green roofs help protect the roof surface and increase its lifespan, while reducing heating and cooling costs and reducing stormwater runoff and improving its quality.*

Focus on Water

A great deal of attention was paid to responsible water use and conservation throughout the facility, both indoors and out. Dual-flush toilets and low-flow faucets were chosen for the building, providing a 33 percent water use savings over a typical office building.

Outdoors, the Center's planning team took advantage of an abandoned public stormwater pipe on the edges of the property. It was capped and utilized as a cistern to reclaim and reuse stormwater for site irrigation. In addition, bioswales and a rain

The building itself is alive, literally, featuring three green or living roofs. Green roofs help protect the roof surface and increase its lifespan, at the same time reducing heating and cooling costs and reducing stormwater runoff and improving its quality.

All-Around Sustainability

The building itself is made up of over 20 percent recycled content, and the construction process was completed in a responsible way. More than 50 percent of construction waste from the building project was diverted from the landfill, recycling materials whenever possible and redirecting reusable materials to appropriate sites.

Energy conservation also features prominently in the Center. An innovative under-floor HVAC system reduces the amount of energy needed by only heating or cooling the portion of the space where an occupant is located, rather than at the ceiling level. All of the Center's heating and cooling equipment features energy conservation controls and contributes to overall reduced energy use.

Not only was the facility built with the environment in mind, the well-being of employees also factored into the building's design. An open floor plan creates work spaces with natural sunlight and views of downtown and parkland in over 90 percent of interior spaces. The Center's parking facility also awards priority parking spaces to employees who drive high-efficiency, low-emission vehicles, further rewarding sustainable behavior.

The Assurity Center worked with The Groundwater Foundation in 2012 to conduct a lunch and learn session for employees to learn more about groundwater and how they could translate the groundwater-friendly practices being implemented at the Center to their own homes.

"The Groundwater [Foundation] presentation was one example of how our Sustainability Task Force works to educate our associates on Assurity's green practices and how they can do their part at home," said Tammy Rogers, Senior Business Analyst and Green Team chairperson. "The presentation was very timely with the 2012 drought and provided great information to our associates on what they can do to conserve and protect our groundwater."

For more information about the Assurity Center and its groundwater-friendly practices, please visit www.assurity.com/assuritycenter.

Out of Sight, Not Out of Mind

Celebrate National Groundwater Awareness Week, March 9-15, 2014

"Although most people know very little about it, groundwater is worthy of public recognition because of the role it plays in human lives and the environment," said Jane Griffin, Groundwater Foundation President, regarding National Groundwater Awareness Week, March 10-16.

Importance to All of Us

Half of Americans rely on groundwater—the water that fills cracks and other openings in beds of rock, gravel, and sand below the ground's surface – for drinking water supplies. In rural areas, the number climbs to about 96 percent. These facts alone justify the need to be groundwater aware, and the reason Groundwater Awareness Week came to be 16 years ago, started by the National Ground Water Association (NGWA).

Groundwater is important to each of us in countless ways. An estimated 99 percent of all available fresh water in the world is found as groundwater. It contributes much of the flow in many streams, and often lakes and streams are "windows" to the water table. Groundwater adds 492 billion gallons per day to U.S. surface water bodies. In large part, the flow in a stream represents water that has flowed from the ground into the stream channel.

Scientists have estimated U.S. groundwater reserves are at least 33,000 trillion gallons, which is equal to the amount discharged into the Gulf of Mexico by the Mississippi River in the past 200 years. While this supply is vast, the U.S. uses 79.6 billion gallons per day of fresh groundwater for public supply, private supply, irrigation, livestock, manufacturing, mining, thermoelectric power, and other purposes. Irrigation accounts for the largest use of groundwater in the U.S., about 67.2 percent of all groundwater pumped each day. Some 53.5 billion gallons of groundwater are used daily for agricultural irrigation from more than 407,900 wells.

Groundwater is tapped through wells placed in water-bearing soils and rocks beneath the surface of the Earth. There are nearly 15.9 million of these wells serving households, cities, business, and agriculture every day. Wells are constructed by the 8,100 contracting firms employing nearly 45,000 people dedicated to providing and protecting our nation's groundwater supplies.

People play an important role as stewards or managers of groundwater. People can also adversely affect the resource. Groundwater protection is particularly important for people with water wells that provide their household water supply. Fortunately, there are simple steps that will help protect groundwater, such as keeping hazardous materials away from any wells; never dumping materials such as motor oil, chemicals, or anything else that could impact water quality onto the land surface, into a hole or pit, or into a surface water supply; and always using licensed or certified water well drillers and pump installers when a well is constructed or serviced, or when the pump is installed or serviced.

Annual Water Test

Groundwater Awareness Week is also a good time to have well water tested and an annual water well checkup performed. Private well owners should test their water annually for bacteria, nitrate, and anything of local concern. Water should be tested more often if:

- There is a change in the taste, odor, or appearance of the water.
- A problem occurs such as a broken well cap or a new contamination source.
- Family members or houseguests have recurrent incidents of gastrointestinal illness.
- An infant is living in the home.
- There is a need to monitor the efficiency and performance of home water treatment equipment.

To find a certified drinking water testing laboratory, visit www.wellowner.org and click on Water Quality/Water Testing.

The presence of coliform bacteria is a possible indicator of a well's susceptibility to contamination from animal wastes. E. coli is bacteria that originates in wastes such as those found in sewage, and it can result in severe illness. Its presence suggests a contamination source such as a poor performing home septic system in the vicinity of the well.

In the vast majority of cases, nitrates come from farm or industrial contamination, or septic systems, and they can be dangerous to your health. The presence of nitrates in well water could be an indication of a local source of contamination or regionally contaminated

Out of Sight, *continued on page 5* ▶

Out of Sight, *continued from page 4*

groundwater.

Two examples of water quality concerns that can be present on either a local or regional basis are arsenic and radon. Both can be naturally occurring in an aquifer. Arsenic is a semimetallic element that occurs in rocks and soils—and water that comes into contact with these rocks and soils. Radon is a colorless, odorless, and tasteless gas that comes from the natural radioactive breakdown of uranium in the ground. Exposure to radon can come from two sources: the air in your home, which seeps up through the ground, and the well water.

Should any contaminants above levels of health concern remain after proper cleaning and disinfection of the water well system, a qualified water well system professional can advise you on treatment options. It is important to compare your drinking water lab test results to the treatment capabilities of any recommended treatment system.

Well Checkup

An annual checkup by a qualified water well contractor is a good way to ensure problem-free service and quality water, and Groundwater Awareness Week is a good reminder to have it done.

Preventative maintenance usually is less costly than emergency maintenance, and good well maintenance — like good car maintenance — can prolong the life of your well and related equipment. NGWA further recommends you test your water whenever there is a change in taste, odor, or appearance, or when the system is serviced.

Wells can provide high-quality drinking water, but with well ownership comes the responsibility of keeping the water well in good working order and help ensure groundwater supplies are protected. A check of your well by a qualified water well contractor may include:

- A flow test to determine system output, along with a check of the water level before and during pumping (if possible), pump motor performance (check amp load, grounding, and line voltage), pressure tank and pressure switch contact, and general water quality (odor, cloudiness, etc.).
- A well equipment inspection to assure it's sanitary and meets local code.
- A test of your water for coliform bacteria and nitrates, and anything else of local concern. Other optional tests are those for iron, manganese, water hardness, sulfides, and other water constituents that cause problems with plumbing, staining, water appearance, and odor.

Well owners are vital to the protection of groundwater. They can take simple steps to ensure the drinking water the well provides to their family is clean by doing small things to protect their well, such as:

1. Keeping hazardous chemicals, such as paint, fertilizer, pesticides, and motor oil far away from the well, and maintaining a "clean" zone of at least 50 feet between the well and any kennels and livestock operations.
2. Maintaining proper separation between the well and buildings, waste systems, and chemical storage areas.
3. Periodically checking the well cover or well cap on top of the casing (well) to ensure it is in good repair and securely attached. Its seal should keep out insects and rodents.
4. Keeping well records in a safe place. These include the construction report, and annual water well system maintenance and water testing results.

For more information about groundwater and what you can do to help keep it clean, visit www.groundwater.org, www.ngwa.org, or www.wellowner.org.

national groundwater awareness week

Recognize Groundwater Awareness Week in Your Community!

- If you have a private well, have the water tested and the well inspected, and encourage others to do the same.
- Use social media to help spread the word about groundwater's importance.
- Write an article for your local newspaper or organization's newsletter.
- Join the Groundwater Guardian program, or get a green space involved as a Groundwater Guardian Green Site. Find out how at www.groundwater.org.
- Be groundwater aware!

Eager to Learn

Teaching and Learning from Girl Scouts

By Amy Kessner, The Groundwater Foundation

Exciting, educational, exhilarating…those three words perfectly sum up what it is like to work with Girl Scouts.

Exciting. There is never a dull moment with the Girl Scouts. They are always eager to learn, and the girls love to participate. There is never a shortage of raised hands when looking for a volunteer, and the atmosphere is always full of laughs, smiles, and questions. Every Girl Scout troop brings a new and different perspective, and that is part of what makes working with them so exciting!

Educational. Every time I go to a Girl Scout event, I expect to teach the girls about groundwater and then they inevitably end up teaching me. Their unique and youthful perspective on the world reminds me how important it is to truly care for this planet with every action we perform. It doesn't matter what age we are, we can all make a difference.

Exhilarating. I am convinced that there are few things more amazing than watching a child experience a 'first' or grasp a concept for the first time. When I am leading a groundwater activity with the girls, I can see their eyes light up with understanding. I get to watch as a passion to protect our groundwater becomes ignited. That is exhilarating. That makes a job worthwhile.

After all of that discourse, you might be wondering what I actually do with the Girl Scouts. The simple answer is teach them about groundwater and how they can be groundwater stewards. However, that answer does not even begin to describe the amazing opportunities available for the Girl Scouts through The Groundwater Foundation.

I am the current Program Manager for the LEAP into Groundwater Girl Scouts program. LEAP is a collaboration between The Groundwater Foundation and the Girl Scouts Spirit of Nebraska. Through this program, a new series of groundwater-focused patch booklets and patches were created and individual groundwater programs and workshops have been implemented throughout Nebraska.

Each Girl Scout Let's Keep It Clean! patch booklet focuses on a different aspect of groundwater. Daisies learn about the importance of water to our lives. Brownies explore groundwater, pollution, and what we can do to keep it clean. Juniors investigate the water and energy connection. Cadettes explore how groundwater and our atmosphere are linked. Seniors learn about the role water plays in our agriculture and the food we eat. Finally, when the Girl Scouts reach Ambassador level, they combine all they have learned to become leaders in groundwater conservation and protection, taking action to make a difference in this world.

In addition to the patch books, Girl Scouts may participate in day camps and Camp Adventure Weekends to learn about groundwater and earn patches! At these camps, Girl Scouts investigate how groundwater becomes polluted and what they can do to help keep it clean. Each program is unique, with the activities being chosen to best suit the girls in attendance. Even though the activities may be different, the main questions to be answered are always the same:

- What is groundwater?
- Why is it groundwater important?
- How does groundwater become polluted and depleted?
- How can we take action to protect and conserve groundwater?

The LEAP program is not just for the girls. Girl Scout personnel, camp staff, and troop leaders have opportunities to learn more about groundwater and how they can incorporate hands-on water education activities into their existing Girl Scout programs through workshops provided by The Groundwater Foundation. Additionally, there are many online resources available for troop leaders including, but certainly not limited to, lesson plans for each activity, a Pinterest page, and a page where they can share their experiences with the program!

If you are interested in being a part of LEAP into Groundwater, check out The Groundwater Foundation's Girl Scout website at http://www.groundwater.org/girlscouts.html. You can also email me at akessner@groundwater.org. I would love to hear from you!

Funding for LEAP into Groundwater is provided by the Nebraska Department of Environmental Quality, Nebraska Environmental Trust, and Rogers Family Foundation.

Meet Your Match

Michigan ByProducts Synergy Program

By Christine Spitzley, Tri-County Regional Planning, East Lansing Michigan

The Michigan ByProduct Synergy (BPS) Program matches byproduct streams from one facility to another facility's needs. It creates revenues and savings, and addresses social and environmental impacts. Essentially, it is not your typical waste management program!

BPS stimulates organizations to think about waste in new ways. By repurposing what has been traditionally considered "waste" Michigan organizations and businesses can:

- Reduce emissions.
- Reduce energy, raw materials, and disposal costs.
- Improve productivity, profitability, regulatory compliance and community relations.
- Develop new products and materials.
- Protect the environment and our natural resources.

Directly or indirectly, the resulting innovation, cost savings and social applications benefit everyone in Michigan. The environment benefits from landfill diversion, CO2 reduction, energy savings, hazardous waste reduction, water use reduction, and reduction in virgin material use.

The Tri-County Regional Planning Commission facilitates and staffs this program and is using it as a tool for groundwater protection. It is the next step in a regional wellhead protection program that began over 20 years ago. Offering organizations a unique opportunity to improve their operations is a positive way to support the economy and the environment, including groundwater.

Funding has come from multiple sources including the Michigan Department of Environmental Quality's Wellhead Protection Grant Program. Current grants are being used to identify and work with organizations within wellhead protection communities who may benefit from BPS. Almost any type of organization can participate in the Michigan BPS Program including: manufacturing, agriculture/food production, mineral recovery, transportation, processing, distribution/construction and professional offices. A sample of current participants:

- General Motors
- Dow Corporation
- Lansing Board of Water and Light
- East Lansing/Meridian Water and Sewer Authority
- Michigan Packaging Company
- Working Bugs, LLC
- Goodwill Greenworks Detroit
- Detroit Dirt
- Wacker Chemical

On September 18, 2013, 15 organizations and businesses came together in East Lansing, Michigan to see if they could find their match. The event started with breakfast and a brief program, which included cases studies for participation from Dow Corporation and Working Bugs, LLC. It then moved into a speed-dating format. Each entity rotated through five five-minute "dates" with other organizations. The dates allowed them to make introductions and exchange information about their byproduct streams and materials needs. The results equaled 10 potential synergies, which were identified in 30 minutes. After the speed dating concluded additional time was allotted for further networking. Due to this success, another event is planned for January 2014.

The keys to successful BPS have been:

- Collaboration – producers and consumers share what they or others might value.
- Motivation – project stakeholders must be able to see the potential in BPS and make it their own.
- Communication and participation – this must permeate all levels of an organization.
- Evaluation – to measure and understand environmental metrics.

If you would like to learn more about the application of ByProduct Synergy as a tool for groundwater protection please contact Christine V. Spitzley, Chief Environmental Programs Planner, Tri-County Regional Planning Commission, 517-393-0342 or cspitzley@mitcrpc.org.

Food Choices Conserve Water

by Danielle Nierenberg, Co-founder of Food Tank: The Food Think Tank

The United States is one of the world's biggest users of water—many Americans use as much water as approximately 900 Kenyans. As a result, water resources in the U.S. are shrinking. In the last five years, there have been water shortages in almost every part of the country, including the worst drought in at least 25 years, which hit 80 percent of the country's farmland in 2012. Even worse, the damaged land won't fully recover this year, and at least 36 states are expecting local, regional, or statewide water shortages, even without drought.

The Natural Resources Defense Council expects water scarcity to affect the American South, West, and Midwest the most. Fourteen states in these regions already have "extreme" or "high" risk of water scarcity. Arizona, Florida, Idaho, Nevada, and Texas face the most danger because they are expected to see some of the largest increases in population by 2030. Water scarcity is about more than lack of water, it's about lack of drinkable water. It is estimated that as many as 53.6 million Americans have contaminated tap water.

But as eaters and consumers, we can profoundly reduce water waste and water consumption through the food choices we make. Recent research from the Barilla Center for Food & Nutrition shows that a healthful diet and environmentally sustainable diet can go hand in hand.

Here are five steps to save water in the United States:

1: EAT LESS MEAT

Eating a little less meat. Switching from a meat-centered weekly menu to a diet rich in vegetables and grains could save 2,500 liters of water a day! And eating grass-fed and locally raised meat, eggs, and dairy products can also save water.

2: STEAM VEGGIES

Steam veggies instead of boiling. In general, steaming vegetables uses less water than boiling, and according to a study in the Journal of Food Quality, it is more nutritious. For example, boiling corn on the cob in a large pot may use 6-8 quarts of water, where¬as steaming only uses 1-2 quarts. If you must boil, save the water for your garden, soup stock, or use it to clean pots.

3: SUPPORT FAMILY FARMS

Provide support for small-scale, family farms. Agricultural subsidies in the U.S. disproportionately support large-scale agribusinesses over the small-scale producers who are more likely to be engaged in sustainable food production, and may be challenged by drought or commodity price fluctuations. Changes in government sup¬port services could reduce this deficit and improve food and water security.

4: STREAMLINE WATERING GARDENS

Streamline water use in home gardens. During the summer months, the U.S. Environmental Protection Agency (EPA) reports that nearly 40 percent of household water is used for watering lawns and gardens. National Geographic suggests incorporating native plants into your garden that are adapted to the local climate and often require less water. Manually watering plants, instead of using automatic sprinklers, cuts water use by 33 percent, according to a report by the EPA. Consumers can also buy self-watering planters, or construct rain barrels that can save you up to 1,300 gallons of water.

5: WASTE LESS

Reduce food waste. The U.N. Food and Agriculture Organization reports that nearly one third of all food produced for human consumption is wasted throughout production, storage, transportation, consumption and disposal. Learn about your food's shelf life and how long you can store food in your freezer. Other ways to reduce food waste are only buying what you plan to eat, using leftovers to create new meals or donating food you can't use to soup kitchens.

It's more important than ever that Americans find ways to save every drop.

Editor's note: Danielle Nierenberg is a food and agriculture expert and co-founder of Food Tank: The Food Think Tank (www.FoodTank.org).

Reprinted from OnTap, Volume 13, Issue 2, Fall/Winter 2013.

DID YOU KNOW?

A recent report from the United Nations says a staggering 1.3 billion tons of food is wasted per year, causing major economic losses and causing significant harm to natural resources. Food waste adds 3.3 billion tons of greenhouse gases to the planet's atmosphere and uses a volume of water equivalent to the annual flow of Russia's Volga River.

Visit www.unep.org to find out more.

News From The Foundation

Hydrogeology: Water for the World Set to be Trial Event

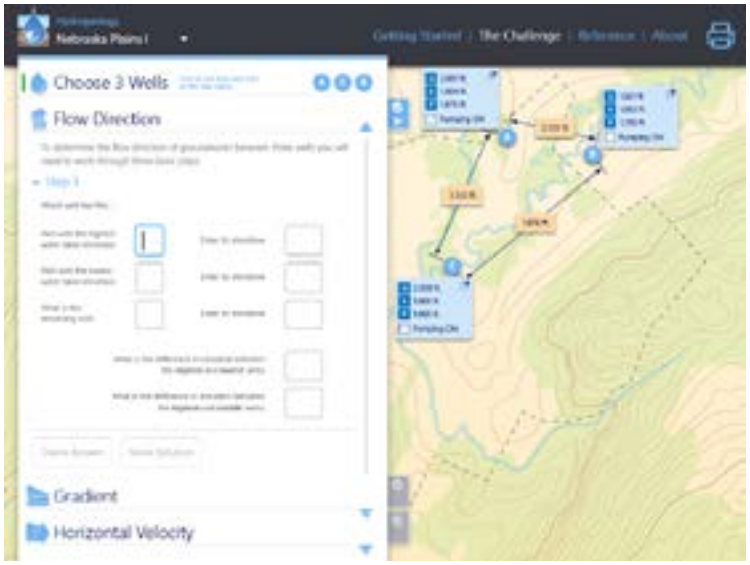
Science Olympiad is one of the premier science competitions in the United States. It allows students the opportunity to compete in many different science events from all fields of science. In the past, The Groundwater Foundation created an event for middle school competitions known as Awesome Aquifers. The success of Awesome Aquifers inspired a new event, Hydrogeology: Water for the World, which is currently being developed specifically for high school competitions.

Hydrogeology: Water for the World requires students to use their critical thinking skills along with an online groundwater modeling learning tool known as The Hydrogeology Challenge to determine a possible remediation solution to a groundwater contamination scenario. Students must also complete a basic question-answer portion of the event that requires them to have knowledge about groundwater basics, conservation, and preservation. In this way, Hydrogeology ensures students and teachers, upon completion of the event, are not only knowledgeable about groundwater and basic computer modeling, but they also have an understanding of what they as individuals can do to protect and conserve groundwater.

In the spring of 2013, Hydrogeology: Water for the World debuted at the Nebraska Science Olympiad State Tournament. In the spring of 2014, Hydrogeology: Water for the World will be a trial event at several regional and state tournaments in Nebraska and across the country.

Want to learn more? Check out http://www.groundwater.org/SO.html.

Hydrogeology: Water for the World is funded by the Nebraska Environmental Trust, Nebraska Department of Environmental Quality, Olsson Associates, J.A. Woollam Foundation, and Kansas Association for Conservation & Environmental Education.



▲ *Screen shot from the groundwater modeling software being developed as part of the Hydrogeology: Water for the World Science Olympiad event. Students will use the software to address groundwater contamination scenarios.*

Groundwater Moves...and So Is The Groundwater Foundation!

We're moving! The timing is perfect to set the stage for the Foundation to have another 30 years of impact. We are in the midst of launching two new youth education programs – a new event for Science Olympiad and a new water curriculum for Girl Scouts. The new office space will provide space to train educators and leaders on utilizing the programs. With the right equipment and technology, we will also be able to conduct satellite trainings.

In order to make this move possible, a Move Groundwater fundraiser is currently underway. A generous donor is matching all donations with a $10,000 gift. If you would like to help make "groundwater move" and have your dollars doubled visit www.groundwater.org/move.html for more information!

We look forward to seeing you or serving you from our new offices! Our new address is 3201 Pioneers Blvd., Ste. 105, Lincoln, Nebraska, 68502.

Mark Johnson Elected to Groundwater Foundation Board of Directors

The Groundwater Foundation is pleased to announce the addition of Mark Johnson, Associate Director of Environmental Programs for the Golf Course Superintendents Association of America (GCSAA) to its Board of Directors. Mark manages the Golf Course Environmental Profile, Rounds 4 Research, Environmental Leaders in Golf Awards, and various sustainability initiatives for the GCSAA.

Mark has more than 30 years of experience in outdoor recreation, wildlife and natural resource conservation and protection with the GCSAA, Kansas Department of Transportation, Rocky Mountain Elk Foundation and Kansas Department of Wildlife and Parks. He is currently chair of the Lower Kansas River WRAPS' (Watershed Restoration and Protection Strategy) leadership team which has given him first-hand knowledge of the water issues facing Kansas.

"Mark brings a wealth of knowledge to The Groundwater Foundation Board," said Jane Griffin, Groundwater Foundation President. "We have worked with Mark for several years on our Groundwater Guardian Green Sites program and I look forward to having his experience and talent on the Board."

Mark cites Theodore Roosevelt's quote "Far and away the best prize that life has to offer is the chance to work hard at work worth doing" as his favorite quote. Hopefully his work with The Groundwater Foundation will afford him that prize.

The Groundwater Foundation's Board of Directors is comprised of experts, industry leaders, community activists, legal experts from across the U.S. – the common denominator among them is their passion and interest in protecting and conserving groundwater for future generations.

the AQUIFER
A PUBLICATION OF THE GROUNDWATER FOUNDATION

The Aquifer
Winter 2013/2014
Volume 28, Number 3

***The Aquifer* is published quarterly by:**

The Groundwater Foundation
P.O. Box 22558
Lincoln, NE 68542-2558
Phone: 402-434-2740
E-mail: info@groundwater.org
Web: www.groundwater.org

The Groundwater Foundation is a nonprofit educational foundation dedicated to educating the public about the conservation and protection of groundwater.

***Aquifer* Staff:**

Editor:
Jennifer Wemhoff
jwemhoff@groundwater.org

Design & Illustration:
Carla Otredosky

Editorial Contributors:
Cindy Kreifels
Jane Griffin

♻ Please consider the environment before printing.

Get Social with The Groundwater Foundation!

Membership, Materials and Publications Order Form

ITEM	PRICE	QTY	AMOUNT
Groundwater Foundation Memberships Ripple Creator .....$35-$74 Big Splash Supporter.....$150-$249 Groundwater Defender.....$500-$999 ☐New Membership ☐Renewal Your contribution as a Groundwater Foundation member helps support the Foundation's educational programs. You will also receive *The Aquifer*, a 10% discount on all Foundation Catalog products, and reduced registration fees to all Groundwater Foundation events. Visit www.groundwater.org for more information.			
Awesome Aquifer Kit Build your own working aquifer model! Includes instructions for six advanced groundwater demonstrations.	$36.00 10 or more at $34.20		
Circles of Fun Teach audiences of all ages to appreciate water use and food production with fun hands-on activities. CD-ROM.	$19.95		
Making A Bigger Splash: A Collection of Water Education and Festival Ideas Hands-on activities, games and science experiments.	$16.45		
Rainmakers: A Photographic Story of Center Pivots Center pivots are used world-wide to bring food to our tables, over 100 intriguing photos enable readers to view the beauty and marvel of this unique technology. Great gift idea.	$24.95		

NAME

ORGANIZATION

ADDRESS

CITY STATE ZIP

DAYTIME PHONE

EMAIL ADDRESS

CHARGE MY: ☐VISA ☐MASTERCARD ☐DISCOVER ☐DINERS CLUB

CARD # EXPIRES

3-DIGIT CVV / SIGNATURE OF CARDHOLDER

ENCLOSED, PLEASE FIND: ☐CHECK ☐MONEY ORDER

Send completed order form and payment to:
The Groundwater Foundation,
P.O. Box 22558, Lincoln, NE 68542-2558

Shipping and Handling Charge Table (continental U.S. only)

Total Price of Items	Shipping Charge
$0.00 - 18.00	$7.00
$19.00 - 50.00	$15.90
$51.00 - 100.00	$29.50
$101 and greater	17% of total order price

Subtotal/Order Price:
Groundwater Foundation members, don't forget to subtract 10% from the subtotal for your member discount. Sorry, discount cannot be used on Foundation memberships (new or renewal).

Shipping & Handling:
*See table below at left. *Please call 402-434-2740 for orders shipped outside of the continental U.S.*

Sub Total:

Sales Tax:
Nebraska residents 7%.

Total Amount Enclosed: