

Straight From The Chair

By: Gwen Pozega, MSAWWA Chair

Hello MSAWWA members. I hope that you all had a great summer and are getting ready to enjoy that snow that is starting to cap the mountains around us.

I'm excited to serve as the Chair of this year's Board and I'm equally excited to welcome our newest members to the Board, Nicole Mosby and Collette Anderson. Being a member of the Board for MSAWWA and being involved in MSAWWA committees has allowed me the opportunity to work with great Montana professionals and has opened my eyes as to the dedication and hard work that the Board and committee members donate to the water profession. With that said, thank you MSAWWA Board and all committee members!

The Board members have been participating in some key events and working on some key items over the past months:

- Revisions to the by-laws and updates to the strategic plan board position descriptions to change from a 9-member board to a 7-member board. Revisions will require approval by the Board and the general membership by vote during the annual meeting in May 2014. Be sure to attend the annual membership meeting to participate in the vote.

(continued on page 9)



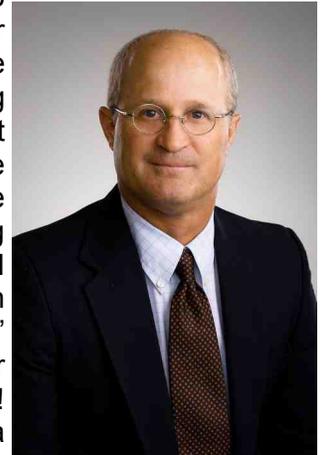
MWEA President's Message

By: Dan Harmon, MWEA President

Once again, greetings to WEF's Montana Member Association! During the MSAWWA/MWEA Young Professionals Meet and Greet this spring in Billings, I had the privilege to bump into a nice fellow who left quite a lasting impression on me. Before I could say hello, I was met with an enthusiastic "good on ya" and an open hand. After stuttering through a return hello! I learned this nice "mate" was a member of a team of soldiers (National Guard equivalent?) deployed from Australia to Montana to provide greatly needed assistance with fighting the wildfires in eastern Montana. In addition to learning that the folks down under deeply care about the USA (as we do of their country as well), this new friend of mine helped me better understand how precious water is and how important what we do as water professionals is to all of us. This friend from the Sun Burned Country told me about how amazed he was of Montana's beauty and its abundant water resources. He marveled at how much these resources are needed in his home land down under.

Showing curiosity about our group, I explained to him the reason for our gathering that evening was to provide support for the joint committee for MSAWWA/MWEA students and young professionals. (This is the committee working to help with networking and career planning for water professionals in our region, and we'd like to see it continue to grow.) His keen interest in what we do was very apparent, and we both discussed how important it is to get deeply involved with what you care about. Certainly he and his colleagues were leading by that example, a long way from home!

(Continued on page 9)



Inside:

- ***2013 Conference Highlights***
- ***2013-2014 MSAWWA-MWEA Boards***
- ***2013-2014 MSAWWA-MWEA Committee Chairs***
- ***Direct links to advertisers—just click 'n go!***



***“Working Together To Protect Montana’s Water Resources”
Highlights from the 2013 Conference***

The 2013 annual MSAWWA-MWEA Joint Conference was held in Great Falls on May 8th and 9th and provided an excellent opportunity for networking and a wide variety of sessions and topics eligible for continuing education credits. The Preconference was hosted by MWEA on May 7th with approximately 55 people attending the “Nutrient Limits & Their Effects On Montana Communities” themed sessions. Total Conference attendance was 159. In addition, there were 56 vendors on site that provided valuable information to all who took advantage of the opportunity. Numerous awards were presented during the banquet on Wednesday evening, as well as at the luncheons on Wednesday and Thursday. The awards presented for MSAWWA and for MWEA at the 2013 Conference were as follows:

WEF Arthur Sidney Bedell Award—Paul LaVigne

MWEA Small Systems Award—Richard Anderson & Keith Thaut (City of Conrad)

MWEA Stockholm Junior Water Prize—Triston Isakson (Fairfield High School)

MSAWWA-MWEA Lifetime Achievement Award—Warren Jones

MSAWWA-MWEA Donald Willems Scholarship—Andrew Olson, MSU Bozeman

AWWA Operator’s Meritorious Service Award—Ron Shorter, Gardiner Water & Sewer

AWWA George Warren Fuller Award—Logan McInnis, Mountain Water Company

Dignitaries representing both AWWA and WEF were in attendance at the conference. This year’s AWWA dignitary was Rosemary Smud, 2012-2013 Vice-President for AWWA. Rosemary is a senior sales engineer for American Cast Iron Pipe Company and lives in Northern California. Rosemary became involved in AWWA in 2003 when she first joined the Young Professionals Committee in the CA-NV Section, and is passionate about encouraging young water professionals to get involved with AWWA. Karen Pallansch joined the Conference as the representative from WEF, and has been a member of the organization since 1994. She has served in several capacities for WEF, at both the state and national level. Karen is currently a manager at the Alexandria Sanitation Authority and is a member of the 2012-2013 Board of Trustees for WEF. Thank you to both of these individuals for attending the 2013 Joint Conference!



At left—Logan McInnis, Chief Engineer for Mountain Water Company in Missoula, receives the MSAWWA George Warren Fuller Award for distinguished service at the 2013 Joint Annual Conference. Logan has served full terms on both the MSAWWA and MWEA Boards and is currently the National Director Elect for MSAWWA. Congratulations to Logan on receiving this prestigious award! AWWA Vice-President Rosemary Smud presented the award.

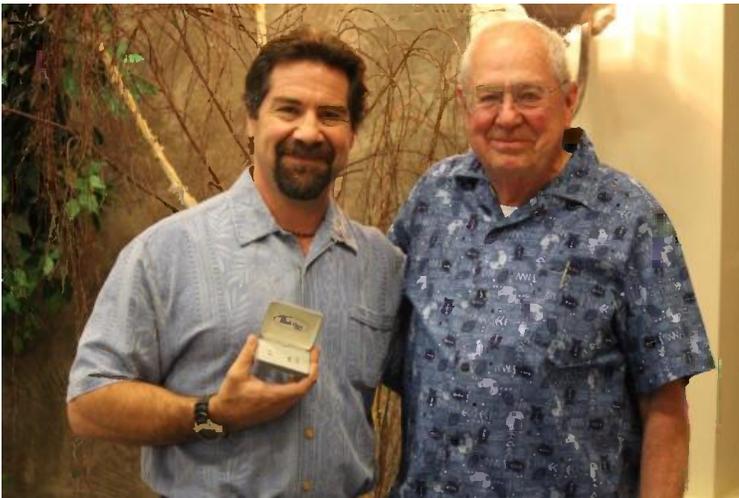
~2013 Conference Photos~



DNRC Director John Tubbs speaks at the opening session



WEF Dignitary Karen Pallansch presents Paul LaVigne with the WEF Arthur Sidney Bedell Award for extraordinary personal service to the organization. Congratulations and thank you Paul for all of your contributions throughout your career!



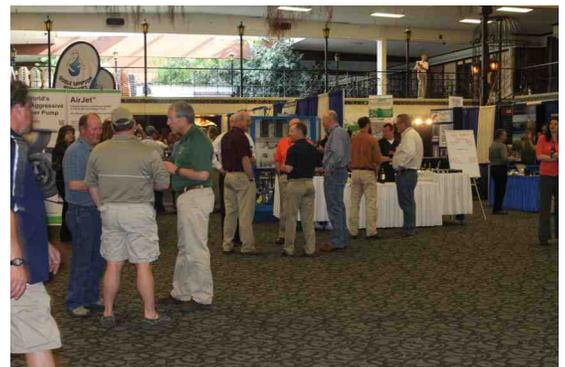
A great father and son team! Paul Montgomery purchased the jewelry made by his father Dick. Proceeds went to the Water For People fundraising effort. Thank you to them both for their generosity!



Bill Bahr presents the MWEA Small Systems Award to Richard Anderson and Keith Thaut with the City of Conrad. Congratulations!



Dr. Anne Camper presents the MSAWWA-MWEA Lifetime Achievement Award to a student of Dr. Warren Jones, who was this year's recipient. Dr. Jones was unable to attend in person and passed away this summer.



A good turn out for the Tuesday Night Ice Breaker—thank you Exhibitors for sponsoring the event.

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If so, please place your order through Robin Matthews-Barnes, MSAWWA Executive Secretary. MSAWWA receives credit for your order. The cost is the same to you, but MSAWWA gets a bonus!

NewsWaves is a publication of the Montana Section of the American Water Works Association and is published twice yearly. It is available for viewing or printing on our website at: www.montana-awwa.org.

We welcome contributions to *NewsWaves*. For more information, contact:

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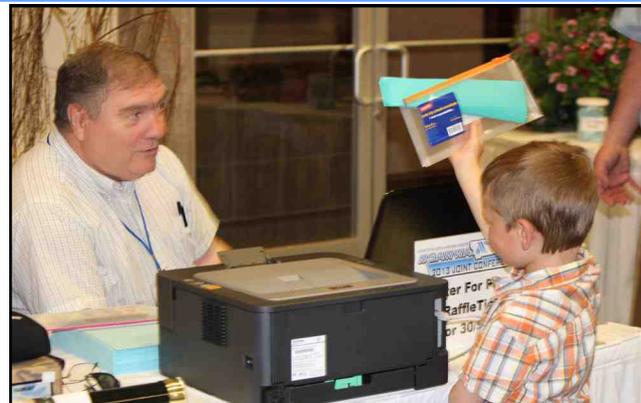
Thank You! Great West Engineering, R.L. Winston Rod Co., and Montana Fly Goods for donating the fly rod and reel for the Water For People raffle that took place at the conference. Retail value of the prize was \$1,140.00. Over \$5300 was raised for Water For People at the conference this year. Congratulations to Terry Threlkeld on winning the rod and reel. Thank you to John Camden and Barb Coffman for all of your efforts!

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John Camden teaching a future MSAWWA member how to raise money for Water For People!

~Joint Scholarship Fund Raffle~

Thank you to Morrison-Maierle, Inc. for the generous donation of the Samsung Galaxy Tab2 that was awarded as 1st prize in the raffle to help fund the Donald G. Willems Joint Scholarship. (2) \$100 Cabelas gift certificates donated by Interstate Engineering and Great West Engineering were also awarded as 2nd and 3rd prize in the raffle. Craig Woolard won the Galaxy Tab 2 and John Wilson and Jackie Kuhl were the recipients of the gift certificates. The raffle raised over \$1500 for the Donald G. Willems Scholarship Fund.

Thank you to all who purchase tickets!



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The Montana Section of American Water Works Association is dedicated to the promotion of public health and welfare in the provision of drinking water of unquestionable quality and sufficient quantity. Montana Section of AWWA will provide the forum and opportunity through which its membership can exchange information, learn of new issues and technologies, educate the public, and enhance the professionalism of workers in all areas of the water industry.

Mission of the Montana Water Environment Association

The Montana Water Environment Association (MWEA) is a non-profit organization dedicated to the preservation and enhancement of Montana's water environment. The Association is committed to advancing science and education, disseminating technical information, increasing public understanding and promoting sound public policy in the water quality and water resources field.



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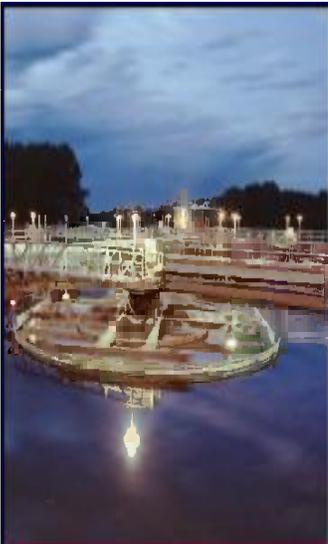
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Come and take advantage of the educational and networking opportunities at the 2014 Joint MSAWWA-MWEA Conference:

May 13th—Preconference (hosted by MSAWWA)

“Municipal Infrastructure Planning”

May 14th & 15th—Conference “Working Together To Protect Montana’s Water Resources”

Location: Hilton Garden Inn Missoula

Registration information will be emailed to members and will also be available on the website soon:

www.montana-awwa.org

Straight From The Chair continued....

- Two Board Members, Nate Weisenburger and Bill DeMeyer and AWWA Vice President, John Alston attended the annual Washington D.C. Fly-In. This allowed them the opportunity to meet with all three congressional delegations to discuss specific topics such as WIFIA.
- MSAWWA is looking into creating a joint website with MWEA. MSAWWA currently has a website but MWEA does not and has asked to share a website. MSAWWA could use this opportunity to further upgrade our own website. Costs to create a joint website are being explored.
- Chair-elect Greg Lukasik attended the 2013 AWWA Summer Workshop. Participating in this event allows you to meet your peers, network with other sections and attend some very useful presentations.
- At the end of October, Junior Trustee Collette Anderson and Executive Secretary Robin Matthews will be attending the 2013 AWWA Regional Meeting of Section Officers (RMSO). This is an important tool for gaining updated information on AWWA and gives the opportunity to see how other AWWA sections operate.

Our association is a great avenue to get involved with the industry and to provide networking between people with similar interests and goals. I encourage you all to take part! The time commitment is minimal and most employers will encourage and support your involvement. If you're interested in becoming a member of the Board or want to sign up for a committee, please don't hesitate to contact a current Board member or our Executive Secretary, Robin Matthews [info@montana-awwa.org]. I look forward to working with you all over this next year and also hope you will join me in encouraging participation and membership in MSAWWA. See you in May 2014 at the Annual Conference in Missoula.-Gwen

MWEA President's Message continued.....

With that in mind, we would like to again encourage everyone to participate in a committee this year! In addition, the Montana MWEA Delegation is also planning a WEFMAX event in early spring (April) 2014, and local input and participation in the program is highly encouraged. Please see any of the MWEA board members and let us know of your interest and we will do our best to get you involved. For those who are really curious about what occurs at a WEFMAX event, don't hesitate to grab our Past President Coralynn Revis. Cora has recently participated in a WEFMAX event and can give you all the details.

Looking forward to seeing you at the WEFMAX event and/or the joint MSAWWA/MWEA conference in Missoula next spring. "Water's Worth It!" Good day mates, and good on ya!

~ Dan Harmon

Congratulations to Andrew Olson!

Recipient of the 2013

Donald G. Willems Scholarship

Andrew Olson, who is an environmental engineering student at Montana State University, is the recipient of the \$1000 MSAWWA/MWEA Joint Scholarship given in honor of Donald G. Willems. Congratulations to Andrew who will graduate this December!

New MWEA Pretreatment Committee

MWEA has added a new committee to help communities, engineers, and operators discuss wastewater pretreatment. The pretreatment committee will be a forum for discussion of both existing and new pretreatment programs. The committee will provide direction to new programs being implemented. This committee will also serve as a round-table for existing communities with pretreatment programs to discuss problems or regulations. Please contact Don Clark at DClark@helenamt.gov or Amy Deitchler at adeitchler@greatwesteng.com to sign up or receive more information.



Sell those scholarship raffle tickets Cora!

Missoula's WWTP & Land Application A Contribution From: Starr Sullivan, WWD Superintendent

Without chemicals and without filtration, Missoula's 12 MGD design (8 MGD average daily flow) municipal wastewater treatment plant reliably reduces phosphorus to 0.3 mg/L.

A 2004 upgrade costing \$18 million modified the existing conventional aeration tanks (1MG total volume) to the Modified Johannesburg Process. Two new trains of bioreactors with a volume of 1.4 million gallons were added to the two existing trains, more than doubling the aeration tankage.

The facility consistently produces an effluent with a total-phosphorus concentration of less than 0.3 mg/L as follows. The otherwise conventional looking concrete aeration tanks have been divided into a plug-flow arrangement of seven baffled cells each. Return activated sludge is mixed with primary effluent as it enters the first of seven in-line biological treatment cells.

In the first tank (pre-anoxic), bacteria remove the residual nitrate-nitrogen from the RAS so that the nitrate demand for BOD is satisfied. Flow proceeds to an anaerobic tank where it is mixed with a Volatile Fatty Acid rich flow from the modified anaerobic digester (fermenter). Here, bacteria take in VFA as an energy source. The third tank in the bioreactor is anoxic; flow from the end of the aeration tanks is recycled to provide nitrate-nitrogen removal.

The fourth, fifth, sixth and seventh tanks are conventional, plug-flow aeration tanks. Here, BOD is removed, ammonia-nitrogen is converted to nitrate-nitrogen, and bacteria use the VFAs that were fed into the anaerobic tank to reduce the soluble phosphorus concentration to levels as low as 0.01 mg/L.

The Missoula Wastewater Division has an onsite laboratory that performs both process control and permit compliance testing. All analysis is done in house with the exception of metals and toxic organics. The lab utilizes an auto-analyzer due to the large number of samples at low nutrient levels.

Treatment Supervisor Gene Connell compiles process data that staff members collect and analyze from each bioreactor cell weekly. The data is compiled in a plant developed Access database. Connell plots the results on graphs to display treatment efficiency. Process changes are made accordingly.

By biologically removing phosphorus, there is no need for Missoula to add chemicals such as alum or ferric chloride. And, as a result, treatment is more sustainable. Plus, Missoula ratepayers are saving hundreds of dollars per day in chemical expenses. The plant does have the ability to add ferric chloride to the splitter box before the secondary clarifiers if it became necessary. The staff are definitely "hope for the best, plan for the worst" types.

(continued on page 12)





**Odor Control—In A Big Way!
~Submitted by Missoula WWTP~**

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**Stockholm Junior
Water Prize
Awardee**

***Triston Isakson from
Fairfield High School
with members of the
SJWP Committee.
Triston was the
recipient of this
year's award for his
project titled:
"Cutthroat Trout Re-
Introduction – Phase
III Modeling" – Phase
III was a temperature
modeling project
studying fish habitat***

***in streams leaving the Rocky Mountain front area. Triston competed at the
national competition in Portland this last June. Congrats to Triston—an
impressive young man!***

Missoula WWTP & Land Application continued.....

Careful oversight of the treatment process keeps effluent TSS (total suspended solids) at 3 mg/L and the total effluent phosphorus averages 0.29 mg/L during the summer permit period. The facility also reduces nitrogen to an average 7 mg/L.

To achieve similar phosphorus removal efficiency, most treatment facilities combine biological and chemical removal. And, utilize polishing filters. Missoula gets it done without chemicals, without filtration.

The Missoula plant continues to investigate other methods of nutrient removal in anticipation of lower regulatory discharge limits to the Clark Fork River. The plant is currently working with the private company AlgEvolve on site piloting "photo-reactors" that grow algae to remove phosphorus to very low levels that creates a usable end product and not creating undesirable chemical sludges.

Missoula uses ultra-violet disinfection. Like most plants, in the past they used elemental chlorine. In 2003 they went online with a UV system. The operators have found UV to be much easier and safer to use than gaseous chlorine. This also eliminates this chemical influence on the river.

The Facility SCADA system uses Wonderware System Platform and Allen-Bradley PLCs on a fiber-optic network. All servers and switches have online redundancy. This control system allows tight system control with a low staffing level. The five plant operators work 10 hour shifts only during the day. They rotate on-call duties and the automated system notifies them if there is a problem afterhours.

After anaerobic digestion and dewatering with a centrifuge, bio-solids are conveyed next door to a private composting facility. Since 1975, dewatered sludge has been processed by EKO Compost, which bags the composted bio-solids for retail and wholesale customers, including Home Depot. Eko Compost was founded by a professor from the University of Montana which is also located in Missoula.

Outside the fence, things get even more interesting. Paraphrasing the famed radio announcer Paul Harvey, the rest of the story follows.

The City of Missoula piloted a beneficial reuse program of using a portion of the treated effluent to irrigate 1.6 acre hybrid poplar tree pilot project starting the spring of 2009. Instead of discharging, the remaining phosphorus, nitrogen, and other wastewater constituents after BNR treatment to the Clark Fork River these remaining constituents are taken up by the trees.

The pilot project results are encouraging. Testing in and around the pilot grove shows no significant negative effects on groundwater or soil. The poplars, meanwhile, are thriving, growing from 12-inch "whips" in 2009 to trees that now stand 13 feet high. Encouraged by the success of the 1.6-acre pilot poplar grove at the wastewater treatment facility, City Council members have authorized the lease, capital costs and long term management of a new, nearby 130-acre hybrid poplar tree farm (to planted in the spring of 2014).

The use of wastewater effluent to grow trees is a perfect complement to Missoula's sludge disposal practices. EKO Compost will, use the tree pruning material for a compost bulking agent. The mature trees will be harvested and sold as saw logs. Hybrid Energy Group Vice President Tom Platt sees the project as groundbreaking because effluent is becoming a commodity. "It's taking a waste product that currently is a liability in the river and a liability to the city and it's turning it into something that can be an asset, along with the biosolids produced" he says.

Planting and bringing the new forest to maturity in 12 years will cost an estimated \$1.3 million. Estimated value of the mature saw logs is \$2 million.

Wastewater Superintendent Starr Sullivan estimates that the 70,000 poplar trees will drink up one million gallons of effluent per day at maturity. "The expansion has the potential to remove nearly 20 percent of what our current discharge is to the river," he says. Pointing to an osprey nest overhead, Sullivan expresses hope that this project will serve as a blueprint for other communities.

The bottom line is that the Missoula Wastewater Division provides exceptional value to its 66,000 citizens. The residential sewer rates are near \$13 dollars per household for collection and treatment to advanced BNR (Biological Nutrient Removal) levels. The facility also provides exemplary permit compliance.

Membrane Bioreactor Facility – Bigfork, Montana

Submitted By: Jeff Ashley, P.E., Morrison-Maierle, Inc.

Background

The Bigfork Water and Sewer District (District) provides water and sewer service to residents in and around the Village of Bigfork, Montana. This rapidly growing community had an aging WWTP (trickling filter system) on a very small site that discharges into one of the most pristine water bodies in North America, Flathead Lake. The local economy is heavily based on summer time tourism to Glacier National Park. As a result, wastewater flows and loads significantly increase in the summer compared to the winter. In 2006, the District partnered with Morrison-Maierle to prepare a wastewater Preliminary Engineering Report (PER) for the purpose of overall wastewater facility planning over the next 20 years. The PER investigated several treatment options for the WWTP to meet the District's current and projected permitted effluent criteria and projected increased capacity needs. Due to the plant's discharge into Flathead Lake, effluent nutrient limits (nitrogen and phosphorus) will continue to be reduced with future discharge permits.

The PER recommended that the plant be converted to an MBR system to achieve more stringent nutrient discharge limits while also maximizing treatment capacity on the constrained site. The MBR system consists of biological treatment of carbon and nitrogen using activated sludge, chemical treatment for phosphorus, and membrane filtration for solids separation producing a very high quality effluent. This technology will give the District flexibility in meeting stringent effluent discharge limits, and also the ability to explore wastewater reuse opportunities in the future.

During the initial planning process, it was anticipated that the District's effluent discharge permit requirements would be continually more stringent over a 10-year period, especially in regards to nutrients. This gradual implementation of lower effluent limits would allow the District to proactively plan for the future, and consider long-term funding strategies for the MBR upgrade. In order to spread out the overall cost to District rate payers, it was recommended that the existing WWTP be upgraded to an MBR facility in phases of construction. This approach also allowed the District to address near term needs first, and eventually implement the full MBR system when needed for capacity and discharge permit requirements.

Phase 1 – Headworks Upgrade

The first phase of the plant upgrade involved replacing the existing headworks facility, which was a high priority for the District due to its deteriorating condition. The existing headworks used a traditional bar screen with 1-inch (25-mm) bar spacing to screen incoming sewage. The headworks building was a deteriorating facility with a ventilation system that was inoperable causing significant odors in the building; a failed automated cleaning mechanism for the screening equipment, requiring manual cleaning of the bar screen; and poor performance of the grit removal system. The PER recommended completely replacing the headworks by demolishing the existing building and constructing a new headworks facility.

An MBR system requires an advanced headworks facility to provide proper pre-treatment to protect the membranes from hair, fiber and other products that pass through a traditional bar screen. The headworks design included completely redundant fine screening equipment with screen openings of 2 mm, along with grinders and washer/compactors. Grit removal was also included for pre-treatment. The fine screening headworks facility was completed in November of 2008, and became the first fine screening headworks facility in Montana. The Phase 1 construction cost was approximately \$2.2 million. The headworks can treat a projected peak hour influent flow of 1.85 mgd, with the ability to add a third fine screen in the future. Side stream equalization was also included in the design using a new flow control structure downstream of the headworks, and existing tankage for equalization storage. This provides operators the ability to limit the flow that is routed to the MBR system.

Phase 2 – MBR Equipment Pre-Selection

The Phase 2 project focused on the MBR upgrade at the WWTP. Due to the significant differences between competing MBR manufacturer's equipment, Morrison-Maierle recommended to the District that a detailed pre-selection



Phase 1 Headworks facility showing the fine screening equipment.

process be performed in order to competitively evaluate and select the MBR equipment before proceeding into design. This process allowed the District to select equipment from one MBR manufacturer based on an evaluated bid, and also become familiar with the equipment, operations and maintenance processes. The pre-selected MBR manufacturer would then be held to the equipment cost, and this cost would be included in the overall construction project bid by general contractors.

A Request for Proposals (RFP) was prepared for the MBR equipment pre-selection and was then publically advertised. A detailed scoring matrix was established in the RFP in order to formally evaluate and rank the proposals and short list if necessary. Four proposals were received from MBR equipment manufacturers, and two manufacturers were short listed for their high scores in the evaluation categories of implementation cost, design and complexity, years of experience, technical support, and warranty of their systems.

One very important aspect of the pre-selection process was for the engineering team and District staff to visit MBR installations and talk with engineers, operators and public works staff about their systems. Since MBRs were new to Montana and represented a significantly different technology for District staff, these visits provided valuable insight for the entire team. Key members of the District and Morrison-Maierle design team visited two MBR installations for each short-listed manufacturer. Formal presentations by each manufacturer followed and then a final evaluation process was performed for ultimate selection of one manufacturer for the project. Enviroquip (now Ovivo) was selected to provide MBR equipment for the District. Ovivo incorporates Kubota flat plate microfiltration membrane cartridges in their systems, which have a nominal pore size of 0.4-microns.

The pre-selection process for the project was unique compared to a typical design project due to the thorough evaluation of equipment performed upfront in the process. The entire team had to focus on operational and maintenance details of the MBR system before a clear understanding of the final end product developed. This turned out to be a critical success factor due to the total cost of the MBR equipment alone being nearly 25 percent of the overall construction cost.

Phase 2 – MBR Process Design

During the pre-selection process, the District made the proactive decision to install the full bioreactor capacity for the 20-year planning period, but only install approximately half of the membrane capacity. The Kubota membrane cartridges are arranged in cassettes that are submerged into the membrane basin. The cassettes can be double-stacked, which effectively doubles the filtration capacity in the same footprint. A single stack of cassettes was proposed to be installed initially in the membrane basins. The District can purchase additional membrane cassettes when needed for upgraded capacity. With the additional membranes, the MBR facility (bioreactors and membranes) is designed for an average day flow of 0.69 MGD, with an equalized peak flow of 1.38 MGD.

In order to meet the projected effluent nutrient limits, it was proposed to use a biological process that is essentially a Modified-Ludzack-Ettinger (MLE) design for carbon and nitrogen removal. In general, the MLE process for Bigfork consists of anoxic and aerated basins, and recycling of activated sludge for denitrification. The pre-treated headworks effluent (containing carbon) enters into a splitter structure where it mixes with the return activated sludge (RAS), rich in nitrates. The flow can be split equally into one of three treatment trains.

From the splitter structure, the flow enters the anoxic basin of the treatment train. Feed-forward pumps are then used to pump the mixed liquor from the anoxic basin into the aeration basin.

The mixed liquor continues from the aeration basin to the membrane basin via a common feed channel. The feed channel allows membrane basins to be isolated with slide gates for maintenance purposes, while the corresponding anoxic and aeration basin can remain on-line.

In the membrane basin, the membranes are submerged in the mixed liquor. The concentrated mixed liquor in the membrane basin is recycled via gravity by an adjustable telescoping valve back to the splitter structure. Recycling the activated sludge from the membrane basin promotes the denitrification process in the anoxic basins and reduces fouling of the membranes by controlling the mixed liquor solids concentration. Since the solids concentration is highest in the membrane basin, sludge is wasted from here by waste activated sludge (WAS) pumps that direct the WAS to existing basins for digestion and storage. By controlling the RAS rate and frequency of sludge wasting, an adequate Sludge Retention Time (SRT) can be achieved for nitrification. Alum is added to the splitter structure for phosphorus removal.

In the membrane basins, the filtered effluent, or permeate, is pumped through the membranes and into a discharge manifold. Solids from the mixed liquor are retained on the membrane surface as permeate is produced. These solids build on the outer surface of the membrane creating a biofilm and eventually may lead to fouling if not controlled. Air scouring systems at the bottom of the tank use coarse bubble diffusers to dislodge and move solids away from the membrane surface and aid in controlling the amount of bio-film that accumulates on the membrane.

Depending on the seasonal flow characteristics, the Bigfork MBR system has a design mixed liquor concentration in the membrane basins ranging from approximately 8,000 – 12,000 mg/L and a recycle rate of 4 to 6 times the average annual flow. The sludge recycle rate is controlled by the feed forward pumps; the higher the flow rate that these pumps operate at, the higher the recycle rate through the adjustable telescoping valve. For N+1 redundancy of membrane basins, the design flux rate is maintained less than 20 gallons per day per square foot of membrane surface area (20 gfd) under most conditions, with two operating basins and the third basin off-line.

Due to the highly variable seasonal flows and loads in Bigfork, additional design features were implemented to optimize operation. One of these features allows operators to pre-thicken the mixed liquor prior to wasting. The MBR design includes a slide gate in the common membrane feed channel to isolate Train 1 from the others for use in a thickening mode. The thickening mode can be used in the winter months during low flow, when only one or two treatment trains are required for liquid treatment. Instead of wasting sludge to the digester, WAS from the Trains 2 and 3 that are in liquid treatment mode, is directed into Train 1. The RAS within Train 1 is then internally recycled. This train is operated at a much lower flux rate to maintain permeability. The sludge is dewatered up to 3% or 30,000 mg/L before wasting to the digester. Thickening will reduce the volume of sludge and maximize the on-site storage volume for the District. Sludge is stored on-site and can also be hauled to an off-site storage facility during the winter, and then land applied during the summer.

Permeate is routed into the ultraviolet disinfection (UV) system consisting of parallel closed vessel reactors. Disinfected effluent is then routed into the existing treatment facility clearwell, and then discharged to the outfall. The clearwell provides a reservoir for pumping plant water to the headworks for cleaning the fine screens and washer/compactors, among other needs at the facility. Additional reservoir capacity is available for future off-site water reuse options.

Phase 2 – MBR Facility Design Considerations

During the initial planning efforts, it was evident the existing WWTP site was constrained and it would be difficult to construct expanded capacity. The existing plant is located in the middle of a residential neighborhood with lake front access. This resulted in the need for very tight construction constraints, and careful coordination with operations staff and the community. Selection of MBR technology aided in reducing the “footprint” of the project, but it was still extremely challenging to incorporate the required treatment and capacity upgrades within the existing property boundaries, and also plan for the construction while minimizing disruptions to operations.

The design team was able to locate the new MBR facility within the only available area on the site. This location was able to take advantage of the grade sloping from north to south and allow for mainly gravity flow from the headworks to the outfall discharge. Design of the facility on the constrained site was able to incorporate District parking, and semi-truck access for sludge hauling to the off-site storage facility.

Another challenge for this project was to consider the constructability of the MBR facility. Factors in the design included the extreme site constraints for contractor mobilization and staging, high groundwater on the site, and allowing District operators to continue to treat wastewater for permit compliance during the 18-month construction period. The MBR facility was constructed in parallel with the existing trickling filter plant.

An important aspect of the MBR facility design was to make the building aesthetically pleasing to the close-by neighbors. The District has always been very proactive in being a “good neighbor” and wanted to continue this philosophy with the MBR upgrade. The District decided that the entire MBR facility needed to be enclosed within a building to eliminate the site of open wastewater basins and equipment disrupting views of Flathead Lake, and minimize any odors that may be generated. It is rare in Montana to have completely indoor wastewater facilities, and this aspect also added to the cost of the project. The challenge was to include all the necessary MBR equipment within one building, make the building attractive, and keep the project cost as reasonable as possible.

A plan was developed to include all the MBR equipment under one roof, and still provide an operator friendly layout with access to equipment and ample room for occupied space for staff. The constructed MBR facility houses the bioreactor basins, membrane basins and all the equipment (mixing, pumping, aeration, disinfection, etc.) in one 96-foot x 70-foot building. The upper level of the building was designed to provide access to the three parallel treatment trains of bioreactor and membrane basins. The basins include concrete walk-ways for access to mixing and pumping equipment within each basin. This upper level also houses the office and control room (300 ft²), laboratory (300 ft²), electrical room, water closet, and alum storage and feed equipment. The building also incorporates a lower equipment level, which is at grade on the south side of the site. The lower level houses permeate pumping, process and membrane scour aeration, and disinfection equipment. All of the equipment and processes for secondary and tertiary treatment were designed into one building, while still providing adequate operation, maintenance and personnel space.

The building architectural design also added to the aesthetics of the facility using colored concrete masonry blocks, architectural canopies over doorways, and textured concrete with a birch tree design on exterior surfaces. The backup generator was located away from neighbors as much as possible to reduce noise when the generator is exercised. Silencers were included on the blower intake piping to minimize noise from operations.

Phase 2 – MBR Construction and Operations

The Phase 2 MBR project was bid during a very competitive bidding environment. Seven general contractors bid on the project, and the bid was awarded at approximately \$6.3 million dollars. The total Phase 1 and 2 construction cost represent approximately \$12 per gallon treated.

The MBR facility was commissioned in February 2012. District staff received training from Ovivo and operations and maintenance assistance from Morrison-Maierle. The new MBR process represented a significant operational change from the trickling filter process in the existing plant. Initially, influent was split between the MBR system and trickling filter plant. MBR effluent was discharged to the collection system and then blended with the trickling filter effluent. When operators became comfortable with the MBR process and the system was meeting permit requirements, the trickling filter process was decommissioned and the entire influent flow was routed through the MBR system.



Exterior of MBR building

Effluent from the MBR facility has easily met the existing discharge permit requirements. Total phosphorus has consistently been less than 0.5 mg/L; total nitrogen has averaged less than 10 mg/L; and BOD and TSS are near non-detect levels. The District has operated the mixed liquor concentration as low as 8,000 mg/L and up to approximately 14,000 mg/L, while establishing their solids inventory and wasting procedures.

Operators have learned that their sludge quality (measured in a lab filterability test), is a good indication of potential membrane permeability issues with fouling. Increased wasting has been needed at times to increase membrane permeability back to acceptable levels. Operators are trending membrane permeability and have performed several chemical cleans on the membranes in response to fouling events. Permeability recovery has been acceptable, and overall the membranes have performed well. District operators have continued to adapt their operational procedures with changing influent flows and loads, and also colder water temperatures.

The District began operating Train 1 in thickening mode during the 2012-2013 winter months. When flow and loads began to pick up in the spring of 2013, Train 1 was put back into treatment mode. The District plans to thicken in Train 1 in the winter of 2013-2014. This process has worked well for the District, thickening the mixed liquor up to 3 percent solids.

Conclusion

The completed MBR facility provides a treatment technology and capacity upgrade for the District all within the existing property boundaries of the site. The entire MBR treatment process is incorporated into one building. The completed facility was able to be incorporated into the neighborhood with minimal disruption during construction, and accomplishes the District's goals for aesthetics.



Interior of MBR building showing membrane basins in foreground

Operationally, the system has performed well and the District is continually learning the intricacies of MBR operation. The overall upgrade project represents a successful approach by the District to implement a critical treatment upgrade with state-of-the-art technology in a small Montana community. Bigfork has the distinction of operating the first MBR facility in the state of Montana.

***Thank You To All Of The Exhibitors
that participated at the 2013 Joint Conference
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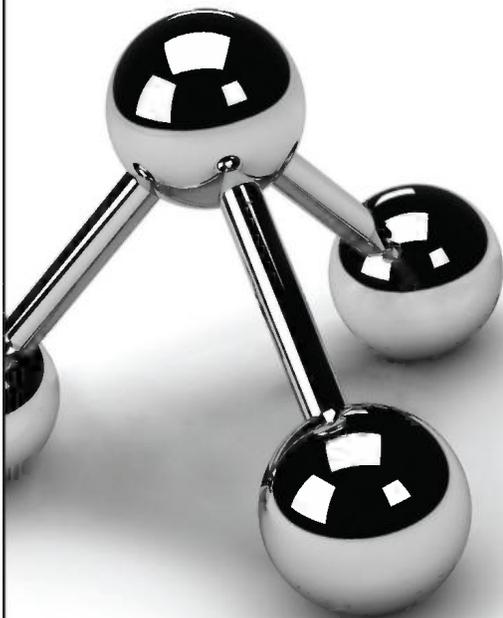
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Calling all Students & Young Professionals!

MSAWWA and MWEA have formed a new Joint SYP Committee and are looking for involvement from currently enrolled college students and those under 35 who are already working in water or wastewater professions. David Carlson of AE2S, Inc. has volunteered to Chair this committee in its formation. Please contact David with any questions that you have or to let him know if you would like to be involved as a volunteer. David can be reached at david.carlson@ae2s.com. The AWWA website also has some great resources available for Young Professionals—check it out by clicking here: [AWWA—Young Professionals](#)



Check out the YP Connections newsletter on the YP portion of WEF.org, for the latest information on committee updates, member profiles, professional development and much more! YP Connections is published 3 times a year.

Contact Information: YPConnections@wef.org

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~2014 Joint Directory~

The Joint Directory will be updated and emailed to both memberships soon. If you have not received a digital copy, or would like a hard copy mailed to you, please email Robin Matthews-Barnes at info@montana-awwa.org and let her know. **ALSO, PLEASE EMAIL ANY UPDATES TO YOUR CONTACT INFORMATION TO ROBIN.** An electronic version allows changes to be made on a more regular basis rather than just annually, saves \$\$\$, and saves paper!

Do You Have Something To Say?

If you have ideas, announcements, articles, or stories you would like to submit for consideration for publication in the next issue of NewsWaves, please email Robin Matthews at info@montana-awwa.org. The next issue will be published in March/April, so keep it in mind!

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Below is a list of the members of MSAWWA and MWEA that volunteered to chair each organization's committees at the 2013 Joint Conference. Volunteers are always welcome, so if you wish to help your association and serve on a committee you may still sign up by contacting the chair of that committee or Robin Matthews at Info@montana-awwa.org or (406) 546-5496.

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Please Support Your Association's Committees

Please remember that the committees cannot survive without member participation. You can sign up to be on a committee at any time during the year, however, the Joint Conference is the ideal time to do so and there will be sign-up sheets in your registration packet. Please consider participation in at least one committee. If you have questions about the committees, please contact the chair of that committee to find out more about how you can help.

If you are currently serving on a committee and wish to continue serving, please be sure to sign up at each conference. The slate is wiped clean after each conference, and unless we have the new sign-up form, we do not know if you wish to continue serving.

Thank you to everyone for making our Associations so great!

Longtime MSAWWA & MWEA Member Robert Sanks passed away last year after many years of service and dedication to the water and wastewater fields. It was requested that his obituary be re-printed in this edition of NewsWaves for those who may not have had the opportunity to read it:

Robert L. Sanks, 96, of Bozeman passed away peacefully in his home, surrounded by his family last Tuesday, September 19, 2012.

Bob was born February 19, 1916, in Pomona, California, to John and Nellie (Church) Sanks. He graduated from Fullerton Union High School in 1934, going on to receive his Bachelor's Degree in Civil Engineering from UC-Berkeley in 1940, followed by his Master's Degree in Structural Engineering from Iowa State in 1949 and his PhD in Sanitary Engineering from UC-Berkeley in 1965. He also did a post-doctorate fellowship from 1965 to 1966 at University of California-Berkeley.

Bob worked as a professor of Civil Engineering in Salt Lake City, Utah from 1946 to 1958 and as a professor and chairman of Civil Engineering at Gonzaga University in Spokane, Washington from 1958 to 1961. From 1966 to 1982, he was a professor in the Department of Civil and Engineering Mechanics at Montana State University, where he became Professor Emeritus in March 1982. Bob was in charge of design and operation of a direct filtration pilot plant and preliminary design of a water treatment plant at Colstrip from 1970 to 1981. From 1979 to 1982, he was the director of the pumping station design conference. Between 1991 and 1995, he was the manager and principal investigator of self-cleaning wet wells for constant speed submersible pumps. He was in charge of many innovations in Montana, including land disposal of sewage at Rocky Boy Reservation, direct filtration of Yellowstone River water for Colstrip, and secondary sewage treatment by biodisc and use of onsite pilot plant tests for the design of sewage treatment in Livingston. His research and improvement of trench-type wet wells made them the only design recommended for medium and large wastewater pumping stations by the Hydraulic Institute in the 1989 edition of American National Standard for Pump Intake Design.

He was an EEE Fellow, as well as a Fellow of the American Society of Civil Engineers and had been published in Who's Who in the World of Engineering. Bob was editor-in-chief and co-author of Pumping Station Design. The first edition won the only 1989 award "Excellence" given for an engineering book by the Professional & Scholarly Division of the American Association of Publishers. That edition and the subsequent two editions are recognized as the preeminent test on pumping stations for water and waste water. He was also published in books including Water Treatment Plant Design for the Practicing Engineer, Land Treatment and Disposal of Municipal and Industrial Wastewaters, and Statically Indeterminate Structural Analysis. Bob was a member of the American Water Works Association, the Water Environment Federation, and the Montana Water Pollution Control Federation. In 2000, he was awarded the Lifetime Achievement Award from the Montana Section American Water Works Association. He is also listed in Who's Who in America and Who's Who in the World.

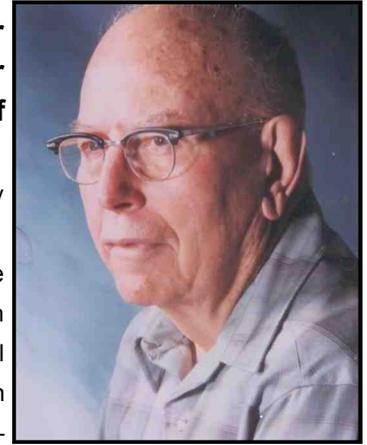
In 1946, Bob married Mary L. Clement. Following her death in 1994, he married Edith Millen Harrington in 1999. Edith passed away in 2010. In 2012, Bob was married to Carol J. Asleson.

While Bob was in the PhD program, he took up playing the clarinet. In the early 1990s, he began playing the cello. He enjoyed philanthropy, locally supporting the Bozeman Symphony, Eagle Mount, United Way, the Montana Food Bank, MSU, as well as numerous national and international humanitarian organizations such as Doctors without Borders and Wounded Warriors among others. He was a member of the Republican Party, the Tea Party, and Rotary. Through Child Fund International, he sponsors a child, Kiteme, in Africa. He loved photography, fishing, camping, hunting, and travel, including "bagging" the record lion in Africa for a man his age, which was 92 at the time.

Bob was preceded in death by his first wife, Mary Clement Sanks and his second wife, Edith Sanks.

Survivors include his wife, Carol Asleson-Sanks; daughter, Margi Sanks-Russell of Colorado Springs, CO; son, John C. and Christine Sanks of Albuquerque, NM; five grandchildren and eight great-grandchildren.

He was always an inspiration to his family and friends. Bob, you are sorely missed.



Montana's water and wastewater community also lost this year's Joint Lifetime Achievement Award recipient, Dr. Warren Jones. Warren was too ill to accept his award in person, and passed away on July 7th of this year.

Aug. 25, 1954 – July 7, 2013--After a year-long battle with glioblastoma, Warren leaves us to be led home by his heart dogs, Ryker and Harley. A warm, honest, and genuine man, Warren was loved by many and leaves friends around the world.

Warren was born in Macon, Ga., to USAF Colonel James Theodore "Ted" Jones (1923 – 1991) of Georgia and Havelyn Jenkins Jones (1925 – 1999) of South Carolina. As an Airforce brat, Warren lived all over the world, including Japan, Washington, D.C., Alaska, and New Mexico. After graduating high school in Albuquerque, he attended UC Davis, studying chemical engineering and environmental engineering. Davis became home for longer than any place he'd lived until that point.

While at Davis, he met his next door neighbor, Samie Foster. Knowing she was a dog lover, he asked her to come with him to look at a litter of sheltie mix puppies. They brought home Reyna, who was with them for the next 16+ years. Warren and Samie were married in July of 1983, a wedding that Warren's mother threatened to boycott because, appropriately enough for Warren and Sam, a dog was the ring-bearer.

After receiving a doctorate in environmental engineering from the University of California at Davis, Warren came to Bozeman in 1986 and began doing research at MSU in the Center for Biofilm Engineering and teaching in the Department of Civil Engineering. As time progressed, he became the point of contact and advocate for the environmental engineering program. Warren had a passion for teaching and loved working with students. Known for his tough exams and rigorous discipline, he was nonetheless beloved by his students and colleagues, as these comments from his Facebook page attest: "Warren's door was always open" and "Your life's work reminds me that the business of the University, composed of teaching, research, and a lot of meetings, is ultimately the mentoring of the next generation." His gentle yet knowledgeable manner extended to all areas of his life: "Whether teaching students in engineering or judging a handler and dog on the Schutzhund field, Warren could make you feel comfortable and relaxed even though you were about to do something you feared the most."

In addition to teaching, Warren served as Chair of Faculty Senate at MSU, was the faculty advisor for the civil engineering student honors organization Chi Epsilon, and was a professional member of the American Water Works Association. He volunteered as a board member for the Gallatin County Local Water Quality District and was chair of the Gallatin County Board of Health. He had a long-standing involvement with the Montana Water School, which offers certification and career enhancement programs to professionals working on civil and industrial water projects.

Warren's love of teaching extended to helping Samie home school their son, Derek, born in 1994. Derek inherited his father's intelligence, quick wit, and diversified talents.

Warren was also an avid lover of German shepherds and Malinois, dog training, and the sport of Schutzhund. As a performance judge with the United Schutzhund Clubs of America, Warren helped many new competitors through their trial jitters and made them feel at ease.

Warren loved the blues. He was a roadie with several bands in college and formed the rock band Baby Fae and the Heartless Baboons with several friends, writing the local hit song, "I Love Ya Baby, But You Got No Heart." After moving to Bozeman, he played bass guitar with Textbook Blues for many years. Ironically, their last gig together was a CD release party for Got Your Number which featured songs with lyrics written by Warren, including "Priorities" and "Thro' Da Ball".

Now we are all singing the blues because the big band conductor in the sky done got his number.

Warren leaves his cherished wife of 30 years, Samie, and beloved son, Derek; brother-in-law, Chris Foster of Colorado; and mother-in-law Patricia Foster of Bozeman (formerly San Diego).

No memorial services are planned; please treasure your memories of Warren and think of him often as you laugh, tell stories, talk dogs, drink a good beer, listen to music, play with your dog, eat hotter 'n' hell Mexican or Indian food, or enjoy a good chicken-fried steak. Play on, Warren, and ROCK THE HOUSE!

In recognition and honor of his dedication to education, contributions may be made in Warren's memory to the "Warren L. Jones Memorial Scholarship." Please make checks payable to the MSU Alumni Foundation, P.O. Box 172750, Bozeman, MT 59717-2750.



A SPECIAL THANK YOU.....

To all of the volunteers who helped to make the 2013 Joint Conference successful. It takes many helping hands to make it all come together, and all of the help is greatly appreciated. A special thank you to the Host City Committee, the Program Committee, and MWEA Education Committee and the registration desk helpers:

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MWEA Education Committee (Preconference Program)

Jeremy Perlinski (Chair)
Coralynn Revis
Scott Murphy
Doug Whitney
Rickey Schultz

Thank you also to Nancy Bruner and Barb Coffman for helping during the week of the conference—your time and experience are greatly appreciated!



Left: Bill DeMeyer is presented with the Presidential Service award by incoming MSAWWA Chair Gwen Pozega. Thank you Bill for your time and efforts on the board!

Right: Coralynn Revis turns over the helm to new MWEA President Dan Harmon. Coralynn stays on the MWEA board as Past President, and was also voted in as the new WEF Director for Montana, replacing Mike Jacobson. Congrats to Cora, and a huge thanks to Mike Jacobson for his many years of service to the organization.



Meet your new 2013-2014 Trustees:

MSAWWA Junior Trustee—Collette Anderson (Great West Engineering, Inc.)

Collette is a registered professional engineer with eight years of engineering experience with emphasis on municipal water and wastewater projects. She is a project engineer at Great West Engineering in Helena involved in all aspects of water and sewer system design, preparation of Preliminary Engineering Reports, grant writing, inspection, project management, and construction management. Collette is a 2006 graduate of Montana Tech with a degree in General Engineering and a minor in Technical Communications. Collette currently serves as the MSAWWA Education Committee Chair.

In her spare time, she also coaches the junior varsity volleyball team at Helena high school. Collette is married and has two boys, Baylor and Bridger, ages 2 1/2 and 9 months.

MSAWWA Junior Trustee—Nicole Mosby (Morrison-Maierle, Inc.)

Nicole Mosby, P.E. has 5 years of experience in the water and wastewater field following completion of a BS in Engineering with Specialties in Civil and Environmental Engineering from the Colorado School of Mines. She is a Water/Wastewater Engineer with Morrison-Maierle's Missoula office and has worked on projects in Montana, Colorado, and New Mexico. She is a member of both AWWA and WEF and currently serves as the Program Committee Chair for the 2014 Joint Conference.

MWEA Junior Trustee—Jeremy Perlinski (Morrison-Maierle, Inc.)

Jeremy Perlinski has 14 years of experience in the water and wastewater field following completion of a BS Civil Engineering degree at Montana State University-Bozeman. He has worked on numerous large and small water and wastewater projects throughout Montana, including design and management of treatment plant, pump station and piping system projects. Jeremy is a Senior Engineer and Project Manager with Morrison-Maierle, located in their Helena office. He is a member of both AWWA and WEF, having served in leadership roles, including the Presidency of MWEA. Jeremy is a registered engineer in MT.

MWEA Senior Trustee—Starr Sullivan (City of Missoula)

Starr is a life long resident of the Rocky Mountains, having spent the last 25 of those in Montana. He has 35 years experience in wastewater treatment and collections and has spent the last 20 years as the Missoula Wastewater Division Superintendent. Starr served as MWEA President in 2002-2003. He is a Montana certified wastewater operator and formerly a certified operator in Utah. Starr was the recipient of the 2005 William D. Hatfield award.

Thank you to all of you for volunteering your time and efforts to help lead
MSAWWA and MWEA into the future!

SAVE THE DATE!!!

Come and take advantage of the educational and networking opportunities at the 2014 Joint MSAWWA-MWEA Conference

May 13—Preconference hosted by MSAWWA "Municipal Infrastructure Planning"
May 14-15—Conference "Working Together To Protect Montana's Water Resources"
Location: Hilton Garden Inn Missoula

Registration information will be emailed to members and will also be available on the website soon: www.montana-awwa.org

Please visit our web site—www.montana-awwa.org