OKI GROUNDWATER COMMITTEE  
June 5, 2013 - 10:00 AM  
OKI Board Room  
720 East Pete Rose Way (at the corner of Eggleston Avenue)*

AGENDA

1. Welcome/ Introductions

2. Announcements

3. Update on Local Groundwater Management Efforts  
   Rick Fueston, Scott Kirk, Tim McLelland, Ken Shearwood

4. OKI Staff Update

5. The Recr8 Application & Website: A One-Stop Resource for Ohio River Conditions  
   Laith Alfaqih, Metropolitan Sewer District of Greater Cincinnati

6. Underground Infrared Sensing and Leak Detection: A Case Study  
   Dave Crouch, City of Fairfield

7. Other Business

ADJOURNMENT
Underground Infrared Sensing and Leak Detection

OHIO WATER DISTRICTS

EnTech® EnSITE VII, Van Mounted IR & Manual GPS Based Investigations

For

Ground Surface Energy Anomalies

Indicative of

Subsurface Potable Water Leaks and Resulting Erosion Voids

For

City Of Fairfield
City of Hamilton
Southwest Ohio Water Company
Southwest Regional Water District

On

June 13-15, 2012

IR Field Data Collection

By

EnTech® Engineering, Inc.
228 Meadowlark C. C. Way, St. Louis, MO 63101-1664
Tel: 314-387-2000
www.entsite.com
E-mail: info@entsite.com

By Dave Crouch
Water Quality

Late 50’s

Late 40’s
<table>
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<tr>
<th>Phase 1:</th>
<th>Description</th>
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<th>Units of Measure</th>
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<td>New PRV Vault</td>
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<td>Pleasant Ave. (Rolling Hills Blvd. to Vonderhaar Ct.)</td>
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</table>

Total for all Phases           |                                                  |                 |                  |           | $1,220,820.00 |
A Case Study

Southwest Ohio Water Company

GROUNDWATER CONSORTIUM

MillerCoors

The City of Hamilton Butler County OIO

Fairfield, Ohio City of Opportunity

Greater Cincinnati Water Works

Southwest Regional Water District
SCOPE OF SERVICES

The scope of services for this project was to perform a pilot project, to locate surface Infrared (IR) energy patterns indicative of subsurface water and wastewater pipeline leaks and their exterior erosion voids for the City of Fairfield, City of Hamilton, SWOWC & SWRWD. The investigation areas were selected by client(s) and encompass a shared / combined 6 pipeline miles (1.5 continuous pipeline miles per water district). EnTech provided a two (2) person field engineering team headed by a Registered Professional Engineer; office based support personnel for pre-engineering, data analysis and documentation generation; and its EnSITE VII pipeline leak and erosion void detection system.
Scanning

IR Energy Patterns can be imaged by special remote sensing cameras through several data collection methods: walking, driving &/or flying. All subsurface artifacts create surface energy patterns. Engineers analyze energy patterns and determine how they are related to nearby subsurface assets such as pipelines (any size, any material, any fluid), earthen dams and levees, septic fields, buried tanks and other buried structures. The main advantage of using energy patterns to investigate these assets is accurate testing, efficiency and cost effectiveness. The lone disadvantage to using energy patterns is that weather conditions such as rain and snow will hinder data collection.
Equipment
Organizing

The City of Fairfield organized neighboring water districts to participate in a pilot water leak detection project with EnTech Engineering, Inc. Each of the four (4) Water Districts identified a 1 ½ mile segment of potable water pipeline mains for investigation by EnTech using its EnSITE VII IR Van system. These areas consisted of water mains in residential, commercial, and country settings. The pipelines were composed of several materials and sized from 3-inch to 36-inch. A total of ~6 miles of pipeline “right-of-way” were identified. The following summarizes these areas:

<table>
<thead>
<tr>
<th>Personnel Involved: Ohio Water Districts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authorized the Scope of Services for IR &amp;</td>
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<tr>
<td>Provided Miscellaneous Information Services</td>
</tr>
<tr>
<td>Andy Eddy (Fairfield)</td>
</tr>
<tr>
<td>Jim Collins (Hamilton)</td>
</tr>
<tr>
<td>Dave Flinn (SWOWC)</td>
</tr>
<tr>
<td>Norma Pennock (SWRWD)</td>
</tr>
</tbody>
</table>
SWRWD 1
Hamilton 1
Fairfield
Pilot Costs

Fee Schedule –

Vehicle expense: \(~800 \text{ miles} \times $0.76/\text{mile} = \)$ 608

Mobilization: \)$ 4,900

Hotel + Meals: US$ 175/day/person \times 4 \text{ days} \times 2 \text{ Field engineers} = \)$ 1,400

*Leak Detection Services ~6 pipeline miles* = \)$ 10,092

Total Demonstration Cost = \)$ 17,000
QUESTIONS
Overview of Ohio River Recreation...

- Water quality in the Ohio River has consistently improved over the past 20 years.
- As a result, recreational use standards are met more frequently, making it safer to recreate on the Ohio River.

Overview of Ohio River Recreation...

- MSD is committed to:
  - Improving water quality in the Ohio River and its tributaries
  - Promoting these local waterways as natural and economic assets to this region

Recreation Management Program

Purpose of program:
- Foster public awareness of water quality (E. coli counts)
- Assist public health agencies to inform public about health-related issues
- Facilitate informed decisions regarding recreational use of local waterways
Recreation Management Program
Current efforts:
- Sampling on the Ohio River during the recreation season (May – October)
- Creating water quality models for E. coli
  - Fate and transport
  - Predictive
- Establishing baseline levels for biological, chemical and physical conditions of Ohio River tributaries
- Developing tool to inform the public about water quality during the recreation season

Overview of Modeling
- Utilized the data collected by MSD, SD1, and ORSANCO over the years
- The predictive water quality model was developed using Artificial Neural Network (ANN)
- The ANN engine used was WEKA
- The E. coli data rich part is in the Cincinnati metropolitan area between the I-275 bridges

Many factors affect the modeling of E. coli especially in dynamic system as the Ohio River, such as:
- CSOs
- Temperature
- Flow
- Precipitation
- Location
- Major factors in the success of predictive modeling are:
  - Data quality (time, location)
  - Data integration from different sources
  - Precipitation

Modeled the data in WEKA using 2-fold cross-validation and as training set
- The results from the modeling were promising
- A correlation of calculated vs measured was ~94%

Recr8OhioRiver iPhone App & Website
- iPhone app and website are live
- The website is Live http://www.recr8ohioriver.org
- Droid will be available June 2013

Events
- PaddleFit 2013 Thursday, June 27, 2013
  - PaddleFit is for the 11th annual PaddleFest featured, June 28-29 at Eden Park.
  - Web site: http://www.paddlefest.com

2013 Great Ohio River Swim Saturday, September 28, 2013 9:00 a.m.
- The 2013 Great Ohio River Swim is scheduled to begin, September 28, 2013 at 9:00 a.m. at the registration area at 70th Ave at the Esplanade Wall.
- The registration will close at 1:00 p.m. at the registration area at 70th Ave.
- PaddleFit will be available on the Cincinnati Public Library, parking is a 34.7 per car charge.
- Web site: http://www.paddlefest.com
Ohio River Swim – Sept 23, 2012

Next Steps

• Continue improving the predictive model
• Complete Droid development
• Add other features based on users’ feedback

Acknowledgements

• Many entities and individuals are helping in making this a success. Special thank you goes to:
  – SD1
  – ORSANCO
  – Green Umbrella
  – Focus group participants

Thank You

Questions?

Laith.Alfaqih@cincinnati-oh.gov
513-244-5164
OKI GROUNDWATER COMMITTEE MEETING SUMMARY
Wednesday, June 5, 2013
OKI Board Room – 10:00 a.m.

Attendees:
Bruce Whitteberry, Chair, Greater Cincinnati Water Works
Jack Thornsberry, Vice Chair, Butler County
Laith Alfaqih, Metropolitan Sewer District of Greater Cincinnati
Ken Broberg, SM Stoller
Jonh Bui, City of Hamilton
Dave Combs, City of Trenton
Dave Crouch, City of Fairfield
Frank Divo, Southwestern Ohio Water Company
Beth Downs, Hamilton to New Baltimore Groundwater Consortium
Elmer Dudas, City of Springboro
Andreas Eddy, City of Fairfield
Rick Fueston, Clermont County Water and Sewer
Tammy Jett, Duke Energy
Scott Kirk, Western Water Company
Mike Lippert, City of Wyoming
Tim McLelland, Hamilton to New Baltimore Groundwater Consortium
Krystal McNutt, Miami Conservancy
Terry Morris, City of Springboro
Dave Morrison, Southwest Regional Water District
Tim Neyer, Clermont County
Norma Pennock, Southwest Regional Water District
Greg Petredis, City of Hamilton
Richard Renneker, Committee Member
Ken Shearwood, Village of New Miami
Cliff Shrive, Stantec
Richard Stuck, Greater Cincinnati Water Works
Robert Wildey, Clermont General Health District
Tom Yeager, Southwest Regional Water District

OKI Staff:
Jane Wittke, Bruce Koehler, Travis Miller, Thomas Dibello

Welcome/Introductions/Announcements:
Bruce Whitteberry welcomed everyone at 10:05 a.m. and announced that the next meeting will be September 11, 2013. He noted that today’s meeting marks the 25th anniversary of the committee’s founding, and shared interesting facts about 1988 when the committee met for the first time. That year, one of the worst groundwater droughts in the past 50 years was occurring. At a cost of $60 billion nationwide, the 1988 drought was categorized as the costliest natural disaster in U.S. history prior to Hurricane Katrina. In 1988, a gallon of gas was 91 cents. Eggs were 65 cents/dozen. Rain Man was the most popular movie. The average price of a new car was $10,400. When Bruce asked those attending what
keeps them coming to meetings 25 years later, Tim McLelland said that the networking aspect has been very beneficial because he has learned quite a bit from speaking with people informally, and Terry Morris commented that sharing information and experience helps communities to help each other.

**Local Groundwater Management Updates**

**Rick Fueston from Clermont County** reported that Clermont County has three treatment facilities that serve a population of over 120,000: the Miami Goshen Stonelick (MGS) plant with a 2.2 million gallon per day (MGD) capacity that pumps groundwater; the Pierce Union Batavia (PUB) plant with a 15 MGD capacity that pumps groundwater; and the Bob McEwen (BMW) plant with an 18 MGD capacity that draws water from East Fork Lake.

Rick described improvements at all three plants. Improvements to the BMW plant installed granular activated carbon to increase the removal of trihalomethanes, added two raw water pumps and doubled the plant’s design capacity. The PUB project improved filter performance, and included replacing a well and electrical control tower, repairing screens, and performing a study of pressure surges upon the plant’s discharge main. PUB improvements also included replacing filter media and portions of the filter wash system. The MGS facility was reconditioned by replacing softener control valves, installing a bulk caustic storage tank, and making upgrades to the internal plumbing and electrical system.

**Scott Kirk from Western Water Company** reported that Western Water has a customer base of 15,000 meters in portions of five counties: Clermont, Warren, Highland, Brown and Clinton. The company has about 750 miles of distribution mains and 12 elevated tanks. He said that growth has slowed tremendously in the past few years, with development adding approximately 100 new customers per year to Western Water’s service areas in Warren County and Hamilton County, down from an average of 400. Their wellfield in the Little Miami Aquifer has an approved source water protection plan, and they share a very effective water education consultant with Warren County who reaches over 5,000 students a year in grades K-8. Western Water is in the last phase of developing a hydraulic model and has added a standby generator in its wellfield, with double-walled containment and a block wall.

**Tim McLelland, Hamilton to New Baltimore Groundwater Consortium** reported that the Consortium is in the process of working with St. Clair Township to update its source water protection ordinance. Updates to the City of Hamilton’s source water protection ordinance are under review, with special attention to industrial areas like the one where the old Chem-Dyne plant was located. Tim gave an example of how the ordinances are working in Fairfield, where a company approached the fire department about expanding a solvent plant because of the new ordinance and followed it, instead of the Consortium having to approach them after the fact of an expansion. The Consortium’s Source Water Protection Plan is also being updated in accordance with the new EPA guidance. The annual Children’s Water Festival will be on October 11, 2013 and the 5K Race for Global Water will be on October 26, 2013.
Ken Shearwood from the Village of New Richmond described his service area as a small river town with a population of 2,700. New Richmond has four wells by the river, and the Village has had some problems with fishermen and campers taking liberties with the wellfield property, including the building of a private dock on top of it last year. In response, the Village posted “federally protected” signs and added concrete blocks in some locations. Another project is installing a 12” line to the reservoir to replace two outdated 8” lines. In addition, a bid is out to replace the school’s booster pump station.

OKI Staff Update

Bruce Koehler reported on the recently completed West Fork Mill Creek Corridor Improvement Plan. This plan deals with the stream corridor and surface water for the most part, but also addresses a drinking water issue because an eroding stream bank has threatened a lime sludge settling pond and two Ohio EPA groundwater monitoring wells near Wyoming’s well field. The West Fork Mill Creek has 1.4 miles of channel that runs along Wyoming’s source water protection area and includes 1,400 feet of the one year time-of-travel zone. OKI has been working with representatives from the communities involved to prepare the plan, and Bruce thanked Mike Lippert for his help.

Jane Wittke gave a historical view of the impetus for the committee. In 1988 OKI was seeking sole source aquifer designation for the southern area of the Great Miami and Little Miami Buried Valley Aquifer while the Miami Valley Planning Commission was seeking designation of the northern area. It was important to get the designation so that federal, state and local governments would understand the value of this great water resource. It was evident that people who worked with and understood the value of groundwater would be important to any efforts to protect it, and that protection efforts would be most effective if they were coordinated. As a result, OKI convened the Groundwater Committee on June 15, 1988 to promote coordinated groundwater management across local boundaries.

Jane also announced that staff will be presenting an amendment for OKI’s Water Quality Management Plan to the Board of Directors for consideration on June 13. The amendment would significantly expand content in the Plan for Butler, Clermont, Hamilton and Warren Counties concerning two important topics. The first is the mapping and analysis of impervious surface, an important tool to show impacts of the built environment on watersheds and waterways. The second is a summary and analysis of storm water management programs which identifies the dozens of organizations carrying out federal requirements and their responsibilities. Both analyses are on the OKI website http://www.oki.org/departments/landuse/waterquality.html.

The Recr8 Application & Website: A One-Stop Resource for Ohio River Conditions

Laith Alfaqih, Metropolitan Sewer District of Greater Cincinnati (MSD) explained that MSD is committed both to improving water quality and to promoting local waterways as natural and economic assets. For that reason, MSD partnered with both ORSANCO and Sanitation District #1 in Northern Kentucky to come up with an application and website that enables tracking water quality in the Ohio River in the tri-state area for anyone who might be interested in using the river for recreation.
The purpose of the program is to foster public awareness of water quality (especially E. coli counts), and to help the health department to inform the public of any health-related issues, in the process enabling the public to make informed decisions when they want to use the river for recreation. MSD monitors the river during the recreation season from May to October and has created a predictive water quality model for E. coli. Model development has been complex and involved establishing baseline levels of biological, chemical and physical conditions of the Ohio River tributaries. All three project partners have supplied reams of data.

A key aspect of the project is developing a tool to inform the public about water quality during the recreational season. An app is now available for iPhones, iPads and Android systems. The website is located at http://www.recr8ohioriver.org and it contains information on current water quality for E.coli (updated every hour), recreational activities along the river, real time weather reports, and water traffic reports for boaters.

**Underground Infrared Sensing and Leak Detection: A Case Study**

*Dave Crouch, City of Fairfield,* described the impetus and results of a pilot project using infrared sensing patterns to indicate the presence of water and wastewater pipe cracks and leaks. He noted the high costs of pipe maintenance and replacement and concerns about the effect of pipe deposits on water quality, giving an example of $1.2 million to replace a mile of 8” pipe with 12” pipe.

The pilot project looked at the efficacy of using infrared technology to detect various types of pipes and materials used for and with water pipes and mains, including concrete, plastic, and iron. The pilot project was a combined effort involving the cities of Fairfield and Hamilton, the Southwestern Ohio Water Company, and the Southwest Regional Water District. Each identified a 1 1/2 mile segment of potable water pipeline mains as a focus for the study, which included water mains in residential, commercial and country settings. The pipelines were composed of several materials and varied in size from 3” to 36”. While the infrared cameras can be used walking, driving or from airplanes, in this pilot study they were mounted on vans.

Dave shared visual examples from each system, and discussion with the project partners indicated that the results were mixed in terms of their accuracy. He noted that the technology is so sensitive that some anomalies detected were because of new pavement, not necessarily leaks, and that the most significant cost is the engineering review needed to interpret the data from the scans. He also said that while costs for the technology have come down in the wake of the recession, and public sector business is being pursued, it is still relatively expensive, citing a cost of about $1600 per mile for a 10” line in Fairfield.

**Other Business and Adjournment**

Jack Thornsberry gave a reminder that the next meeting date will be September 11, and adjourned the committee at noon.