Feature Presentations

Ground Water and Surface Water Interaction in the Great Miami Basin

Brent Huntsman, Terran Corporation

Social Media: Opportunities and Uses for Water Utilities

Gayle Foster, OKI, and Michele Ralston, Greater Cincinnati Water Works

OKI Groundwater Committee Meeting

November 30, 2011
OKI GROUNDWATER COMMITTEE
November 30, 2011 - 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
   Scott Belcher, Tim McLelland, Tim Neyer, Dave Weihrauch

4. OKI Staff Update

5. Ground Water/ Surface Water Interaction in the Great Miami Basin
   Brent Huntsman, Terran Corporation

6. Social Media: Opportunities and Uses for Water Utilities
   Gayle Foster, OKI, and Michele Ralston, Greater Cincinnati Water Works

7. Other Business

ADJOURNMENT
At confluence of Mill Creek main stem and East Fork Mill Creek

- North of I-275
- East of I-75
- In Sharonville

Staff Updates
At confluence of Mill Creek main stem and East Fork Mill Creek  
North of I-275  
East of I-75  
In Sharonville
Design Elements

- Natural channel design to increase sinuosity by channel shaping and increased meanders
- Floodplain creation by excavating both sides of the stream and wetland
- Riparian restoration by planting with native riparian trees and shrubs
- Instream habitat construction of riffles, J-hook weirs and boulder clusters
- Wetland creation
- Recreation trails with educational signage

Expected Outcomes

- Reduced streambank erosion
- Reduced flooding
- Elimination of channel downcutting
- Creation of high quality pool/riffle/run complexes
- Increased aquatic and terrestrial habitat and species diversity
- Improved bedload conveyance
- Reduced siltation
- Increased dissolved oxygen content
- Improved assimilative capacity of urban runoff pollutants
- Attainment of water quality standards for Warm Water Habitat
- Wetland creation
- Groundwater recharge
- Provide park area for hiking, bird watching and other recreation
- Education

Project Funding

- Water Resource Restoration Sponsor Program (WRRSP) grant is for $1,729,094
  - design, survey, stream restoration, riparian floodplain creation, and earthwork
- Section 319 nonpoint source pollution reduction grant is for $317,000
  - construction (excavation and planting) of the wetland, administration, education and outreach
Project Partners

Project Timeline
- Summer 2007 – Project Envisioned
  - Fall 2007 – Ohio EPA Approved Concept
  - December 2007 – WRRSP grant submitted
- January 2008 – Ohio EPA approved WRRSP funding
  - March 2008 – Design was delayed to resolve property issues
  - May 2008 – Section 319 grant submitted
- December 2008 – Ohio EPA approved 319(h) funding
  - February 2010 – Resolution of property issues
  - December 2010 – Environmental Covenant recorded
- January 2011 to May 2011 – Design
  - Winter 2011 to Spring 2011 – Wetland Construction
  - Spring 2011 to Fall 2011 – Stream Restoration
- September 2011 – Lunch & Learn
- November 2011 – Grand Opening Tour
- December 2011 – Construction Complete
- June 2012 – Education and Outreach Complete

Project Site Conditions
Before Construction:
- Unstable channel
- Erosion
- Mid-channel bar
- Log jams
Project Site Conditions
Before Construction:
• Erosion
  • Entrenched
  • No riparian zone

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Project Site Conditions
Before Construction:
• Weak riffles
  • Shallow pools
  • Nutrient enrichment

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Project Site Conditions
Before Construction:
• Sewer and encasement in stream
  • Sewer crossings and lowhead dams
Project Site Conditions
Before Construction:
• Invasive species
• Pioneer species
• Disconnected floodplain

Wetland Construction:
Clearing and Grubbing

Wetland Construction:
Digging In
Wetland Construction: Soil Testing & Mobilization

Wetland Now

Stream Design
- Rock toe stabilization
- Coir fiber matting
- Native vegetation
- Natural channel design
- Bankfull benches
- Proper width to depth ratio
- Meanders & sinuosity
- Re-connection to floodplain
- J-hook weirs
- Stable cross section
- Point bars
- Newbury riffles
Site Design
• Walking trail
• Recreation
• Interpretive signs

Education and Outreach
• Vegetation for volunteers
• Walking and canoe tours
• Interpretive signage
• Educational literature
Groundwater-Surface Water Interactions - GMR

Using Thermometric Measurements to Determine Aquifer - Riverbed Hydraulic Exchanges

B. E. Huntsman, CPG and D. J. Wagel
Terran Corporation, Beavercreek Ohio
Groundwater-Surface Water Interactions - GMR

Using Thermometric Measurements to Determine Aquifer- Riverbed Hydraulic Exchanges

B. E. Huntsman, CPG and D. J. Wagel
Terran Corporation, Beavercreek Ohio

Groundwater – Surface Water Interactions

(a) Natural groundwater discharge
(b) reduced discharge
(c) induced recharge conditions

(after Winter et al, 1998)
Conceptual diagram of three distinct riverbed layers (from Levy et al, 2008)

The Great Flood of 1913

Temperature Trends
Rivers & Aquifers Interactions

D. A. Stonestrom and J. Constantz, 2004
C. Hatch, et al. (2006)

Equations to calculate vertical velocity from measured amplitudes.

\[ v_{z,v} = \frac{2 \kappa}{\Delta z} \ln A_{z} + \sqrt{\frac{\alpha + v_{Ar}^2}{2}} \]

\[ V_{f} = \gamma v_{Ar} \]

Where:
- \( v_{z,v} \): vertical groundwater velocity
- \( v_{Ar} \): thermal front velocity
- \( \kappa \): effective thermal diffusivity
- \( \Delta z \): spacing between measurement points
- \( A_{z} \): amplitude ratio
- \( P \): period of temperature variations
- \( \gamma \): ratio of the heat capacities of the streambed and fluid

Arriaga and Leap (2006)

\[ \frac{T_{z} - T_{o}}{T_{L} - T_{o}} - \frac{e^{\beta z} - 1}{e^{\beta L} - 1} = 0 \]

\[ \beta = \frac{c_{w} \rho_{w} v L}{k} \]

\( T_{z} \): temperature at any depth
\( T_{o} \): uppermost temperature measurement
\( T_{L} \): lowermost temperature measurement
\( z \): distance from uppermost monitoring location
\( \beta \): dimensionless parameter
\( c_{w} \): specific heat of water
\( \rho_{w} \): density of water
\( v_{z} \): vertical velocity of the groundwater
\( L \): length of the monitored zone
\( k \): thermal conductivity of the solid/fluid matrix
Thermographic Summary of Aquifer Temperatures at 1st Street Bridge
CONCLUSIONS

- Whilst a predominantly gaining reach, ground water pumping in Dayton creates losing segments on eastern side of GMR near RM 79.5.

- Average SW/GW vertical flow velocities ~ 1-2 cm/day.

- Typical hydraulic conductivities of the aquifer near the SW/GW interface are 4 to 25 ft/day.

- Subsurface thermometric monitoring can provide continuous, near real-time assessment of SW/GW interactions.

<table>
<thead>
<tr>
<th>Study</th>
<th>Location</th>
<th>K (ft/sec)</th>
<th>K (ft/day)</th>
<th>K (cm/sec)</th>
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<tbody>
<tr>
<td>Terran Corp.</td>
<td>Great Miami River, Dayton, Ohio</td>
<td>4.7 x 10^-05 to 2.9 x 10^-04</td>
<td>4.1 to 25</td>
<td>1.4 x 10^-03 to 8.7 x 10^-03</td>
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<tr>
<td>Levy et al, 2008</td>
<td>Great Miami River, Dayton, Ohio</td>
<td>6.9 x 10^-07 to 6.6 x 10^-05</td>
<td>0.06 to 5.7</td>
<td>2.1 x 10^-05 to 2.0 x 10^-03</td>
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<td>Levy et al, 2008</td>
<td>Great Miami River, Dayton, Ohio</td>
<td>1.3 x 10^-04 to 3.8 x 10^-04</td>
<td>11.6 to 32.8</td>
<td>4.1 x 10^-03 to 1.2 x 10^-02</td>
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<td>Great Miami River, Dayton, Ohio</td>
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<td>9.6 x 10^-07 to 9.6 x 10^-05</td>
<td>0.8 to 2.8 x 10^-04</td>
<td>7.1 x 10^-05 to 2.4 x 10^-04</td>
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<tr>
<td>Great Miami River, Dayton, Ohio</td>
<td>6.7 x 10^-07 to 7.0 x 10^-04</td>
<td>0.1 to 60.5</td>
<td>3.5 x 10^-05 to 2.1 x 10^-02</td>
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<tr>
<td>Great Miami River, Dayton, Ohio</td>
<td>8.5 x 10^-06 to 2.7 x 10^-05</td>
<td>0.7 to 2.3</td>
<td>2.5 x 10^-04 to 8.1 x 10^-04</td>
<td></td>
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<td>Mad River, Dayton, Ohio</td>
<td>1.0 x 10^-06 to 6.0 x 10^-04</td>
<td>0.1 to 51.8</td>
<td>3.5 x 10^-05 to 1.8 x 10^-02</td>
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<tr>
<td>Mad River, Dayton, Ohio</td>
<td>3.1 x 10^-07 to 8.1 x 10^-05</td>
<td>0.03 to 7.0</td>
<td>1.1 x 10^-05 to 2.5 x 10^-03</td>
<td></td>
</tr>
<tr>
<td>Dove, 1961</td>
<td>Great Miami River SW of Venice, Ohio</td>
<td>8.5 x 10^-06</td>
<td>0.74</td>
<td>2.6 x 10^-04</td>
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</table>
Social Media: Opportunities and Uses for Water Utilities

Gayle Foster, OKI, and Michele Ralston, Greater Cincinnati Water Works
Social Media: Opportunities and Uses for Water Utilities

Gayle Foster, Project Administrator
OKI Regional Council of Governments
November 30, 2011

START WITH THE QUESTION: WHY?
Exactly What is Social Media?
Social media includes the various online technology tools that enable people to communicate easily via the internet to share information and resources. Social media can include text, audio, video, images, podcasts, and other multimedia communications.

What is Social Media Networking?
Social networking is based on a certain structure that allow people to both express their individuality and to meet people with similar interests. This structure includes having profiles, friends, blog posts, widgets, and usually something unique to that particular social networking website… such as instant messaging with Twitter or the ability to polk a person on Facebook.

What are some examples of Social Media?
The two most popular social media networks are:

<table>
<thead>
<tr>
<th>Facebook</th>
<th>Twitter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over 800 million users</td>
<td>Over 175 million users</td>
</tr>
<tr>
<td>50% are active users logging in at least once a day</td>
<td>40% are active users logging in at least once a day</td>
</tr>
<tr>
<td>350 million users Accessing the site through a mobile device.</td>
<td>Over 230 million Tweets are processed a day.</td>
</tr>
</tbody>
</table>

Largest Audio Video Social Media Services

<table>
<thead>
<tr>
<th>YouTube</th>
<th>Apple iTunes Ping</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over 2 billion views per Day.</td>
<td>Pandora: Music Genome Project</td>
</tr>
<tr>
<td>YouTube has over 250 million academic classes.</td>
<td>Spotify: Has partnered with Facebook to become</td>
</tr>
<tr>
<td>Over 12 minutes of instructional trainings are loaded each minute</td>
<td>Grooveshark: More music from around the world and independent artist.</td>
</tr>
</tbody>
</table>

Podcast Social Media

- Podcasting is delivering audio content to iPods and other portable media players on demand, so that it can be listened to at the user’s convenience. The main benefit of podcasting is that listeners can sync content to their media player and take it with them to listen whenever they want to. Because podcasts are typically saved in MP3 format, they can also be listened to on nearly any computer.
Podcast

- Most Live Podcasts are linked with Facebook or Twitter
- Podcasting provides:
  - Portability of books, instruction, meetings, and entertainment.
  - Real Time or recorded.
  - Smart Phones, iPads, computers, and iPods.

The Facebook Primer

Friend Pages
Fan or Like Pages
Groups
Ads
APPS

A Friend Page is your personal Facebook page. It includes your personal profile, pictures, status, applications, Messaging, lists, and groups. It also includes your Newsfeed page. Your display is referred to as your wall where you can post your status, links, pictures, blog notes, event invitations, videos, and now music.
Facebook Pages

Pages are for organizations, businesses, celebrities, and bands to broadcast great information in an official, public manner to people who choose to connect with them. Similar to profiles (timelines), Pages can be enhanced with applications that help the entity communicate and engage with their audiences, and capture new audiences virally through friend recommendations, News Feed stories, Facebook events, and beyond.
Facebook Groups

Create a private space
Have things you only want to share with a small group of people? Just create a group, add friends, and start sharing. Once you have your group, you can post updates, poll the group, chat with everyone at once, and more.

Group pages are great for teams that work in the field or at remote locations where the information can be followed by the group in real time.
Facebook allows you to target your audience

Two ways to pay
1. Set a daily budget
2. Pay for clicks only.

You can promote your Facebook Page and increase your sphere of influence at the same time.

Facebook Ads
Ads can appear in the right-hand column of pages throughout Facebook. Ads are eligible to appear on many types of pages, including apps, photos, groups, pages, profiles (timelines), and the home page.

Facebook Ads
Your friends might see news about the social actions you have taken in Facebook Ads. This news will only be shown to your confirmed friends and will adhere to applicable privacy settings you’ve set for your account. If a photo is used, it is your profile photo and not from your photo albums.
Facebook Ads
The content of a Facebook Ad is sometimes paired with news about social actions (e.g., liking a Page) that your friends have taken.

What are Apps?
Apps on Facebook are designed to enhance your experience on the site with engaging games and useful features like Events and Photos. Some apps are built by Facebook developers, but most are built by outside developers who use Facebook.
Twitter is a social networking and microblogging service that allows you to answer the question, "What are you doing?" by sending short text messages 140 characters in length, called "tweets", to your friends, or "followers."
Social Media & Greater Cincinnati Water Works

Michele Ralston, Greater Cincinnati Water Works
Why is GCWW Using Social Media?

1. Customer/Community Engagement
2. Communicate key messages
   - How people are communicating

Why is GCWW Using Social Media?

AARP Case Study

- More than a quarter (27%) of Americans age 50+ use social media websites
- Facebook most popular
- 40% of adults 50+ feel extremely or very comfortable using the internet
- 47% of adults 50+ heard about SNS from family member other than spouse
  - of those, 70% heard about it from a child or grandchild

Source: Pew Research Center and American Girl Scout Council
Remember…

 Teens and young adults are the heaviest SNS users.

SURPRISE! Among teens, girls are no more likely than boys to use SNS.
But among adults, women use SNS at higher rates than men.

AARP Case Study

- Overhauled website with focus on social networking, added mobile apps
Why is GCWW Using Social Media?

3. Media Relations
   - WXIX, Water Line Insurance
   - Channel 12, Green Roof Project
   - Channel 5, Water Main Leak

Why is GCWW Using Social Media?

- More Americans get their news online than from newspaper or radio
  - 92% of Americans use multiple sources to get their daily news
    1. Local television news
    2. National television news
    3. Internet
    4. National print newspapers
    5. Local print newspapers
    6. Radio

Source: Pew Research Center's Internet & American Life Project and Project for Excellence in Journalism

What is GCWW Saying?

- Social media messages align with key goals and strategies in strategic plan
  - Quality Drinking Water
  - Customer Service
  - Community Involvement/Partnerships
  - Innovation
  - Environment
  - Efficiency and cost effectiveness
Facebook

- More than 500 million active users
- More than 5 billion pieces of content (web links, news, blog posts, pictures) shared each week
- More than 1.5 million local businesses have active Facebook pages

Twitter

- More than 190 million users (17 million actively use)
- Highest traffic volume is Sunday through Wednesday
- About 65 million tweets posted daily, 750 each second
- Visitors spend about 8-minutes a day on Twitter

GCWW Twitter Statistics
The Social Conversation…what are they saying?

• More than 2 billion views a day
• 24 hours of video uploaded every minute
• Average person spends 15 minutes a day on YouTube
What are they clicking to see?

1. YouTube Frozen Pipes 1,281
2. YouTube Customer Questions 228
3. City Website Survey 204
4. MyCheckFree 118
5. Bizjournals article (online bill payer) 175
GCWW Social Media Editorial Calendar

Held 2011 Training Session

- Educate
- Engage
- Get ideas

GCWW Social Media Editorial Calendar

Create Month-by-Month
- Weekly, consistent theme

Week One: news, info. for customers
Week Two: conservation/green ideas
Week Three: employee, customer, community spotlight (video, photo with copy)
Week Four: Life of Water (series)

GCWW Social Media Editorial Calendar

January - Week One

- Note on FB page on how to prevent frozen pipes
  - Create YouTube video with GCWW expert
  - Share link on twitter

- Note on FB page on how to thaw frozen pipes
  - Create YouTube video with GCWW expert
  - Share link on twitter
GCWW Social Media Editorial Calendar

January - Week Two
- Look Back, What’s ahead with innovation message
  - Note on FB
  - Create YouTube video with GCWW expert(s)
  - Share link on twitter

January - Week Three
- Note on FB page on how Fountain Square Ice Rink uses water
  - Create YouTube video with Fountain Square representative
  - Share link on twitter

GCWW Social Media
Next Steps
1. High Profile Engineering Projects
2. Water is Life Campaign
3. Customer Call Center
4. Internal GCWW Communications

GCWW Social Media
Questions?
<table>
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<tr>
<th>Course Date</th>
<th>Course Title</th>
<th>Course Number</th>
<th>Approved Audience</th>
<th>Approved Hours</th>
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<tr>
<td>March 3, 2010</td>
<td>Update on Local Groundwater Management Efforts</td>
<td>OEPA-D500304-X</td>
<td>DW only</td>
<td>.5</td>
<td>3/3/13</td>
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<td>June 2, 2010</td>
<td>Dealing with Corrosion in Your Distribution System</td>
<td>OEPA-D502767-OM</td>
<td>DW only</td>
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<td>June 2, 2010</td>
<td>Keeping it Clean: The “Why and “How” of Well Maintenance</td>
<td>OEPA-D502435-OM</td>
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<td>Update on Local Groundwater Management Efforts</td>
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<td>DW only</td>
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<td>6/2/13</td>
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<td>September 15, 2010</td>
<td>Pesticides, Pharmaceuticals and Personal Care Products in the Great Miami Basin</td>
<td>OEPA-B483340-OM</td>
<td>DW&amp;WW</td>
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<td>September 15, 2010</td>
<td>Evaluating Water Loss and Other Potential Regulatory Issues</td>
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<td>Update on Local Groundwater Management Efforts</td>
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<td>DW&amp;WW</td>
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<td>December 15, 2010</td>
<td>Cincinnati’s Operational Case Study for Water Distribution System</td>
<td>OEPA-D508452-OM</td>
<td>DW only</td>
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<td>Salt Piles and Source Water Protection</td>
<td>OEPA-D508452-OM</td>
<td>DW only</td>
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<td>12/15/13</td>
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<td>December 15, 2010</td>
<td>Update on Local Groundwater Management Efforts</td>
<td>OEPA-D472024-X</td>
<td>DW only</td>
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<td>6/3/12</td>
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<td>June 8, 2011</td>
<td>Update on Local Groundwater Management Efforts</td>
<td>OEPA-B502683-X</td>
<td>DW&amp;WW</td>
<td>.5</td>
<td>6/8/14</td>
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<td>June 8, 2011</td>
<td>Aquifer Settings in Southwest Ohio and Their Implications</td>
<td>OEPA-D517982-X</td>
<td>DW only</td>
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<td>June 8, 2012</td>
<td>Water Issues and Growth: Issues and Impacts</td>
<td>OEPA- 518251-X</td>
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<td>September 14, 2011</td>
<td>Superfund Sites in SW Ohio</td>
<td>OEPA- D522970-X</td>
<td>DW only</td>
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<td>September 14, 2011</td>
<td>Updating the 208 Plan for SW Ohio</td>
<td>OEPA- B510404-OM</td>
<td>DW&amp;WW</td>
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<td>September 14, 2012</td>
<td>Update on Local Groundwater Management Efforts</td>
<td>OEPA-D519780-OM</td>
<td>DW only</td>
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Welcome and Introductions
Bruce Whitteberry called the meeting to order at 10:10 a.m. and those attending introduced themselves.
Announcements
Jane Wittke announced that the committee’s meeting dates scheduled for the coming year are March 7, 2012; May 30, 2012; September 12, 2012; and December 5, 2012. Bruce Whitteberry reported on behalf of Allison Reed of the Ohio EPA that congratulations were order to Clermont County and Indian Hill for getting Drinking Water and Source Water Protection Plans for their wellfields endorsed. Bruce also announced that the City of Wyoming received the award for “Best Tasting Water in Ohio” at the statewide conference of the AWWA.

Local Groundwater Management Updates
Tim McLelland from the Hamilton to New Baltimore Groundwater Consortium
Tim reported that the City of Fairfield just adopted the updates and changes to their source water protection ordinance proposed by the Consortium. The next steps will be to go to the City of Hamilton and to Ross and St. Clair Townships with the updates and changes, which reflect new delineations of the time of travel zones made this past year.

Tim also announced that the Consortium received the Groundwater Guardian award for another year, and that the 13th annual Butler County Children’s Water Festival was very successful, involving 1200 students and 40 presenters. He noted that over the life of the festival, more than 13,000 students have been reached. He also said that the Reynolds Well Drilling Company actually drilled a demonstration well as part of the festival this year, that the Miami Conservancy District is going to donate a transducer, and that next year the demonstration well will be sampled during the festival so that the children can see how wells are monitored. Tim also mentioned that the Race for Global Water held in Fairfield on September 17 was successful in bringing in more than 160 runners and raising more than $7,000.

Tim Neyer from the Clermont County Water Resources Department reported that Clermont County serves more than 100,000 customers with more than 43,000 taps. The Clermont Water system is different from most systems because it has three different plants with three different treatment processes. The largest treatment plant is near New Richmond which is a 15 million gallon per day (MGD) iron and manganese filtration plant. There is 10 MGD surface water treatment plant in Batavia and a 2.2 MGD ion exchange plant between Milford and Loveland.

Clermont County received endorsements of their source water protection plans in November. The Batavia plant is under expansion and includes replacing the gap caps on the filters with a post-filtration carbon contact chamber to reduce disinfection byproducts. Clermont County and the Village of Batavia have signed a service agreement and in January 2012 the County will begin maintaining and operating the Village’s water distribution system, fee collections and wastewater treatment.

Dave Weihrauch from the City of Oxford reported that Oxford has had a great year for groundwater production thanks to so much precipitation and 20 to 30 feet of water in the saturated zone of Oxford’s Four Mile Valley wellfield. The radial collector
wells of the Four Mile Valley wellfield are closer to the City and require less energy to pump than the wells in the Seven Mile Valley wellfield, farther east of the City. Dave explained that Oxford is working with OhioEPA on the redelineation of their source water protection area, and has recovered the use of one of its radial collector wells that had previously been lost to a “Groundwater Under the Influence of Surface Water” designation.

Dave also reported that the American Water Works Association’s Water Utility Council is working on national legislation that would offer loans and loan guarantees for large water infrastructure projects, through a “Water Infrastructure Innovation Authority” bill. The bill would enable projects and State Revolving Fund programs to secure financing without going to traditional credit markets.

**OKI Staff Updates**

**Jane Wittke** announced that the OKI Board of Directors adopted the Water Quality Management Plan Update for southwest Ohio on October 13, and thanked committee members for their help in developing it. She also noted that the complete plan of over 300 pages, individual plan chapters, and/or a 20-page Executive Summary can be downloaded from OKI’s website [www.oki.org](http://www.oki.org).

**Robert Lakeberg** described a new project by OKI staff to analyze impervious surface in Butler, Clermont, Hamilton and Warren Counties in Ohio, which is any surface in the landscape that cannot absorb or infiltrate rainfall, such as pavement, rooftops, and tennis and basketball courts. Data on impervious surfaces is an important tool for water quality management planning because it enables analyzing the impacts of the built environment on watersheds and waterways. When coupled with relevant information about the natural environment such as slopes, highly erodible soils, riparian corridors, and aquifers, it becomes even more valuable as an aid to identifying areas of increased runoff, sedimentation and streambank erosion and areas of reduced aquifer recharge.

The analysis will be performed primarily using GIS software and aerial photography flown in 2007. Using supervised classification methods and remote sensing tools included with ArcGIS software, impervious surfaces can be extracted from aerial and satellite imagery. This data can be enhanced by including mapped areas such as roads that are already known to be impermeable. The resulting impervious surface layer will be made available as an update to the Water Quality Management Plan.

**Bruce Koehler** gave an update on the Twin Creek Preserve, which is a collaborative stream restoration and wetland construction project led by the Mill Creek Watershed Council of Communities in partnership with the Butler County Water and Sewer Department, the Metropolitan Sewer District of Greater Cincinnati and the City of Sharonville. OKI devotes staff time to the project through Mr. Koehler’s chairmanship of the Watershed Council. The 30-acre project site, owned by Sharonville, is located in the upper Mill Creek watershed at the confluence of the Mill Creek main stem and the East Fork Mill Creek. With $2.1 million in federal funds, the project is transforming disused industrial property into a 5-acre wetland and nature preserve with more than
2,000 feet of restored stream channels that meander and a re-connect to their floodplain. This will reduce localized flooding. Among its benefits, the project will increase groundwater recharge and help attain Ohio EPA’s water quality standards.

Bruce also reported on a research study by the University of Cincinnati and the U.S. EPA’s Cincinnati Office of Research and Development. In a paper titled *Evolution of the Water Balance of an Urban Catchment*, researchers concluded that urban development has increased the flux of water into the Mill Creek watershed by 28%. OKI advised them of a Water-Resources Investigation Report (02-4167) by the U.S. Geological Survey titled *Hydrogeology, Ground-Water Use, and Ground-Water Levels in the Mill Creek Valley Near Evendale, Ohio*, which concluded that groundwater levels in the lower Mill Creek Valley aquifer have risen 65 to 100 feet in the Evendale area since 1955.

**Groundwater/ Surface Water Interaction in the Great Miami Basin**  
**Brent Huntsman of the Terran Corporation**

Brent Huntsman described his research into groundwater/surface water interaction in the Dayton area, funded in part by the Miami Conservancy District and using thermometric measurement techniques. Predictable changes in heat content, as measured by temperature variations, can be used as tracers of groundwater and surface water movement. Because deeper groundwater temperatures are generally more stable while surface water temperatures fluctuate widely, knowing how the temperature varies with depth can be used to calculate the rate and direction of water exchange between streams, rivers or lakes and aquifers.

The question of whether a stream is a gaining stream (receiving groundwater) or a losing stream (contributing to groundwater) is affected in part by nearby wells, which intercept recharge that would otherwise go to the stream, and the pumping of which can pull in surface water from the stream. In addition, streams can become less permeable to recharge because of sedimentation. Brent mentioned ongoing work done by Dr. Jonathan Levy and his students of Miami University in this regard. One of the questions Brent was interested in pursuing is the effect of floods on surface water/groundwater interaction: does the scouring of streambeds that occurs in floods increase recharge to the stream? He also noted that much study of groundwater/surface water interaction has relied on one-dimensional vertical flow analysis, which doesn't account for horizontal flow, e.g. from groundwater to the streambed or below.

He then described the installation of monitoring equipment near the piers of the First and Third Street Bridges over the Great Miami River in Dayton, and showed a visual sequence of color-coded temperature changes occurring, with warmer surface water sometimes moving to the east because pumping was occurring from nearby wells to the east. He concluded that while that reach of the river is a predominantly gaining reach, groundwater pumping in Dayton creates losing segments on the eastern side of the Great Miami River along River Mile 79.5. He noted that average surface water/groundwater vertical flow velocities were about 1-2 centimeters a day, and that typical hydraulic conductivities of the aquifer near the surface water/groundwater
interface were 4 to 25 feet a day. Variations in water temperature and stream-bed sedimentation can change the rate of groundwater/surface water exchange by several orders of magnitude.

In response to a question about identifying the order of magnitude of flood events that would affect surface water/groundwater interaction, Brent clarified that there were no consistent threshold levels that he observed. In response to another question, he also noted that there were two major geothermal systems in the study area that could be affected by water temperature variations. A full report on this and other studies addressing groundwater/surface water interaction in the Great Miami Basin can be found via http://www.miamiconservancy.org/resources/Library, MCD’s website.

Social Media: Opportunities and Uses for Water Utilities
Gayle Foster, OKI, described the impact of social media on everyday communications and its exponential value of reaching mass networks of people and organizations. Gayle emphasized that the difference between social media and other traditional media such as print and broadcast is that social media is based on two-way communications. There is opportunity for people to respond and converse in real time from anywhere in the world. This real-time factor, for good or ill, means people are no longer dependent upon third-party filters (such as the news) to get and give information and points of view. For example, this ability has impacted how consumers can communicate to other consumers about businesses and services in real time. One bad review of a service can turn into 10,000 bad reviews within a day.

Gayle shared several statistics about the largest social media network services. Facebook has over 800 million active users with half of these users logging in everyday. 350 million users actually access their accounts through mobile devices. Over 300,000 users use Facebook messaging for private communications, which has prompted a growing number of universities to discontinue issuing email accounts for students. Gayle presented an overview of the Facebook system of pages, and how they can work for water utility companies. Gayle also introduced Twitter to the group and discussed how useful Twitter can be to issue water alerts or for communicating to teams in the field simultaneously and in real time. Facebook and Twitter are great ways to create customer networks based on interest, location or other variables. You can control the message by being able to initiate communications and can respond directly to customers.

Michele Ralston, Greater Cincinnati Water Works (GCWW), described how GCWW is using social media with customers and other stakeholders. Michelle shared recent research from the Pew Research Center which showed that while 82% of users of social network sites are between the ages of 18-29 years, adults 50-64 years are one of the fastest growing groups of users, and 47% of this older group was introduced to social media by younger family members. An American Association of Retired Persons case study indicates that in the next five years social networks will be one of the most effective means of communicating with the older age group.
Michele explained that GCWW is using social media to enhance its effectiveness with electronic media because more Americans are getting their sources of news online as opposed to local newspapers. She pointed out that electronic media has broadened its presence on social networks and are often picking up stories from postings in Twitter and Facebook. She has effectively used Twitter and Facebook to send out information on events that then got picked up and covered by electronic media. Two examples were Channel 12 coverage of the Green Roof Project and Channel 5 coverage of water main break stories. She said that Twitter has been the most effective tool for GCWW to reach the media and key stakeholders (community and environmental groups, local officials, etc.) because tweets can be and are re-tweeted by GWCC followers, which then extends the reach of a GCWW message.

Michele emphasized that it is important to have a targeted and multi-faceted approach to your social media effort. Not all stories will interest all segments of your customers. Using three or four different social media outlets maximizes the opportunities to get your word out to the public. Focusing content is also essential. The focus of the GCWW message revolves around quality drinking water, customer service, and GCWW activities in the community. The messages that seem to get the most response are those dealing with high-profile projects and events such as water main breaks.

Michelle showed examples of customer interactions on the GCWW Twitter page, including a complaint that the sidewalks around a water storage tower were not being cleared of snow the way ordinary citizens are expected to keep their walkways clear. As a result, GCWW was able to respond immediately both in terms of dealing with the snow and in communicating with the commenter directly. One of the ideas to come from these interactions is to incorporate social media monitoring (Twitter) in the GCWW call center in order to respond quickly and efficiently to customer queries. She noted that with customer demographics changing, it is important to communicate the way customers prefer. GCWW is also considering using social media to communicate to the public about high profile engineering/construction projects in the near future.

In response to a question, Michele confirmed that GCWW leadership support had been essential to using social media effectively, and that training sessions with division heads and middle managers had been very helpful. In response to a question about a social media “downside,” she said that a few commenters have been negative or profane, but noted that these “conversations” can be taken off-line. In response to a question about workplaces that can’t afford a staff person devoted only to social media, Michele suggested first identifying a communication goal as that will help determine specific tools; then identifying who on staff is interested; having them read about and experiment with social media; and starting with one tool, such as Facebook.

**Adjournment**

The meeting was adjourned at 12:25 p.m., and the committee was reminded that the next meeting is scheduled for 10 a.m. on March 7, 2012.