THE SOURCE

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Steele Plant Reopens

In 1966, a state-of-the-art 10 million-gallon-a-day (MGD) conventional drinking water treatment plant, named for Mr. Joe M. Steele of the Steele Canning Company in Springdale, began treating raw water and producing potable drinking water from Beaver Lake. At the time, the water treatment plant was owned by the city of Springdale and the raw water intake on Beaver Lake was owned by Beaver Water District.

Times were good in Northwest Arkansas. Beaver Dam had been completed and Beaver Lake had filled up sooner than expected. In addition to providing for flood control, drinking water for homes and for industrial uses, and hydroelectric power, the lake provided new opportunities for recreation such as boating, fishing and camping. Life was good in this part of the state.

Forty-three years later, the plant has been refurbished and renovated, bringing total capacity of Beaver Water District to a whopping 140 MGD a day capacity.

"It's a milestone. It's an historic event," said Alan D. Fortenberry P.E., CEO of Beaver Water District. "We've gone from 10 MGD to 140 MGD, from a population of about 125,000 in Benton and Washington counties in the 1960s to approximately 400,000 people today. What once was primarily a rural area with farms and orchards, some food processing industries and a university is now very urbanized. We've seen Northwest Arkansas grow from a spot on the map to worldwide headquarters for multinational corporations such as Wal-Mart and Tyson Foods. We've seen farmland sold and developed into residential areas almost overnight. And with people comes more

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demand for water. Prosperity just wouldn't be possible without a sufficient supply of economical drinking water."

Times have changed a lot since the mid-1960s. Today, Beaver Water District supplies drinking water to more than 250,000 people and industries in Fayetteville, Springdale, Rogers, Bentonville and surrounding areas. These cities then resell the water to surrounding towns and communities.

The District's mission is to serve our customers in the Benton and Washington County area by providing high quality drinking water that meets or exceeds all federal and state regulatory requirements in such quantities as meets their demands and is economically priced consistent with our quality standards.

As the population grew, so did the demands on the original Steele plant, which was renovated from 10 to 25 to 50 MGD from 1966 to 1978. By 1980, more than 80,000 people derived drinking water from Beaver Water District. In 1993, another 40 MGD plant, the Hardy W. Croxton Plant, began operations. In 2006, to continue to keep pace with exploding population growth and associated water demands, a 60 MGD plant expansion was completed.

"Once that happened, we were able to take the Steele plant out of operation so it could be renovated," Fortenberry said.

Crossland Heavy Contractors began work on the project in April 2007. This past December, plant startup began ahead of the contracted schedule. Then on Jan. 22, the first treated water from the Steele plant made its way to customer cities.

"This brings Beaver Water District's total treatment capacity to 140 MGD, enough to meet projected drinking water needs until the year 2020," Fortenberry said. "If it weren't for the foresight of our Board of Directors, we couldn't plan ahead for this kind of expansion. Thanks to them, we funded the Steele plant renovation with money from reserves. The total cost of the construction was $26.1 million."

No Disruptions Due to Ice Storm

You may have lost your electrical power, but you never lost your water supply. Not if your water comes from Beaver Water District, that is.

Though it has been categorized by some as "the worst ice storm in Arkansas history," the weather event that began on Jan. 26, and continued to have lasting effects for several weeks for some in Northwest Arkansas, did not cause any interruptions in service when it came to Beaver Water District and its four customer cities and their customers.

"We were in good shape throughout the storm," said Stacy Cheevers, Plant Manager at Beaver Water District. "We operated on commercial power throughout the event. We were prepared for this. We had eight people on 24-hour shifts starting that Monday, in anticipation of the storm that was coming."

If electrical power from Carroll Electric had been lost, Beaver Water District has standby generators that are powered with diesel, so it would not have caused any service interruptions, he said.

"We didn't have any problem delivering water to our four customer cities," Cheevers said. "While we lost our telemetry signal that tells us the water

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levels in tanks at Fayetteville, their personnel simply read tank levels manually and reported to our operators at the plant so their tanks stayed full as usual."

When asked if any other challenges came up, Cheevers noted that a tree fell on a power line in the right of way between the water plant and the raw water intake on the lake, but a crew got to work on that quickly. Even though the overhead line was down, the plant still had power to a portion of the pumps from the underground feeds, he added.

Tree south of District's Administration Building on Jan. 27. Photo by Danny Dearing.

"As always, Beaver Water District staff worked 24/7 to ensure we protected the public health with safe, clean water for Northwest Arkansas, even with an ice storm in our midst," Alan D. Fortenberry P.E., CEO of the District said.

On Feb. 19th, the District's Board of Directors recognized several members of the District's staff for outstanding service during the ice storm.

While Beaver Water District did not experience any interruptions in service, more than 60 smaller water systems across the state did come under boil orders for various reasons. To lend a hand, Beaver Water District's laboratory and personnel tested numerous water samples to help get the boil orders lifted as quickly as possible.

Knowledge Gap Assessment of Community Leadership in the Beaver Lake Watershed

By Robert Morgan, P.E., Ph.D.

In Arkansas, decisions regarding protection of our natural resources have largely been delegated to local community leadership. In 2007, the Northwest Arkansas Council initiated a project to develop a watershed management policy for Beaver Lake. To bring the project's policy advisory group up to speed rapidly, it was necessary to know whether community leaders in our watershed possessed adequate knowledge about Beaver Lake and its watershed to make informed management decisions. Beaver Water District, with assistance from the Forrester Group, a regional environmental mediation company,

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engaged in a knowledge gap assessment to answer that question.

Knowledge gap assessment is an evaluation of an organization's available knowledge with respect to the knowledge required to meet that organization's mission. Knowledge gap assessment has been used in systems management for decades; however, it has not often been applied to watershed processes. In the past few years, Will Focht and Michael Langston from the Environmental Institute at Oklahoma State University have expanded the use of knowledge gap assessment for informing watershed management. The Beaver Lake Knowledge Gap Assessment and Dialogue (KGAD) was a practical application of theoretical work that Focht and Langston had done in the Spavinaw Creek watershed. The KGAD blended a series of mental modeling, mediation, dialogue, engineering and management systems concepts into a tool that could aid the user in public education, management planning, and collaborative endeavors.

The KGAD involved four tasks including: determination of the knowledge necessary to make informed management decisions (concept or mental mapping); selecting individuals representative of leadership in the multiple communities within our watershed to assess; conducting open-ended, one-on-one interviews with the selected leadership; and analyzing the results.

Obviously, no single person can possess the total knowledge of the watershed or of the persons most influential in stakeholder groups within the watershed. A facilitated discussion among regional scientists and resource managers led to the development of a concept map of Beaver Lake and its watershed. The map identified several issues of interest and provided lines of influence and processes that affected those issues. The concept map was then converted into a simplified

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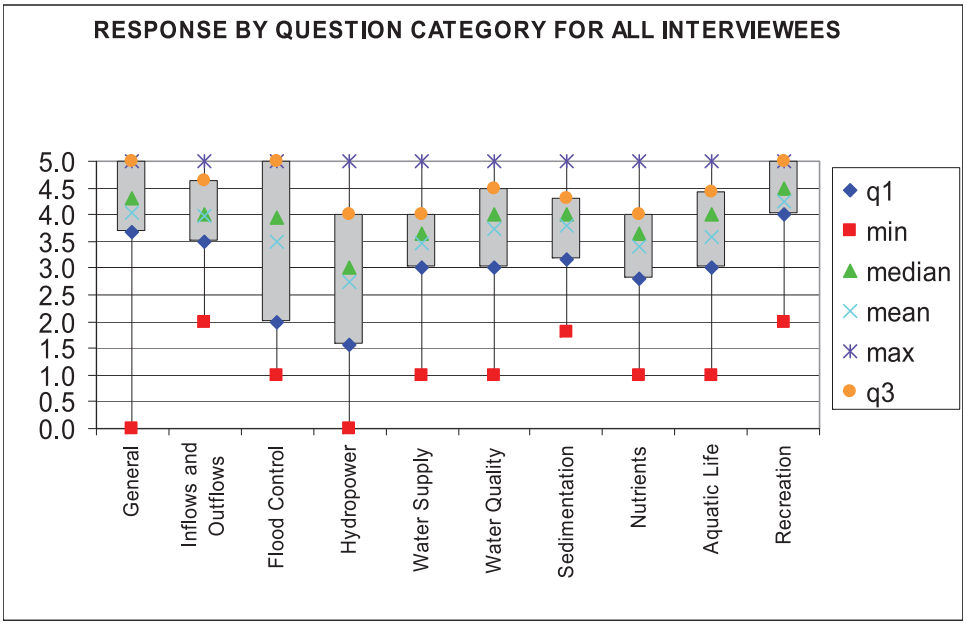

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survey document outlining the key processes and concepts.

The representative group of community leaders was found through a snowballing process. In the snowballing process, several individuals with knowledge of the different communities were asked to identify other individuals key to the various community groups and who those groups turned to for information. A list was compiled and those persons were solicited for interviews. The Forrester Group's Shawn Grindstaff then conducted open-ended dialogues with the community leaders to evaluate their state of knowledge with respect to the concept map developed by the resource managers and scientists. These dialogues were extensive and lasted anywhere from one to four hours depending on the participant's willingness to continue. Each participant's knowledge was rated from 0 (totally dysfunctional) up to 5 (extraordinarily deep knowledge) for each issue. The scores were compiled in graphic format to allow visual interpretation of the results. All interviews were conducted on the condition of anonymity and confidentiality.

The issues identified in the concept mapping exercise were general knowledge, inflows and outflows or hydrology, flood control, hydropower, water supply, water quality, sedimentation, nutrients, aquatic life, and recreation. Twenty community leaders participated in the dialogue process. Overall, it was found that the group had a very good handle on general knowledge of Beaver Lake and its watershed and on processes related to recreation. The lowest scoring areas were production of hydroelectric power and flood control processes. However, within these low scoring areas, there were individuals with extraordinary knowledge. A common thread across almost all issues was a gap in knowledge of the local, state or federal agency with management responsibility over that issue. The KGAD also sub-divided each issue into key concepts and rated participants on each key concept. The results may be viewed on the Beaver Water District's website, *www.bwdh2o.org*.

Overall, our community leadership sample exhibited good knowledge of Beaver Lake and its watershed. It was reassuring to know that the persons with influence on watershed and lake management decisions were informed. On the other hand, even though knowledge was present in the group as a whole, in each category there were individuals who did not possess a great deal of knowledge on specific subjects. That was entirely as expected given the complexity of lake and watershed management. While the interviewees were outstanding in their fields, they were not expected to have extensive knowledge in lake management. An unexpected byproduct of the KGAD was the number of stories about the lake and watershed brought to Grindstaff's attention. These stories reflect the oral history of our watershed. This oral history represents an area of research that should be compiled before it disappears.

In summary, the KGAD evaluated information/education needs related to our community leadership's knowledge of Beaver Lake. The process focused on persons influential in shaping opinions of various community groups. The results have been provided to TetraTech, the consulting firm hired by the Northwest Arkansas Council to work with watershed leaders to develop a Beaver Lake watershed management policy to protect our source of drinking water. (For more information about the KGAD, contact Dr. Robert Morgan at *rmorgan@bwdh2o.org*.)

NACA Begins Construction

Construction bids for the transmission lines for Northwest Arkansas' new regional wastewater treatment facility were awarded at the Jan. 21st board meeting of the Northwest Arkansas Conservation Authority (NACA).

The low bid for the Little Osage Line (from Bentonville) was $9,602,350 from Crossland Heavy Contractors, Inc., and the low bid for the Brush Creek Line (from Tontitown) was $4,148,240 from Rosetta Construction, LLC., according to John Sampier, Executive Director of NACA.

"The bids were some $5 million under estimate. Construction should begin in about 30 days," Sampier said in an interview on Feb. 5.

The NACA Board then met in a special meeting on Feb. 26th. At that time, the board awarded the low bid for the construction of the Regional Wastewater Treatment Facility to BRB Con tractors. The bid was $24,110,000, about $2.5 million under estimate. Following this, the Arkansas Department of Environmental Quality published the required 30-day Public Comment Notice for a Construction Permit.

To fully appreciate the significance of this news, one must step back in time to the year 2000, when the water utility commissions of Rogers and Springdale and their respective water utility superintendents began discussing the need for an acceptable method of removing phosphorus-laden biosolids from the northwest Arkansas watershed. NACA was formed by the two cities in 2002 under the authority of the Arkansas Joint County and Municipal Waste Disposal Act. Soon, Bentonville joined NACA, and that city's need for additional wastewater capacity caused the Authority to adopt the regionalization of wastewater treatment as its overall goal, Sampier explained.

Today, NACA membership consists of 10 cities – Bentonville, Rogers, Lowell, Bethel Heights, Springdale, Tontitown, Highfill, Cave Springs, Elm Springs, and Centerton.

"NACA is not only a response to the Oklahoma-Illinois River issue, but a recognition by these 10 cities that it is environmentally and economically imperative that regional solutions be found that will protect the watersheds of the White River, Spavinaw, and Illinois," Sampier said.

While the Environmental Protection Agency is proposing a strict limit for the effluent from the plant, Sampier said both NACA and its engineers and the Arkansas Department of Environmental Quality

The regional treatment site is located on Snavely Road two miles south of the Northwest Arkansas Regional Airport. Photo: Google Maps/Google Earth

believe the proposed EPA limits of 0.1 mg/l of phosphorous per liter are unrealistic.

"The other three signatories to the Oklahoma-Arkansas Agreement – Fayetteville, Springdale and Rogers – all were given five-year permits of 1 milligram per liter phosphorus. Since Bentonville was a signatory and our facility will be used 85% by Bentonville, we believe we should be treated the same as the others. We recognize that when the agreement expires in June of 2012 that the limits will be revisited, but we believe that a 0.1 mgl phosphorus limit to be imposed on us after three years cannot be supported by any current stream data on the Osage Creek. Besides, who can tell what will be necessary in three years? Through the leadership of ADEQ, our attorneys and assistance from our Congressional delegation, we hope to resolve this issue quickly so we can proceed with construction."

District Employees Honored For Professional Excellence

Bill HagenBurger, 2008 Chair of the Northwest District of AWW&WEA, presents awards to Beaver Water District employees Mike Smart of Avoca (left) and Cindy Harp of Rogers.

The Northwest District of the Arkansas Water Works and Water Environment Federation recently named Mike Smart of Avoca, a Water Operator with Beaver Water District (BWD), 2008 Water Operator of the Year-More than 5,000 Population. Cindy Harp of Rogers, a Laboratory Technician with BWD, was named 2008 Laboratory Professional of the Year.

Smart began working for BWD in 1992. He is a certified Grade IV Water Treatment Operator, and he also holds a Grade IV Water Distribution Operator license. Harp, who began her career with BWD in 1995, also holds a Grade IV Water Treatment Operator license and Grade IV Water Distribution Operator license, as well as a Class III Wastewater Treatment Operator license and an Advanced Industrial Wastewater Treatment Operator license.

Smart and Harp are established, recognized leaders among their peers in their respective fields. The two were also recognized by the Beaver Water District's Board of Directors at the board's monthly meeting in January.

The Northwest District of the AWW&WEA formed in 1950 to encourage the education and licensing of its members in the fields of water and wastewater systems and to provide a venue by which the members can share information, obtain training and improve the overall standing of our profession within the communities it serves. For more information, visit *www.nwd-awwwea.org.*

Study Tests Uses for Water Plant Waste

By Caleb Fort
(Reprinted from The Morning News, Jan. 22, 2009)

Water providers might be able to use waste from their treatment plants to improve the quality of Beaver Lake.

The Beaver Water District landfills water treatment residuals, the solids removed from the lake water to make it potable, for about $250,000 a year, said Bill Hagenburger, plant engineer for the district.

Brian Haggard, director of the Arkansas Water Resources Center, researched the effectiveness of using residuals to absorb phosphorus, which he said is one of the leading contributors to problems in the area's lakes and rivers.

Phosphorus can come from chicken litter, septic systems and the soil. The nutrient contributes to algae growth, so limiting the amount of phosphorus can limit the amount of algae, Haggard said.

Algae can cause taste and odor problems, take oxygen from the water and sometimes release toxic chemicals.

The district regularly commissions studies by the Water Resources Center, part of the University of Arkansas.

The usefulness of residuals comes from the alum left over from the treatment process. Alum is a chemical used to help particles settle, one part of the process of making lake water potable. When the alum-bearing residuals come into contact with phosphorus, the alum binds to the phosphorus, making it insoluble in water, Haggard said.

In some tests, the Beaver Water District's residuals reduced the phosphorus transferred from soil to water by 80 percent, Haggard said.

Residuals could be surface-applied to high-phosphorus soils, used to treat chicken litter or tilled into the top several inches of problematic soil, he said.

The plant produced 6,776 tons of residuals in 2008, Hagenburger said. That might sound like a lot, but it would barely put a dent in treating the chicken litter produced in the area, Lloyd said.

"It's very promising, but it would be on a very limited basis," he said. "We'd be looking at a process to identify which areas would give us the most bang for our buck."

Because the plant produces a relatively small amount of residuals, a program to use water treatment leftovers would have to focus on high-phosphorus areas near Beaver Lake or the White River, Lloyd said.

The district and the water resource center have to do at least another year of research on the idea, especially testing its practical application outside of the laboratory, Lloyd said.

It will be at least a year and a half before the district has a practical use for the residuals, he said.

One potential problem is the Arkansas Department of Environmental Quality limits surface application of water treatment residuals to 10 tons per acre, he said. That might not be enough for the residuals to bond to phosphorus, he said, so the district might have to work with the department to change the rules, he said.

The Benton-Washington Regional Public Water Authority, a smaller provider than Beaver Water District, is in the midst of settling a fine with the Arkansas Department of Environmental Quality, in part because the department says the authority did not properly dispose of residuals.

A mixture of dirt, alum and water falls from an auger conveyor into a pile to be transferred to a dump truck at the Beaver Water District treatment plant in Lowell. (Photograph by Amy Wilson.)

"It would be great if they did something where we could get rid of (residuals) in a useful way," said Scott Borman, director of the authority.

Haggard said he was not familiar with the authority's treatment process, so he could not say how effective its waste would be at absorbing phosphorus. Residuals vary depending on treatment process and the water source, he said.

Fast Facts
Water Treatment

• Water Treatment Residuals: The solids removed from raw water during the process of making it potable. In the case of Beaver Water District, the residuals are dirt plus alum, said Larry Lloyd, chief operating officer of the district.

• Alum: A chemical used to clump particles together during water treatment to help solids settle out of the water. It also bonds to phosphorus, making it insoluble in water, said Brian Haggard, director of the Arkansas Water Resources Center.

• Phosphorus: A nutrient Haggard said can cause excessive algae growth.

Source: Staff Report