

# THE AQUAETERIAN

## In This Issue:

### President's Corner:

Busy and Grateful  
Pg. 1

### Feature Article:

What is a Quantitative Risk  
Assessment?  
Pg. 2-3

### Project Spotlight:

Asbestos Inspection and Demolition  
Pg. 4

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## Hot Topics

**AquAeTer** is taking an active role in assisting our clients with solutions to engineering and scientific questions in ways that are consistent with the economic, environmental, and societal pillars of sustainability. Our technical staff is trained in the Carbon Exchange programs and Life Cycle Assessments that can help American industries maintain a sustainable future on American soil while maintaining our strategic resources. For more on this subject please visit [www.aquaeter.com](http://www.aquaeter.com).

## THE PRESIDENT'S CORNER

**Sumus actuosus et gratus**  
"We are busy and grateful"

**AquAeTer** has acquired several new projects and has a very busy staff. In the Denver office, Steve Wampler and Cathryn Stewart were awarded a project for groundwater and landfill gas monitoring/reporting for seven Waste Management landfills in Colorado. Their office also has several other projects with Waste Management. Chris Bolin, Steve Smith and Terra Plute continue their work with the Treated Wood Council on Life-Cycle Assessments of treated wood products. Chris presented an update to TWC and WWPI in February. In the Brentwood office, Amanda Klink continues to provide timely Phase I ESAs and NEPAs for cell tower sites. She has recently been awarded cell tower markets in Fort Smith and Pine Bluff, Arkansas; Macon, Georgia, while continuing work in Charlotte, North Carolina; Knoxville and Nashville, Tennessee; and Baltimore/D.C. area. John Michael Corn and his crew of Miriam Sielbeck, Amanda Klink, Amanda Safford, Todd Olsen, and Trey Lewis completed a Total Maximum Daily Load (TMDL) study of the Conecuh/Escambia River for Georgia-Pacific. They will be tackling the Tombigbee River this summer. Pam Hoover and Paul Marotta have been preparing an air permit for Stella Jones/Burke-Parsons-Bowlby. Christopher Green has been busy with several brownfield sites for retail use in Louisiana, Mississippi, Tennessee and North Carolina. Josh Kelley has completed several asbestos abatement projects in Tennessee, Mississippi and North Carolina.

The Denver office has added Sarah Gelsinger, Environmental Scientist and the corporate office added Contessa Miller, Accounting Assistant, in the fall of 2008. In this issue, Steve Wampler presents a Quantitative Risk Assessment of the Western New York Nuclear Service Center, aka West Valley Site. Also, Joshua Kelley writes about an asbestos abatement project that involved the demolition of an out-of-date retail site in order to allow for redevelopment of a new retail center. Joshua is a certified AHERA asbestos inspector and contractor supervisor. Congratulations to Wes Eckenfelder, who has published his 4th edition of "Industrial Water Quality" along with co-authors Davis Ford and A.J. Englande. It is available through McGraw-Hill and the book was sponsored by WEF at the 2008 conference.

Our employees have been blessed with some new additions to the **AquAeTer** family. Sarah Gelsinger had her first child, Landon; Christy Lewis welcomed her first child, Sarah; Chrisie Brown has recently added Asher as a playmate to her first child, Sophie; Joshua Kelley welcomed Hudson as a playmate to his first child, Harper; Christopher Green added his second child, Madison as a playmate to his first child, Kayla; and John Michael Corn has added Landon as a playmate to his big sister, Addie. We are grateful to have a wonderful group of professionals and wonderful families, who make it all worthwhile.



Annual Greenhouse Party - March 14, 2009

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## WHAT IS A QUANTITATIVE RISK ASSESSMENT?

Dr. B. John Garrick, past President and Fellow of the Society for Risk Analysis, and Dr. Stan Kaplan, SRA Fellow, in “On the Quantitative Definition of Risk” (Risk Analysis, 1981) addressed the concept of “quantitative risk assessment” as a means to provide a quantified estimate of the likelihood that identifiable types of events, ranging from common and expected to rare and unexpected, will disrupt a physical system in a manner that could impact persons or the environment. During 2008, **AquAeTer**, and specifically Steve Wampler, John Michael Corn, and Miriam Sielbeck, had the distinct pleasure and honor of working with Dr. Garrick and nuclear risk experts, John Stetkar and Thomas Potter, to conduct a Quantitative Risk Assessment, or QRA, for the State-Licensed Radioactive Waste Disposal Area at the Western New York Nuclear Service Center (WNYNSC), also known as the West Valley Site.

The 15-acre State-Licensed Disposal Area, or SDA, includes 14 “closed” landfill cells where low-level radioactive wastes were disposed during the period between 1966 and 1972 when the 3,300-acre West Valley Site was the location of a commercial nuclear fuel reprocessing and radioactive waste management facility. Most of this rural site, located in the scenic forested hills of western New York, south of Buffalo, now is undergoing evaluation and remediation under the auspices of the U.S. Department of Energy. The New York State Energy Research and Development Agency (NYSERDA) is a participant in the evaluation and remediation process, and is responsible for management of the 15-acre SDA.

Under NYSERDA management since the mid-1970s, the SDA landfill facility has been placed in a stable and closely monitored condition while the State and its contractors evaluate methods for final and permanent closure. During 2008, NYSERDA determined that it desired to continue to manage the SDA in a stable, but not permanently closed, configuration for at least 30 more years to allow development of an optimum method for final closure. At numerous facilities across the U.S. and around the world, methods for remediation and restoration of facilities similar to the SDA are being conceived of, developed, tested, applied, modified and improved. Delayed SDA closure will allow NYSERDA to consider and make maximum use of advances in remediation and restoration technologies that are expected to occur before 2038. On the recommendation of a distinguished Independent Expert Review Team, NYSERDA made the decision to conduct the QRA to evaluate the radiation risks to the public over this 30-year delayed closure time period.

The fundamental elements of the QRA process are consideration of the “triplet” definition of risk, which includes:

- What can go wrong?
- What is the likelihood that this will happen?
- What are the consequences of this happening?

The QRA considered two categories of potential human receptors who might be impacted by the continued presence of the SDA.

- A transient (temporary) recreational hiker/hunter who walks the stream valleys between the SDA and the downstream WNYNSC boundary, and
- A resident (permanent) farmer located at the downstream WNYNSC boundary.

The QRA focused on potential releases of radioactive liquids and solids, and examined a wide range of potential natural and human-caused conditions that could cause or contribute to such releases. These conditions, or threats, were grouped into two general categories.

- **Disruptive Events** - unexpected events that cause an immediate change to the site; such as severe storms, tornadoes, earthquakes, fires, and airplane crashes.
- **Nominal Events and Processes** - expected events and natural processes that evolve continuously at a rate that can be quantified, and that can be constant or can change over time – such as, groundwater flow, slope subsidence and failure, and the aging and deterioration of engineered and natural systems.

As a member of the QRA Team, **AquAeTer**'s primary areas of contribution were in areas of “what can go wrong” (failure scenarios) and “what are the consequences” (radionuclide transport), and specifically to consider some of the failure scenarios that are “nominal events and processes.” More specifically, **AquAeTer** was asked to assist with quantification of three failure and radionuclide transport mechanisms.

**Mechanisms and consequences of releases to groundwater.** Groundwater movement, though slow in the low permeability glacial till clays in which the SDA trenches were constructed, does occur and is quantifiable, as is the transport of radionuclides moving in groundwater away from the SDA trenches. **AquAeTer**, working with SDA Team member Tom Potter and IERT members, Dr. Shlomo Neumann of the University of Arizona and Dr. Peter Swift of Sandia Laboratories, did simple numerical modeling of groundwater and radionuclide movement along a variety of shallow and deep pathways from SDA trenches to discharge points along area surface-water streams.

**Mechanisms and consequences of slope failures.** Though stable under normal conditions, stream-valley slopes in glacial tills bounding the SDA on two sides could become unstable and fail under unlikely, but quantifiable, ground-motion



Aerial View of State Disposal Area

caused by earthquakes. **AquAeTer** modeled hundreds of slope failure scenarios that could cause breaches in disposal trench caps and walls. Though extremely unlikely because of the relative seismic stability of western New York, seismic events that could cause failure were quantifiable, as was the volume of disposal trench material that such slope failures could expose to the environment and then to conditions that could move those released materials toward receptors.

**Mechanisms and consequences of releases to surface water.** The nominal release mechanisms of groundwater movement and slope failure, as well as other nominal and disruptive events, could place liquids and solids in surface-water streams valleys near the SDA. **AquAeTer**, using USACE flow and transport models, determined flows and estimated sediment transport in the several streams draining the SDA and WNYNSC area. Flows and sediment transport were determined for precipitation conditions ranging from very likely storm events, such as a 2-inch rainfall, to the extremely unlikely case of a 25-inch PMP (probably maximum precipitation) event.

The QRA confirmed that the risk to human receptors, considering the full spectrum of nominal and disruptive release events, is well below widely accepted radiation dose limits. With extremely high confidence, the QRA determined that members of the public would be exposed to unacceptably high radiation doses far less often than even one time during the 30-year period. More simply stated, the QRA determined that a release with such consequences is extremely unlikely during the next 30 years. In fact, the QRA determined that the SDA site, if maintained in its current state in perpetuity, might be expected to experience this type of event only once in nearly 500 years.

The QRA Report can be viewed at: <http://www.nyscrda.org/publications/sdaqquantitativetiveriskassessment.pdf>

How might the QRA approach be applicable to your facility or situation? Such an approach might have applicability to any situation where quantification of long-term risk to human health or the environment is necessary to convince regulatory agencies or members of the public of the appropriateness of a temporary or final closure plan for a contaminated site or facility. **AquAeTer** would welcome the opportunity to discuss QRA applicability with you.

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Mr. Wampler is Vice President and Director of Engineering for **AquAeTer**. Based in Denver, Colorado, he works as a principal geological engineer and hydrogeologist responsible for corporate quality assurance, strategic planning, and project technical oversight and review. He



has over 30 years experience in engineering geology, hydrogeology, geotechnical engineering, and environmental consulting, with much of that experience dealing with the management of solid, hazardous, and radioactive waste materials and response to releases of hazardous and radioactive constituents into the environment. His municipal solid waste and hazardous waste landfill experience includes permitting, design, construction, environmental monitoring, closure, and post-closure care. He holds B.S. and M.S. degrees in Geological Engineering from the Missouri University of Science and Technology (formerly, Missouri School of Mines) and is a registered Professional Engineer and Professional Geologist in several states.

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Mr. Kelley received a B.S. in Environmental Biology from Tennessee Technological University in 2005. He joined **AquAeTer** in 2007 and has more than three years of environmental and biological research and project experience. He has worked in both laboratory and field settings on projects, including aquatic macro-invertebrate sampling, fisheries surveys, and botanical cataloging. He has experience in Phase I Environmental Site Assessments, wetland delineations, and water

quality studies. Mr. Kelley has also performed numerous asbestos inspections, industrial hygiene sampling events, construction pay application inspections, and lead-based paint inspections. He is a certified AHERA asbestos inspector and a certified AHERA asbestos contractor supervisor.



## ASBESTOS INSPECTION AND DEMOLITION

**AquAeTer** was contracted by a real estate developer to conduct a Phase I Environmental Site Assessment (ESA) for a property located in Monteagle, Tennessee. The client was interested in acquiring the property for re-development as a retail pharmacy, which required the demolition of the existing on-site structures. Based on the client's demolition plans and **AquAeTer's** Phase I ESA recommendations, a pre-demolition asbestos survey was performed in conjunction with the Phase I ESA. Under current enforcement of the U.S. Environmental Protection Agency (USEPA) National Emission Standards for Hazardous Air Pollutants (NESHAPs), the Tennessee Department of Environment and Conservation (TDEC) Air Pollution Control (APC) requires a thorough inspection of all commercial, industrial, educational, and public buildings for the presence of asbestos prior to any demolition or major renovation activities.

During the Phase I ESA and asbestos survey, **AquAeTer** identified multiple asbestos containing materials (ACM). Additionally, one building on-site was so significantly damaged that, our personnel were unable to survey the building because of safety concerns. Following the completion of the Phase I ESA and asbestos survey reports, **AquAeTer** was contracted to coordinate the abatement and appropriate disposal of all ACM.

According to the USEPA NESHAP for asbestos, all buildings must be thoroughly inspected for the presence of asbestos prior to demolition. Since one building on the property was not surveyed for safety concerns, **AquAeTer** contacted the building inspector of the City of Monteagle, Tennessee to request a letter confirming that the building was structurally unsound and unsafe to enter. This approval would allow the project team to move forward with planning the appropriate demolition of the specified building. The demolition of the building would be conducted according to TDEC APC's Demolition Guidance for Structurally Unsound Buildings.

Upon receipt of the building inspector's correspondence confirming the condition of the unsurveyed building, and after securing the necessary



Preparation for Asbestos Abatement

qualified environmental contractors, **AquAeTer** filed the required notification forms with TDEC APC. **AquAeTer** scheduled the demolition of the structurally unsound building and the asbestos abatement to occur simultaneously, subsequent to TDEC's approval, in order to expedite the completion of the project. As a result of our continued contact with the client, subcontractors, and state regulators, the client was able to begin the site preparations for the new development immediately following the completion of the abatement and demolition activities.

**AquAeTer's** extensive experience with real estate re-development projects allowed us to save time and money for this client throughout this re-development project. In this case, our staff's knowledge of the regulatory requirements for demolition allowed the client to save both time and money by performing an asbestos inspection in conjunction with the Phase I ESA, as well as, avoidance of potential penalties or legal action as a result of an unauthorized demolition.

To learn more about our Phase I ESAs, Phase II, and asbestos projects, please contact Mr. Kelley by e-mail at [jkelly@aquater.com](mailto:jkelly@aquater.com) or call 615-373-8532.