

The GEI

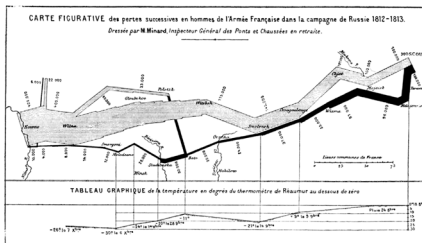
MGP Reporter

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Modeling and Visualization

Andrew Adinolfi (MODFLOW), Kristen Ponak (GIS), Brian Skelly (EVS), GEI Consultants, Inc.

In 1869, the Frenchman Charles Joseph Minard drew a map of Napoleon's March to and from Russia in 1812 and 1813. The map included many variables: Napoleon's route, the number of troops, air temperatures along the return route. Minard's map clearly and immediately illustrated how Napoleon's army was weakened by the war and decimated by the cold.



Environmental consultants are challenged daily to graphically present data that deftly communicate the effects of environmental impacts. Simple, clear report writing can enhance the graphics, but limitations remain. For example, paper graphics intended to support visualization of three dimensions are forever frozen in two dimensions, without realistic visual cues or landmarks that provide perspective and easily orient the viewer.

Data presentation tools have evolved since Minard's day. These tools graphically animate data and information and there are systems that build and store multiple layers of interactive data. These tools and their outputs dramatically improve understanding when sharing results with site owners, regulators, and the public.

Geographical Information Systems (GIS)

Maps have always been crucial tools for understanding our world and finding our way through it. They have evolved from hand-drawn, paper maps (Minard style, where a small revision required creation of a new, hand drawn map) to Geographic Information Systems (GIS), developed by ESRI (Redlands, California). A GIS can conduct spatial analyses, generate statistics, interpolate surfaces, and print figures that display these attributes. A GIS can also provide interactive web maps where data are stored, edited, and enhanced in real-time, all while sharing with others via the internet.

In general, a GIS is developed with layers of information. The information can consist of almost any quality or attribute: topography,

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ground cover, surface water locations and quality, geology and soil quality, hydrology and groundwater quality. Basic uses include storage of layers of information such as boundaries, historic structures, monitoring wells, boring locations, and sample locations. Data and information generated at all of these locations or features is linked and locked to the locations and features. At MGP sites, GIS can be applied to quantify and visualize contamination, help analyze and understand subsurface features, and store many years' worth of investigation data in one location.

Real-time interaction with the layers and attributes can reveal correlations, contrasts, or random characteristics that in the past may have required endless page turning and a sharper than average memory. Double-click on a well to access the boring log, the well construction log, a photograph of the well, two rounds of analytical data, or water levels. Double-click a historic gas holder to access the years it was present and the associated gas production records.

A GIS supports understanding of site characteristics by its ability to:

- Connect to environmental databases (EQ-UIS, gINT, Access) so that changes made in databases are reflected in GIS.
- Overlay multiple layers of information to analyze data trends (or lack thereof), in relation to geology and groundwater flow.
- Provide new deliverable options: GIS exports interactive pdf documents or data can be accessible to anyone via a web-based interface.

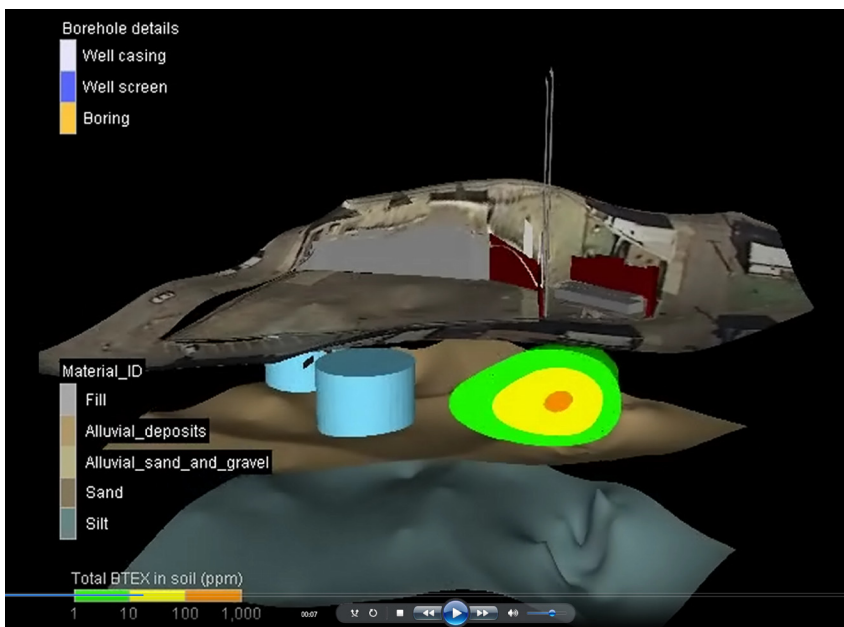
Environmental Visualization System (EVS)

The Environmental Visualization System (EVS), created by C Tech Development Corporation (Kaneohe, Hawaii) depicts physical data with three-dimensional graphics. The graphics can be animated for automatic viewing, or saved as "4DIM" files that can be manipulated on a computer monitor (or projected to a screen) in endless ways: zoom in and out, reorient to different viewing angles above or below the ground surface, chose slices or cross-sections for viewing. Aerial photographs can be draped over the site to assist in recognition. Features such as buildings, trees, and gas hold-

ers can be inserted at scale, in three dimensions. Analytical data can also be displayed in quantitative or symbolic fashions. EVS is a powerful medium to depict MGP impacts in a more intuitive framework.

Before three-dimensional graphics were available, practitioners developed and interpreted plan view and cross-section drawings to characterize the nature and extent of contaminants. For practitioners that approach has worked fine for years, but for a non-technical viewer, the gaze goes quickly to glaze. With EVS the two-dimensional conceptual model comes to life. Instead of flat plan views and cross-sections spread across the conference table, a single color image integrates and summarizes the relevant site information. Fortunately, development costs have fallen dramatically over the last few years. The most striking aspect of EVS graphics is palpable: the audience "gets" it. Once that happens, explaining proposed remedial options is simpler.

A brief animation of one of our models can be viewed [here](#). The animation presents a site, the former holder foundations and BTEX impacts in soil. Please allow a moment for the animation to load.



MODFLOW

How did meteorologists know the possible tracks Hurricane Irene might take? They were predicted by a computer model using a wide range of climatological and geographic data as inputs. A model can be similarly employed to predict behavior of groundwater, and expected improvements following remediation.

Editorial

Why Attend MGP 2012?

John Ripp, GEI Consultants, Inc.

GEI and its partner organizers are hosting the 4th International Symposium and Exhibition on the Redevelopment of Manufactured Gas Plant sites (MGP 2012) in Chicago next March. Attendance requires time, energy, money, and setting aside other commitments to deal with two-and-a-half days of MGP tech transfer. Why bother? Wouldn't it be easier via internet or conference proceedings? Besides, Chicago in March! Are you kidding?

As with all ventures, you only benefit from what you put into it. MGP conferences are one of the few ways to renew relationships, exchange stories, and simply have a good time with people who know what a relief holder is. Chicago is a great city no matter what time of year it is - the Palmer House is close to some of the best restaurants and museums in the country.

There will be plenty of familiar faces and accomplished new practitioners. The agenda is free of sleeping pills, particularly around 2 p.m. The presentations are fresh and provide a lesson or valuable idea. They are mixed in with a series of moderator-directed panel discussions which can be lively and controversial at the same time.

Some attend these meetings for an education, while others seek out new business opportunities. With an attendance of about 275 I believe both will happen. But the best reason to attend MGP 2012 is to drop email and cell phones for a while and exchange ideas with fellow practitioners face-to-face.

MGP Reporter

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The GEI MGP Reporter is a quarterly newsletter covering selected environmental issues in the electric and gas industry. The newsletter staff welcomes articles and comments from members of the industry. When contractor and/or vendor names are listed anywhere in this publication, it is for information only and does not imply any endorsement whatsoever on the part of GEI or its co-sponsors.

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Web Finds

Coal tar has a Facebook page (<http://www.facebook.com/page%ADes/Coal-tar/111314075563096#!/pages/Coal-tar/111314075563096>)

The author/owner is not apparent, but does appear concerned about the driveway sealer issue mentioned in Newsbriefs on page 5.

At a website known as wiseGEEK (<http://www.wisegeek.com/what-is-coal-tar.htm>) you'll be glad to discover, after all these years, that coal tar can have a "pleasing" scent. We've been waiting a long time for someone to say it.

Remediation of a former MGP located at a public housing complex was recently completed. It took just 15 months to develop the removal action work plan, complete pre-design investigation, generate the remedial design, and conduct the removal. For more on the project go to: http://www.epaos.org/site/site_profile.aspx?site_id=4134



MGP 2012

Fourth International Symposium and Exhibition on the
Redevelopment of Manufactured Gas Plant Sites

Register Now!
With Discounted
Early Registration
Fees until 1/5/12

Government Rate
also available!

Hotel Reservation
Deadline: 2/27/12



Abstracts are due September 30, 2011
Click [HERE](#) to submit your abstract.

MGP 2012 Sponsors



Platinum & Gold Sponsors as of 08/31/2011

Chicago Illinois

Chicago skyline photo by Buphoff/Wikipedia.
(Creative Commons)

March 27-30, 2012

MGP 2012 will be held at the
iconic, downtown and historic
Palmer House Hilton Hotel.



Newsbriefs

We've had several newsbriefs describing the ban of coal tar-based driveway sealers in several cities and states. Well, we missed a few. In 2007 Home Depot and Lowes decided to phase out driveway sealers that contain coal tar. In 2009 the Minnesota legislature passed a bill restricting state agencies from purchasing "undiluted" coal tar based sealants. We have not been able to determine exactly what they mean by "undiluted". It is apparent, however,

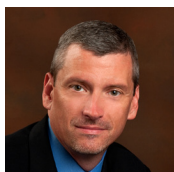
that this action influenced several Minnesota communities to follow suit: Centerville, Circle Pines, Maplewood, New Hope, Prior Lake, Roseville, Vadnais Heights, and White Bear Lake. Bee Cave, Texas has also joined Austin in banning the use of coal tar based driveway sealers. Washington DC banned the sealers in 2009, as well. In June of this year Suffolk County, New York enacted a ban.

Announcing

GEI Consultants Opens Offices in Southeastern US

BOSTON, Mass. — August 2, 2011— GEI Consultants, Inc., one of the nation's leading geotechnical, environmental, water resources, and ecological science and engineering firms, announced today that it has opened offices in Atlanta, Georgia and Raleigh, North Carolina to better serve existing and new clients, markets, and opportunities in the region. GEI has hired twelve local professionals in advance of the office openings on August 1, 2011. Key contact and office location information is provided below.

“Over the past decade GEI has generated over \$20 million in fees in Southeastern states supporting a host of clients on dozens of geotechnical, environmental and water resources-related projects,” says Francis D. Leathers, P.E., president of GEI. “By opening offices in Atlanta and Raleigh, GEI is better equipped to support existing and new clients with well regarded local technical professionals. These individuals are in turn supported by other nationally recognized experts in a variety of specialties within geotechnical and environmental engineering, water resources planning and engineering, and ecological science.”



Scott Keating joins GEI as vice president with responsibility for Southeast operations, and branch manager of the Atlanta office. He has more than 25 years of experience in environmental engineering and consulting and is considered an expert in environmental and remediation services applied to freight and transit rail, former manufactured gas plant (MGP) sites, and a variety of energy, industrial and institutional settings. His transportation experience includes 20 years of program and project management and technical problem solving on dozens of freight and transit rail projects involving petroleum fuels, metals, chlorinated solvents and PCBs. His MGP and traditional environmental experience supplements GEI's well-established practices.

“GEI has a strong national reputation for excellence in the fields of environmental remediation and engineering in addition to its equally well regarded geotechnical, water resources and ecology practices. Though GEI has worked with clients in all Southeastern states for many years, it is exciting to help launch our physical presence,” says Keating.

Joining Keating in Atlanta are Jamie Laubenthal, senior program manager, Jason Broshear, environmental geologist/project manager, Andrea Brazell, database specialist/project manager, and Lesley Gastwirth, environmental scientist.



GEI's Raleigh, North Carolina office will be managed by Christopher Bradley, P.E., an environmental engineer with 16 years of experience in the environmental consulting industry. He comes to GEI with a strong track record in environmental remediation, design, and implementation for a broad range of clients in the Southeastern U.S. with a focus towards MGP utility and rail transportation clients on soil, sediment, and groundwater remediation projects. “Being a mid-sized, employee-owned firm supports close client contact and presents exciting opportunities to integrate our collective national expertise on a local level. It also offers an attractive culture for our new staff.” He is joined in the Raleigh office by senior environmental project managers Mark Westray and Paul Jansen; remedial design engineers Currie Mixon, P.E., and Jon Williams, P.E.; and geologists Wes Sterling, P.G. and Brooke Bennett.

M. Lorraine White Joins GEI Consultants

SACRAMENTO, Calif.— September 19, 2011 — GEI Consultants, Inc., one of the nation's leading geotechnical, environmental, water resources, and ecological science and engineering firms, announced today that M.Lorraine White has joined the firm

as Water-Energy Program Manager. To this role, Ms. White brings twenty years of experience in energy and water resources development, enhancement and conservation to help GEI's clients develop and implement sustainable strategies that lie at the intersection of water, energy and climate.

Ms. White reports to Ms. Laurie Park, leader of GEI's Sustainability Practice. “Through her ground breaking work for the state of California, Lorraine is recognized nationally as the impetus behind California's water-energy initiative, an unprecedented effort to overcome regulatory, market and policy barriers to harvest the multiple value streams that can best be achieved through integrated management of the state's water and energy resources and infrastructure. We are excited about being able to share her visionary insights with our clients.”

Prior to joining GEI, Ms. White served as the state Energy Commission's lead on California's water-energy nexus, representing the commission in regulatory policy deliberations at the California Public Utilities Commission, the Department of Water Resources, and the Water Energy Sub-Team of the Governor's Climate Action Team. She has also helped the state develop and implement a wide variety of resource efficiency, environmental protection and clean energy development policies. In 2007, Ms. White led a complex stakeholder process to produce the biennial Integrated Energy Policy Report that informs the Governor, the Legislature and other policymakers about the current and future state of energy in California.



Ms. White received a bachelor of science degree in biochemistry from the University of California at Davis. A Fellow of the California State Legislature, she is also a Founding Member of The Association of Women in Water, Energy and Environment. She will be located in GEI's Sacramento office.

Modeling and Visualization (continued from page 2)

MODFLOW (United States Geological Survey, 1988) solves groundwater flow partial differential equations using regional and site hydrogeologic information as inputs. The model is calibrated to known conditions and relationships such as water table elevations and contaminant concentrations. A remedial system such as groundwater extraction, groundwater cutoff, or capping can then be simulated in the model to predict the potential effectiveness of such systems at meeting remedial objectives. To design the groundwater model, GIS can be used to compile and store site and regional information, and to identify trends and patterns that need to be in the model. For example, groundwater elevation contours can be superimposed over subway locations, to assess whether pumping from the subway tunnel may influence groundwater flow.

MODFLOW output is a powerful tool to assist in making key decisions in remedial feasibility studies and design. Output can include comparisons of the predicted reduction in offsite groundwater flow versus cutoff wall length or depth (and estimated costs). MODFLOW is also used to produce 3D depictions and animations of complex groundwater flow regimes that may drive remedial decisions at MGP sites. Uncertainties can also be incorporated in the model as a safety factor for final design.

A Better Understanding

Modeling and visualization software share data through import and export tools. While each software tool has its strengths, the combined passing of data between them can facilitate understanding of the site. Interoperability allows data mining from each piece of software. And since each piece of software has its own rules for data input, data control is achieved.

All site data that may be used for modeling should be managed in tandem with location data so that it can be mapped in a relevant plane and made available to other software programs. If the data are managed well and tied to the appropriate reference system, reporting and communication are improved.

Traditionally, a report and two-dimensional figures were the main tools for communication. These have been enhanced by color and are understandable to technical professionals, but they lack broader dimensionality and “feel” and they may alienate laypeople. The classic adage “garbage in, garbage out” still applies, so the accuracy of field data must be confirmed and site knowledge is required. But when all the pieces come together GIS, EVS, and MODFLOW provide tangible views of simulated but understandable surroundings.

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