Big Sky Clearwater

Montana Department of Environmental Quality

Volume XXXV1, Issue 2 — Fall 2006

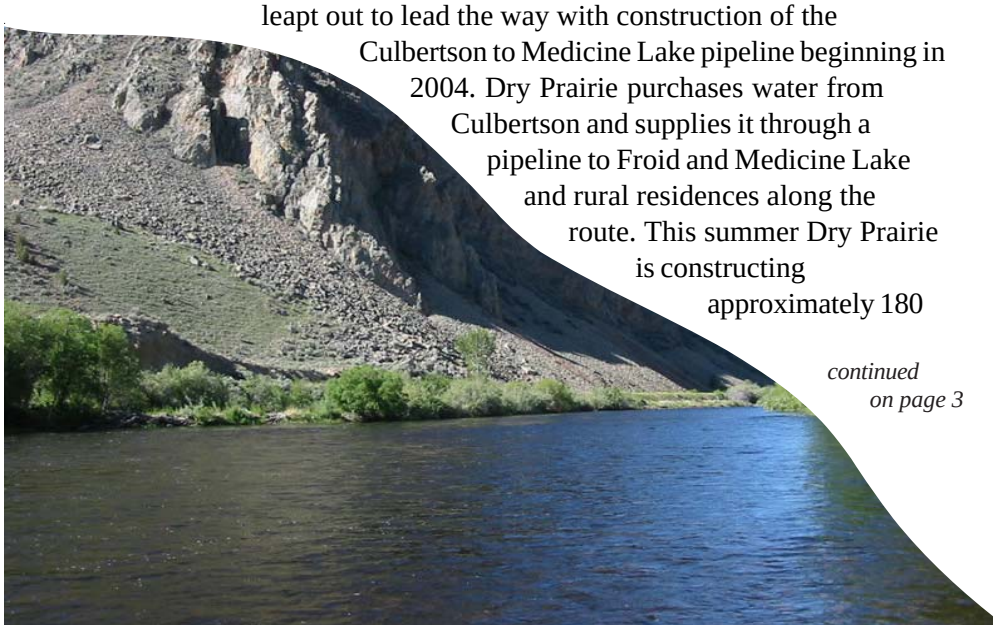
Regional Water System Projects in Montana

by Marc Golz, Drinking Water SRF, Department of Environmental Quality

Several years ago, I won't mention how many, I began attending meetings regarding the planning of large regional water projects in Montana. The first such project was the Rocky Boy's Pipeline (which name someone wittily shortened to Robopipe). The other regional water project at the time, which seemed like a sleeper at first, was the Fort Peck Project. Since then several other regional projects have been added to the drawing board. These include the Central Montana Regional Water System project and the Dry Redwater (you can see why they want better water). The governing boards for these systems are duly recognized regional water authorities.

Robopipe, officially the Rocky Boy's/North Central Montana Regional Water System, is about to begin construction this year on an intake for the water treatment plant. The intake will be located in Lake Elwell, near the Tiber Dam. Eventually this project is intended to serve the Rocky Boy's reservation and an area from Interstate 15 at Dutton on the west to Fort Benton along US 87 to Havre and north to Canada.

The Fort Peck/Dry Prairie Regional Water System, though a sleeper at first, leapt out to lead the way with construction of the Culbertson to Medicine Lake pipeline beginning in 2004. Dry Prairie purchases water from Culbertson and supplies it through a pipeline to Froid and Medicine Lake and rural residences along the route. This summer Dry Prairie is constructing approximately 180



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Big Sky Clearwater

Volume XXXVI, Issue 2

Fall 2006

The ***Big Sky Clearwater***,
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is for water and wastewater operators and managers. The Department welcomes articles of interest and suggestions for articles related to water quality, water and wastewater treatment and the water environment. Articles may be about your treatment plant experiences, or those of others, technical papers or any information that may benefit other operators or managers.

Please submit articles 30 days before publication (*August 1 and February 1*) to:

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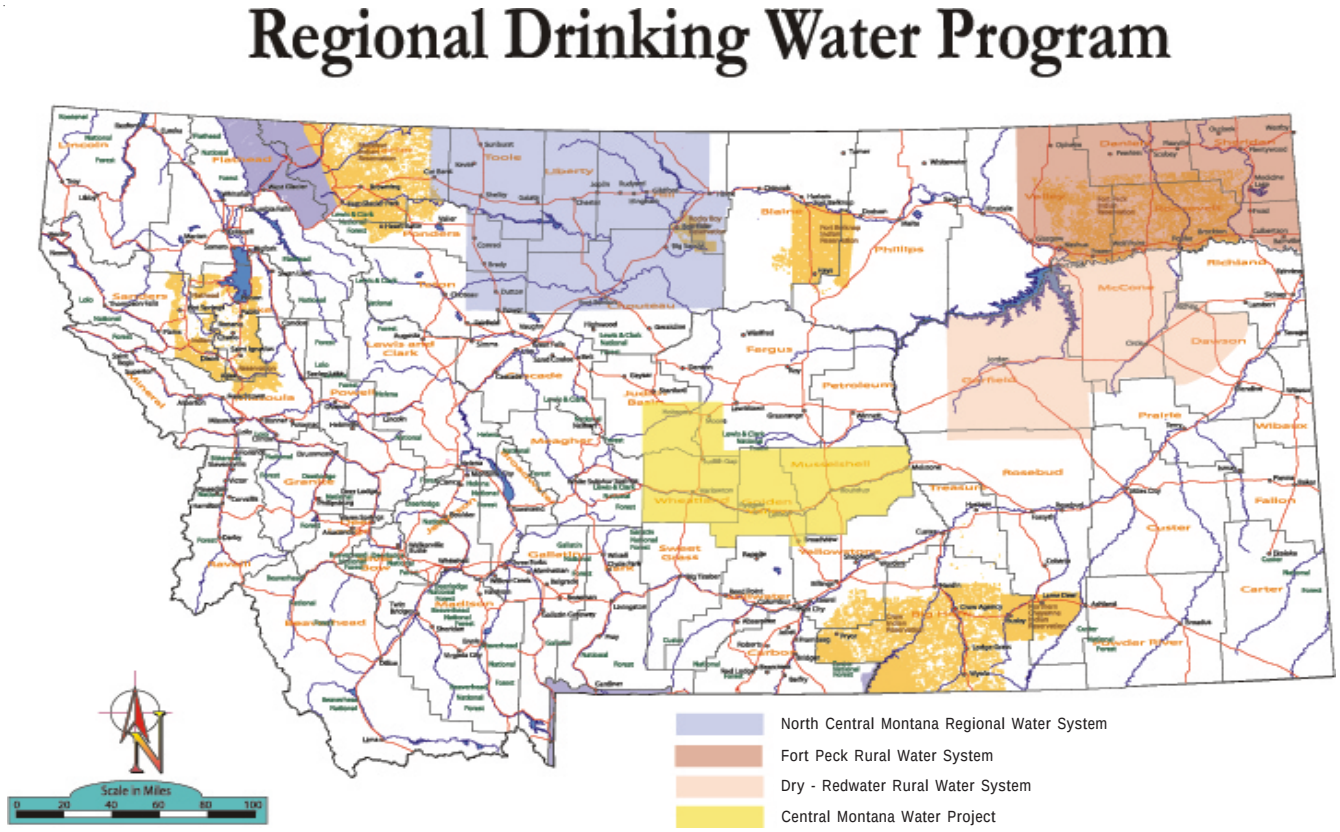
miles of pipeline to serve 180 rural residences and also to serve the town of Bainville. This project will eventually serve the Fort Peck Reservation and an area from Glasgow on the west north to the Canadian border and from Glasgow along the Missouri River to the North Dakota border.

The Rocky Boy's/North Central and Fort Peck/Dry Prairie projects, while taking many years to complete, will total about 450 million dollars. Thus, in addition to providing badly needed drinking water, they will provide a significant boost to Montana's economy.

The state of Montana, through the Departments of Environmental Quality and Natural Resources and Conservation, has provided thousands of hours of time to these regional water system projects. DNRC has a full-time regional water system coordinator, Rick Duncan, and several other financial and technical people that devote time and energy to these projects. In addition, the DEQ has also contributed substantial amounts of time and energy in an attempt to assure that these projects are developed in a sound and efficient manner. DEQ has contributed significant time to a process called value engineering. This process evaluates systems designs and determines if the designs are the most appropriate and cost-effective way to build the projects being considered.

The current administration of the state of Montana has demonstrated an avowed support for these projects. The governor has shown an increased interest and heightened awareness of the regional water system projects in Montana and has engendered a greater sense of cooperation between the indigenous population of Montana and the state government.

DNRC and DEQ have also participated in and facilitated the environmental review processes in cooperation with the Bureau of Reclamation for these projects to assure that the construction of the facilities will have little significant detrimental impacts on the environment. The Bureau of Reclamation published Findings of No



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Significant Impact for both the Rocky Boy's/North Central and Fort Peck/Dry Prairie projects.

Regional water system projects involve a large number of different interests including: the Chippewa-Cree tribe of the Rocky Boy's Reservation, the Assiniboine and Sioux tribes of the Fort Peck Reservation, cities and towns and rural water districts and the state of Montana and the Federal Government. Most of the funding for these projects comes through the Federal Bureau of Reclamation. In addition, the Drinking Water State Revolving Fund and Treasure State Endowment have provided key funding to allow these projects to get off the ground. The leadership of the DNRC has been very important at some very critical junctures when it looked like the projects might be stalled.

Also, Montana's three congressional delegates have provided crucial assistance to help secure the funding and shepherd necessary documentation through the often daunting and usually frustrating federal process.

When I first started attending the meetings years ago, I thought that these projects had little chance of actually succeeding (like taking a drink downstream of the herd). But this was proven wrong. There is a long way to go yet, but with perseverance, stick-to-it-tiveness as my parents called it, it appears that we will see good quality drinking water for many people along parts of the Hi-line and Central and Northeastern Montana. ■

EXAMS PASSED JANUARY 2006 - JUNE 2006

CLASS 1's

Muscutt, Julie	Helena	1A	OT
Quinn, Tami	Missoula	1A	FC
Wagner, Jeffrey	Billings	1A	OT
Blankenship, John	Chinook	1B	OT
Casterline, Shane	Havre	1B	FC
Kilsdonk, Odean	Culbertson	1B	FC
Ladenburg, Michael	Havre	1B	OT
Muscutt, Julie	Helena	1B	FC
Smith, Zoe	Billings	1B	OT
Thom, Douglas	Butte	1B	OT
Burrell, Kenneth	Glacier Park	1C	FC
Crase, Coley	Butte	1C	FC
Gray, Jonathan	Billings	1C	OT
Kemp, Greg	Missoula	1C	OT
LeFeuvre, Larry	Kalispell	1C	FC
Metier, Angela	Kalispell	1C	OT
Wilkins, Brian	Butte	1C	FC
Debats, David	Billings	1D	FC

CLASS 2's

Dorr, David	Havre	2A	OT
Henderson, Faron	Helena	2A	OT
Bogle, Charles	Whitefish	2A	FC
Haman, Cary	Laurel	2A	OT
Dubuque, Theodore	Missoula	2B	FC
Barrett, Edward	Hamilton	2A3B	FC
Hemphill, Vickie	Bigfork	2A3B	OT
Martin, Jon	Bigfork	2A3B	FC
Siloti, Mary	Bigfork	2A3B	FC
Brown, Gordon	Poplar	2C	OT

CLASS 3's

Becker, David	Forsyth	3A	OT
Burrell, Kenneth	Glacier Park	3A	OT
Dubuque, Theodore	Missoula	3A	FC
Nuttall, William	Pinesdale	3A	FC
Sundgren, Eric	Hingham	3A	OT
Tyler, Terry	Chester	3A	FC
Wendland, Leonard	Hingham	3A	OT
Dowell, Valarie	Missoula	3B	FC
Henderson, Faron	Helena	3B	FC
Quinn, Tami	Missoula	3B	FC
Hansen, Michale	Whitehall	3A4B	FC
Horsley, Albert	Vaughn	3A4B	FC
Johnson, Eric	Whitehall	3A4B	FC
McNac, Leney	Ashland	3A4B	FC
Beres, Michael	Roundup	3A4B	FC
Wisdom, Pierce	Big Timber	3A4B	FC
Beres, Michael	Roundup	3C	FC
Bohn, Blair	Eureka	3C	OT
Forrider, James	Alberton	3C	FC
Horsley, Albert	Vaughn	3C	FC
Marsh, Elaine	Glacier Park	3C	OT
Walls, Joseph	Kevin	3C	OT
Geyer, Larry	Big Sandy	3C	FC
Hanson, Loni	Red Lodge	3C	FC
Stewart, Michael	Vaughn	3C	FC
Thomas, Philip	Geraldine	3C	FC
Wining, Gary	Arlee	3C	FC

FC = Fully Certified
OT = Operator-in-Training

CLASS 4's

Behee, Branden	Great Falls	4A	FC
Fialkowski, Matthew	Great Falls	4A	FC
Grose, David	Great Falls	4A	FC
Javinar, Steven	Great Falls	4A	FC
Koller, Justin	Great Falls	4A	FC
Ladenburg, Michael	Havre	4A	OT
Petersma, Trevor	Great Falls	4A	FC
Sylvia, Nathan	Great Falls	4A	FC
Darko, Pat	Sand Coulee	4AB	OT
Dutter, Tim	Kalispell	4AB	FC
Fellman, Dan	Jordan	4AB	OT
Fleming, Juli	Augusta	4AB	FC
Forrider, James	Alberton	4AB	FC
Green, Reginald	Custer	4AB	OT
Hance, Randall	Savage	4AB	OT
Hasse, Leo	Kalispell	4AB	FC
Hutchison, William	Bigfork	4AB	FC
Malberg, Geri	Kalispell	4AB	FC
Miller, Jeri	Kalispell	4AB	OT
Page, Wallace	Florence	4AB	FC
Palmer, Chad	Heron	4AB	FC
Peters, Jeffrey	Belt	4AB	FC
Pinnow, Larry	Billings	4AB	FC
Rothenberger, Rock	Hungry Horse	4AB	FC
Schuster, Teri	Missoula	4AB	FC
Walls, Joseph	Kevin	4AB	OT
Zimmer, Ken	Glendive	4AB	FC
Christensen, Bret	Billings	4AB	OT
Koessl, Kirk	Nashua	4AB	FC
Christensen, Bret	Billings	4C	OT
Henderson, Faron	Helena	4C	FC
Johnson, Eric	Whitehall	4C	FC
Kleinsasser, John	Valier	4C	OT
Waldner, George	Valier	4C	FC
Wallace, Michelle	Fairfield	4C	FC
Wipf, Walter M.	Broadview	4C	FC

CLASS 5's

Allen, Mike	Townsend	5AB	FC
Bumgarner, Diana	Fortine	5AB	OT
Butsick, Joseph	Darby	5AB	FC
Dixon, Terry	Dillon	5AB	FC
Forsythe, Micah	Augusta	5AB	FC
Gragg, Kenneth	Missoula	5AB	FC
Johnson, Dean	Glendive	5AB	FC
Jordan, Joseph	Augusta	5AB	FC
Lafever, Cara	Bigfork	5AB	FC
Prince, Monica	Hall	5AB	FC
Sabol, Rodney	Condon	5AB	FC
Whitford, Donald	Fortine	5AB	FC

Congratulations!

The exams for certification require considerable time in study and preparation. Passing represents a lot of hard work and initiative on the part ofthe individual. Be sure to show appreciation to your water and wastewater operator for working hard to ensure that they are properly trained to care for your system.

Lagoons and Odors

This has been an active year in terms of calls about odors drifting from lagoons. Lagoons are effective and simple systems for treating wastewater, but are subject to environmental, ambient conditions. Spring conditions this year, warming, cooling, rainy, warm again, cool again, etc., caused many lagoons to turn over, releasing some smelly sulfides and other gaseous odorous compounds to the atmosphere. If the lagoon system is placed such that homes or communities are down wind from the lagoons, those folks affected by the smells will complain to both the system operators and DEQ. Most of the rest of the year, lagoons look like any other pond and odors are not a problem.

Only aerated and facultative ponds are used to treat municipal wastewater in Montana. Both are designed to be aerobic at the pond surface. If they are properly designed to handle the organic and hydraulic loads, and if they are operated properly, little odor control is necessary. However, like spring turnover, there are conditions that arise that can cause odors to become a problem. Algae and rising sludge from the lagoon bottom may become offensive, particularly during hot weather and during the annual spring and fall turnovers.

Algae provide oxygen for treatment in facultative ponds, especially blue-green species, but also provide a food source for odor-producing bacteria called actinomycetes. (See WEF Manual of Practice #22.) Blue-green algae also prefer organically overloaded conditions, such as those in the springtime due to a combination of residual untreated BOD in the lagoons leftover from dormant winter conditions combined with the daily influent load. As lagoon waters warm, following the melting of the ice cover and the stirring of the lagoon contents due to turnover, soluble organic material is in abundant supply. Bacterial activity increases as water temperature increases, dissolved oxygen sources are consumed more rapidly and anaerobic conditions occur in portions of the cells, if not across the entire lagoon.

Overloaded conditions are most likely to occur in the primary cell, especially if all the influent is sent into that cell and not distributed in a parallel fashion to another cell. Odors escape when aerobic conditions are not maintained. Solutions are to split the flow to another basin or send all the influent to a different cell to allow the overloaded cell a chance to recover. Operators at aerated lagoons may have recirculation systems to bring oxygenated waters from the final cell to mix in with the influent to the facility. Temporary recirculation systems have been used, as well, using a pump and hoses to return well-treated water from the last cell to the primary cell. This can be done in single cell lagoon systems, too. Some systems have added wind and solar powered mixers to assist with turnover and high sludge levels in lagoons.

Temporary or permanent aeration can be added to lagoons under the ice or to lagoons after the ice melts to maintain adequate DO levels in the ponds. Engineering solutions may also be needed in certain situations to avoid possible overloading and odor problems.

It is important for operators and managers of lagoon systems, or any WWTP for that matter, to accurately measure the influent wastewater organic strength and hydraulic quantity. Lagoons are designed to treat a specific maximum amount of organic material and must hold the wastewater for a specific length of time to provide adequate treatment. Too much material from additional sources, such as population growth, commercial or industrial sources or unidentified sources, like septage, can overload lagoons and cause odorous conditions. Unexpectedly high flows, for example, from increased sources or storm events, can reduce treatment and leave untreated organic material in the lagoon water, resulting in anaerobic conditions in portions of the lagoon or the discharge of pollutants into the environment. Additionally, accounting for all the flow into and out of your lagoon will help determine if your pond system is leaking excessively and may need to be re-lined.

Pond shorelines must be kept free of weeds to allow easy cleaning and prevent accumulations of scum, grease, and other organic material that may decay and become a source of odors at the water's edge. Pond dikes must be maintained to prevent erosion; stable banks will allow removal of odorous material and prevent scum mats and weed growth. Scum and grease are prevalent in municipal wastewater and they float on the pond surface allowing birds or animals to carry off odorous material. Scum mats can be broken up and sunk or skimmed from the surface.

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Lagoons and Odors *- continued from page 6*

Sometimes, if other aeration sources are not available, motor boats can be driven across ponds to provide mixing and aeration. Chemicals, such as sodium nitrate, can be used to provide oxygen to the bacteria. Please use caution and safe practices when working around ponds. Disease-causing organisms are present and applying chemicals at excessive rates can damage the bacterial mass. These last few suggestions are temporary solutions to a larger problem that should be addressed through review of loading and design capacity of the plant. Practice being a good neighbor and don't ignore complaints about odors. There may be a very serious condition right under your nose. ■

My Last CEC Naggings

(THAT YOU MAYBE SHOULDN'T IGNORE)

CONGRATULATIONS to all operators who got re-certified by getting their CEC's (*continuing education credits*) in by May 31, 2006 and renewal fees in by June 30, 2006.

Now it's time to start over again and why not earn your credits early so you don't have to rush at the end. There are lots of fun and exciting ways to get your credits. These include attending any approved courses (*the METC 2006 calendar lists courses from the current training providers, so check out the ones from July through December*). You can complete an approved correspondence course (*these are also listed in the METC calendar*), or find your own class and apply to have it approved for credit. There are also some new ways to earn credits: Internet and CD-Rom courses. Remember that operators-in-training are not required to earn CEC's.

My last day with the Operator Certification Program was September 15th. Everyone has made my last 7 years here in the program wonderful.

I want to thank all the operators for all their hard work over the years and I'll miss you all VERY much!

Sincerely-Ashley Eichhorn

Reflections in the Ripples

By Bill Bahr – DEQ

Sometimes it's hard to recall what water and wastewater systems were like when I first started learning about treatment processes and operating in a wastewater plant 25 years ago. Certainly, the safety programs have changed through the years. I remember those of us at the Great Falls WWTP, working for Envirotech Operating Services, wondering about the wisdom of checking submersible, two-level lift stations without retrieval systems or gas detectors. We had minimal programs in-place to protect us while we changed out one-ton gas chlorine cylinders. For many of us 'old-timers,' it isn't too difficult to look back and remember entering confined spaces, handling chemicals, working on ladders, inspecting lift stations and doing the many other jobs associated with operating water and wastewater plants with little thought about the consequences of something going wrong.

Back in those long ago days of yore, my peers in plants across the state and the nation began to take notice of accidents and deaths associated with our very dangerous industry. Many facilities developed their own safety procedures, as did we at the Great Falls plant. Eventually, federal safety programs were developed and adopted by states to protect us against dangers from illness, electrocution, chemical exposure, confined space situations, explosion and fire dangers, laboratory injuries, lifting injuries and many, many other unsafe conditions. Our rallying cry has always been that nobody should have to work in unsafe conditions to earn a living. Though most utility workers continue to face the same sort of dangers in these facilities, including street work on collection systems and distribution systems, the safety awareness of operators today seems much greater.

I am encouraged about the direction of our safety programs when I am required to wear a hardhat at the Billings WWTP, or sit through safety training at operator schools. Whenever I observe operators using protective gear and following safe chemical handling procedures, or using proper trenching techniques, I remember how it once was and how much safer operators are today.

Small Wastewater System of the Year

The Town of Cascade received the Small Wastewater System of the Year award from the Montana Water Environment Association at the annual conference in Helena this year. Public Works Director, Joe Voss, was on hand to receive the award and congratulations from his peers. Joe has done an outstanding job of taking care of the water and wastewater system for Cascade for many years. The town has been very proactive in replacing a leaking lagoon system sited on an island in the middle of the Missouri river with a lagoon system located nearby on farm land. The treated wastewater is no longer discharged to state waters, but is used beneficially to raise crops on agricultural land. The town, under Joe's leadership, has a sound fiscal program and the staff practices exceptional maintenance strategies. Congratulations to Joe and the Town of Cascade.

photo by bigskyfishing.com

Operator Professionalism

The annual joint conference of the Montana Section of the American Water Works Association (MSAWWA) and MWEA is a great opportunity for operators to get training or attend workshops that address current issues affecting the water and wastewater utilities in Montana. As an operator at the Great Falls WWTP for many years, I was always encouraged to participate in professional groups such as these organizations. Sometimes I just attended to gain new information about what was happening in the field of wastewater or water treatment. Sometimes I wanted to participate in committees, such as the safety committee that promotes safe practices for operators. Sometimes I wanted to make professional acquaintances in hopes of furthering my career in this field.

The 2006 conference held in Helena in May included technical sessions on the new in-stream targets for nitrogen and phosphorus that will impact many

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Reflections in the Ripples - *continued from page 8*

communities and require construction of advanced wastewater treatment systems, and updates on the latest drinking water system rules and regulations. New technologies for both water and wastewater systems were discussed and exhibits showing new equipment and approaches to monitoring, sampling, and operations were available. For anyone interested in learning about changes affecting all of us, this was a great technical program.

The Water Environment Federation (WEF), the parent organization for MWEA, conducts biennial safety surveys to discover how accidents occur in the wastewater industry, which was one of the most dangerous occupations in the 1980s. Through diligent efforts, WEF volunteers developed many of the safe practices in use today in many industries, not just wastewater treatment, and slowly incident and accident rates for operators in wastewater systems are dropping.

The same is true for new developments in improving treatment plant performance and operations. Folks from around Montana from the ranks of engineering firms that work directly with community public works staffs, from governmental offices that regulate water and wastewater plants, from manufacturers of treatment processes, and from cities, towns and water and sewer districts, come together to guide policies, review new treatment technologies and discuss new methods for achieving better performance. The learning opportunities abound for operators and for a reasonable cost. WEF still has an annual membership for operators at around $50. Included with that is membership in MWEA, access to the rest of the professionals in the organization, and the WEF publication, Water & Environment Technology, among other benefits.

Montana needs professional operators in our many and varied water and wastewater systems … attending the joint annual conference is surely one of the best ways to achieve that goal.

Montana Rural Water Systems News

Bill O'Connell, formerly of MRWS, has moved on to the national organization and we would like to thank Bill for all his work with public water systems over the years. I am sure that MRWS will miss his fine work. MRWS has announced that Bill's successor is Dan Kramer. Welcome Dan, though we watched you for the past several years.

Dan has over 14 years of experience as a groundwater and wastewater professional and technician for multiple water districts. He helped develop two grant projects, one being a backup well system, and the other being the expansion of a single cell lagoon system to a wetlands treatment system.

He currently provides support for water and sewer systems that serve Native American people and he analyzes system problems and helps guide in the formation of water and sewer districts. Dan also helps new operators become certified and/or stay in compliance with state regulations. He has extensive training in electronics, computers and mechanical maintenance and repair.

If you have any questions or need assistance regarding SDWA Regulations, Water Training Requests or Consumer Confidence Reports, contact Dan. Also, contact Dan with any questions related to MRWS Wellhead/Source Water Protection. MRWS headquarters are in Great Falls. Call 406-454-1151.

Advanced Wastewater Training

Along with the sessions at the joint conference, the Montana Environmental Training Center and DEQ are presenting sessions on advanced operations strategies. The sessions at the Yellow Bay Biostation on Flathead Lake focus on microbiology and optimizing performance of WWTPs conducted by Paul Klopping, and will address BNR operations and a visit to the Kalispell facility. Dr. Michael Richard is scheduled to be at the Fall School in Bozeman in October to address BNR, innovative lagoon options, microbiological troubleshooting, among other advanced topics.

I was fortunate to attend training on advanced operations of BNR facilities presented by Ron Schuyler and Dr. Seth Terry of RTW Engineering in Denver in August. These sessions were in-depth and rigorous. I have tried to summarize some of the main points in a BNR article in the issue. It was very educational to learn of the approaches taken to meet strict N and P limits that these experienced and knowledgeable trainers proposed. The class included several Colorado operators that are running facilities that are faced with similar stringent discharge standards and many of the plants were located in ski areas facing extreme climate conditions. ■

Biological Nutrient Removal from WWTP Effluents

Modern water treatment plants are complex facilities designed to meet ever-changing conditions and requirements to provide safe drinking water. Wastewater plants have evolved to meet new conditions, as well. It would seem that change is the only constant when it comes to operating and maintaining our treatment systems. Modern wastewater plants are being designed to treat increasing population loads and meet more stringent standards for disposal of treated water and the resultant residuals. Research, engineering and operational forces continue to refine and redefine what WWTPs are capable of achieving with regard to removal of pollutants from our used water.

Biological nutrient removal (BNR) of nitrogen and phosphorus compounds in the treatment facilities before discharge to state waters is now state-of-the-art technology, even here in Montana. Technological treatment processes can remove nutrient pollutants, but BNR processes may be more cost-effective and more benign for communities to employ. BNR facilities are logical choices for Montana communities, considering that our state waters are some of the cleanest waters in the nation. We must be prepared to do whatever we can to protect the health of state waters in order to provide safe water to drink, recreate in and preserve for future Montanans. Nitrogen and phosphorus compounds can be toxic to aquatic life in streams, can add fertilizing nutrients that increase algal production to levels that harm water bodies, and can even enter our drinking system waters posing significant health threats to children.

Several Montana plants now employ some form of nutrient conversion or removal. Kalispell has been operating an advanced WWTP since 1992, helping to reduce phosphorus loads into Flathead Lake. Helena has a new plant that converts toxic ammonia into nitrates and utilizes denitrification to reduce nitrates to nitrogen gas, eliminating a source of pollution from the Prickly Pear Creek. Missoula has completed a new facility that reduces nitrogen and phosphorus from the Clark Fork watershed. Glacier National Park Headquarters, the Rae Water & Sewer District near Bozeman and the Big Sky Water & Sewer District have built Sequencing Batch Reactor (SBR) plants to reduce nutrient loads in their discharges. Lewistown and East Helena have recently built treatment plants that have changed from one mode of treatment to a different type in an effort to meet discharge limits and protect public health and the environment. Lewistown replaced an attached growth system, Rotating Biological Contactor (RBC), with an Oxidation Ditch that includes anaerobic and anoxic zones that provide a means for reducing N and P nutrients prior to discharging to the pristine waters of Spring Creek. East Helena converted aerated lagoons to an Activated Sludge system that converts ammonia to nitrates, reducing toxicity levels in the Prickly Pear Creek. Many smaller communities use lagoon technology to treat wastewater loads and then land apply the treated effluent to grow crops beneficially with the remaining nutrients, eliminating a source of pollution in state waters.

Development of Total Maximum Daily Loads (TMDL) limits for watersheds will certainly require certain communities to apply innovative processes in the treatment of wastewater that can meet some stringent in-stream target values for N and P compounds. In the Middle Rockies Ecoregion, Total Nitrogen (TN) and Total Phosphorus (TP) concentration limits will likely be established in the range of 0.33 mg/l and 0.02-0.04 mg/l, respectively. It is these maximum levels that are projected by state ecologists to be protective of the beneficial uses established for these watersheds. Much as the phosphorus reduction limits for the Flathead basin have helped maintain water quality in Flathead Lake over the past 20 years and the Voluntary Nutrient Reduction Plan (VNRP) for the Clark Fork River basin has helped lower nitrogen levels and reduce algal production in that river, water quality standards for all watersheds in Montana will be established to maintain and preserve our valuable natural water resources.

The levels of TN and TP proposed in many river basins and for many lakes will not be achieved easily or without substantial investment by communities. River basins with sizable flows, such as the Yellowstone, the Missouri and the lower Clark Fork, will have mixing zones that will help systems meet in-stream concentration limits through dilution, but will still need to have suitably designed WWTPs that optimize treatment to meet these stringent limits. Smaller streams receiving discharges from larger

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Biological Nutrient Removal from WWTP Effluents - *continued from page 10*

cities, such as Bozeman, Butte, Kalispell, Helena and East Helena, will probably not have mixing zones, or will have much smaller mixing zones. It is likely that a combination of treatment technologies will be needed to reduce TN and TP in these small flow watersheds.

Both the federal Clean Water Act and the Montana Water Quality Act allow for economic and affordability analysis to be applied in meeting water quality standards. However, covering the costs of building and operating systems to meet the limits in the TMDLs will be spread out over larger populations and have lower fiscal impacts than those felt by citizens in smaller communities, such as Philipsburg. Additionally, research and engineering agencies are working to discover new methods for lowering nutrients in plant effluents and meeting water quality standards that are protective of Montana waters.

In order to improve my understanding of how to optimize treatment performance through improved process control in WWTPs, I have discovered a few new ideas and approaches to process control. Environmental conditions in the wastewater flowing through WWTPs has a large effect on the ability of the microorganisms to "get 'er done"; i.e., to take up, convert, and/or remove nutrient compounds prior to discharge in the plant effluent. Bacteria need a ratio of carbon, nitrogen and phosphorus compounds to grow normally without the formation of troublesome filamentous bacteria; this C:N:P ratio is about 100 parts C to 5 parts N to 1 part P. Carbon compound concentrations are generally measured as Biochemical Oxygen Demand (BOD).

The growth of the biomass removes N and P as it removes carbon and forms new cells. These cells are removed as solids in the WWTP, thus taking some N and P from the flow. Please note that only about 12-14% of 'available' nitrogen is removed through bacterial cell growth and only about 2% of phosphorus in normal cell growth. Obviously, removal of N and P only through cell growth won't achieve removal to levels needed.

Nitrogen can be effectively removed through biological nitrification and denitrification. Ammonia, the most common form of nitrogen in raw wastewater, is oxidized to nitrate by nitrification in an oxic zone and then reduced through denitrification to nitrogen gas in an anoxic zone. Oxic zones have dissolved oxygen (DO) available, while anoxic zones rely on nitrate, NO_3, to supply the oxygen to the bacteria. Nitrogen gas is insoluble in water, so the gas bubbles are released into the air, which is about 78% nitrogen. Several physical-chemical processes are available to remove nitrogen compounds, but may not be cost-effective for domestic wastewater treatment.

Phosphorus removal processes in use in modern WWTPs often utilize both enhanced bacterial cell storage and cost-effective physical-chemical processes. Phosphorus is retained in the solids removed from the wastewater stream and must be handled appropriately before final disposal. The chemical processes for removing phosphorus are well understood and costs can be safely predicted along with performance levels. Biological removal of P relies on creating conditions in the bioreactor that allow Phosphorus Accumulating Organisms, PAOs, to predominate. Using anaerobic zones, where no DO or nitrate is present, PAOs release internal phosphorus, while taking up soluble forms of BOD, generally present as volatile fatty acids (VFAs). When these PAOs enter the aerobic portion of the bioreactor, they release the stored carbon and take up phosphorus. These particular microorganisms take in more phosphorus than they release and overall, through the bioreactor, phosphorus is reduced. The solids removed must be maintained in an aerobic condition to prevent re-release of the phosphorus.

In either of the biological nutrient removal processes, the N and P compounds must be 'biologically available' to the biomass in order for the bacteria to assimilate the nutrients. That generally means that the compounds need to be dissolved and not in particulate form. The bacteria will need to adsorb the wastes in order to absorb them through the cell wall. This takes more detention time (larger basins) and more energy, as a rule.

Environmental conditions that impact nitrification/ denitrification (N/DN) and enhanced biological phosphorus removal (EBPR) processes include, but are not limited to: temperature, pH, alkalinity, low levels of soluble BOD, too much oxygen in the anoxic

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Biological Nutrient Removal from WWTP Effluents - *continued from page 11*

(denitrification) zone, oxygen and/or nitrate in the anaerobic zone, erratic loading, sidestream sources, drinking water source and toxic elements.

The control elements for operating BNR plants are many and varied. Operators need to collect appropriate data in order to optimize conditions for the biological and chemical treatments to be effective. Operational controls include: DO levels, Oxidation-Reduction Potential (ORP) values, pH, nitrate and ammonia concentrations, phosphorus concentrations, and flow monitoring for recycle rates. Conditions suitable for N-removal are not the same as those necessary for optimal P-removal. Operators may want to conduct suspended solids (SS) tests on the mixed liquor in the bioreactor at varying times and in different locations. Solids concentrations are important indicators of how the process is working and conditions change throughout the day and night. There are SS meters available that provide quick information. Remember that the volatile SS portion, or MLVSS, shows how much of the biomass is inert, or not involved in the process.

DO levels are important and ought to be measured in different areas of the bioreactor. Consider using portable meters, since meters mounted in permanent locations may be difficult to relocate. Specific Oxygen Uptake Rate (SOUR) tests are easy to run and provide information on the rate of aerobic oxidation by the bacterial mass. ORP meters show the degree of oxidation potential within the biomass and indicate which compounds of carbon, nitrogen, phosphorus or sulfur can be oxidized or reduced under the conditions present. Many plants combine usage of ORP and DO meters to provide process control information for the various treatment zones. Ammonia and nitrate concentrations should be measured to indicate performance within the nitrification and denitrification zones and nitrate in the anaerobic zone can limit P-removal.

Sludge age, or mean cell residence time (MCRT), should be greater than 5 days, Nitrifiers grow very slowly. Nitrification requires alkalinity, consuming 7.1 mg of alkalinity (as $CaCO_3$) for every mg of ammonia converted to nitrate. If the influent contains 25 mg/l of ammonia, the biomass will need 178 mg/l alkalinity just to complete nitrification. Another 40-60 mg/l alkalinity are needed to maintain normal biological processes, so source water must contain about 238 mg/l. Please note that some researchers suggest that 100 mg/l alkalinity is necessary for normal biological functions, so the water may need 278 mg/l alkalinity in the example cited.

Soluble carbon for the EBPR process is available is most domestic wastewater, but to optimize P-removal, VFAs are usually supplied. Under anaerobic, or septic, conditions as are present in most collection systems, VFAs are formed, but concentrations may not be enough to meet high loading conditions. WWTPs will often provide equalization basins to even out the loads and will use a source for VFAs for primary basins, anaerobic digesters or fermenters. Since organic acids are created and used in this step, these processes can be smelly and corrosive. Odor controls and corrosion resistant materials are necessary and operators must perform diligent maintenance on these processes.

As more advanced WWTPs are constructed and built, we will learn more about how to push these facilities to optimize performance. Joni Emrick, manager of the Kalispell facility, has spoken at both the Water Environment Federation national conference and at a meeting of researchers and government officials in Washington, D.C., about procedures employed at her plant to obtain TP levels in the 0.1-0.2 range without the use of chemicals. Montana has a cold climate and both BNR processes are limited by cold temperatures. Colorado has several facilities serving high mountain ski resort communities that are achieving excellent results for both N and P removal in colder temperatures. Controlling biological processes in extreme climates is a difficult and complex task. Operators will need more tools and assistance than ever.

Can we design, build, and operate WWTPs to meet stringent nutrient limits? The easy answer is, yes, the technologies exist. The harder answers to find are: How much will the facilities cost? How will communities afford to build and operate them? What will operators need to know and what will they need to do in order to assure that optimal results are achieved? That is the future for wastewater treatment in Montana. ■

A Strong Source Water Protection Plan

A good source water protection plan creates a clear, firm call to action. While the details of each plan will vary based on local factors, any good plan should include the following components:

- A list of specific actions to be taken to protect and/or restore the source water. The actions must be described as to-do tasks, not general recommendations or "shoulds" and "coulds." (Be sure and include both "quick and dirty actions" as well as more complex ones. There's nothing like a few small positive accomplishments to make people feel involved and invested.)
- A detailed description of who is responsible for the listed actions.
- A timeline with milestones to measure progress.
- A plan for tracking implementation actions to make sure action items are accomplished.
- Identification of funding needs and a plan for bringing in the funds. ■

Getting a Source Water Protection Plan Certified

Why develop a Drinking Water Protection Plan?
The requirements for water quality monitoring of public water systems in Montana provide some degree of assurance of safe drinking water; however, almost all systems have some vulnerability to potential contaminants. One of the best ways to ensure the continued delivery of high quality water is to develop a local plan designed to protect against potential contamination. Not only will this measure add a margin of safety, it will raise awareness in the local community of the risks of drinking water contamination and provide information to them about how they can help protect their source of water. The benefits of source water protection planning also include ensuring local management of the resource, facilitating state and federal resource prioritization, potential for reduced monitoring costs (monitoring waiver), and possibly obtaining future priority funding for protection activities in your area.

Getting your plan "certified"
There are a number of technical assistance providers working in Montana and helping water systems with source water protection planning. These plans are voluntary and many water systems never consider asking the Source Water Protection Section at DEQ for review and comment. It may seem like a voluntary plan shouldn't need state agency review.

However, many funding entities are beginning to ask that a source water protection plan be in-place in order for a PWS to be eligible to receive financial assistance. Since the state has standards for source water protection plans, it is logical that funding entities will ask for documentation that your protection plan has been certified by DEQ to meet the minimum standards. Here's a summary of what goes into a source water protection plan.

- Description of the characteristics of the community, public water supply, and water source.
- List of the key individuals and groups that participated in decision-making and those who will implement the source water protection plan.
- Current information on construction of wells or surface water intakes including recent sanitary survey information and maintenance records.
- Well yield and a well log for groundwater sources.
- Engineering drawing of the water intake for surface water sources.

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Getting a Source Water Protection Plan Certified - *continued from page 13*

- Methods, criteria, and sources of information used to delineate source water protection areas.
- Map showing locations of water intakes and boundaries of source water protection areas.
- Contaminant source inventory of the source water protection areas in proper format for inclusion in a statewide database.
- Susceptibility assessment for each combination of significant contaminant source and water intake.
- Management options chosen including a copy of any ordinances adopted.
- Statement of the goals of management actions and a time frame for implementation and evaluation.
- Emergency response plan tailored specifically to incidents likely in your area.

Many of the items in this list are found in your source water assessment report (if you don't have a copy, contact DEQ at the number below). The last four items are what make or break a protection plan. Has the source water assessment report been reviewed critically by the PWS to ensure it is correct? What actions are needed to ensure that high or very high potential contaminant sources are addressed? How will these actions occur, who will implement them, and what is the schedule? Has an emergency plan been written that truly addresses potential emergencies your PWS could experience?

Having a certified source water protection plan helps the funding entity know that the investment of your water system is being protected.

Need Help?

A template to guide you through the development of a Source Water Protection Plan can be found on our Internet site at **http://www.deq.state.mt.us/wqinfo/swp/Circulars.asp**. The whole idea of involving others in the community can be daunting. In-depth technical assistance is available through DEQ and MRWS for communities that choose to move beyond the assessments to voluntarily develop a source water protection plan. Contact Joe Meek at DEQ at (406) 444-4806 for more information. ■

Protecting the Area Around Your Wellhead

It seems pretty simple; you want to protect your well against damage to the casing and prevent direct introduction of contaminants into the well or groundwater in the immediate area surrounding the well. But how do you make it happen, especially if your well has been in-place for years and you don't own the land upon which it sits?

DEQ recommends ownership, easement, or the lease of the land immediately surrounding the well to control entry to the well site, control certain activities at the wellhead, and to control the use of chemicals around the well. The following is what a well control zone easement might look like. Keep in mind that the exact language needs to be tailored to your specific situation, but a well that has this level of protection around it is probably in pretty good shape.

DECLARATION OF WELL CONTROL ZONE (aka WELL ISOLATION ZONE)

THIS DECLARATION made on this _____ day of ___, 199__, by _____, hereinafter referred to as **DECLARANT**.

W I T N E S S E T H ;

WHEREAS, the **DECLARANT** is the owner of the privately owned tracts of real property situated within the 100-foot radius described on the hereto attached Exhibit A (this should be a meets and bounds description), and

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Protecting the Area Around Your Wellhead *- continued from page 14*

WHEREAS, a well will be drilled upon the real property of _____, situated in the center of the 100-foot radius described on Exhibit A, hereto attached; and

WHEREAS, the **DECLARANT**, in order to protect the quality and purity of water from said well, are willing to impose certain restrictions upon the said area to run with the real property and to be binding on all parties having or acquiring any right, title, or interest in and to the said area, **NOW THEREFORE**;

DECLARANT hereby declares that all of the property within a 100-foot radius of the well, hereinafter referred to as the **WELL CONTROL ZONE**, shall be held, sold, and conveyed **SUBJECT** to the following restrictions:

- No septic system, wastewater disposal system, sewer pipe, sewage lift station, French drain, or class V injection well, shall be located within the **WELL CONTROL ZONE**.
- No groundwater mixing zone shall encroach on the **WELL CONTROL ZONE.**
- No hazardous substances as defined by 75-10-602 MCA, gasoline, liquid fuels, petroleum products, or solvents shall be used or stored within the **WELL CONTROL ZONE**.
- No stormwater conveyance or retention structures, injection well, grass infiltration swale, or other stormwater structures shall be located within the **WELL CONTROL ZONE**.
- No livestock shall be confined, fed, watered, or maintained within the **WELL CONTROL ZONE**.
- No private well shall be constructed within the **WELL CONTROL ZONE**.
- No roadway or roadway easement shall be constructed or maintained within the **WELL CONTROL ZONE**.
- Activities, which may threaten the quality of water in the **WELL CONTROL ZONE**, are prohibited.
- Maintenance of land with the **WELL CONTROL ZONE** shall be accomplished only by mechanical means.
- The application of fertilizers shall be at agronomic rates and applied only during the growing season within the **WELL CONTROL ZONE**.

These restrictions shall terminate and be of no further force and effect in the event the aforementioned well is discontinued as a source of water and abandoned in accordance with the laws and regulations of the Montana Department of Natural Resources and Conservation.

STATE OF MONTANA

County of _____

On this ___day of _____, 199_____, before me, the undersigned, a Notary Public of the state of Montana, personally appeared _____ known to me to be the persons whose names are subscribed to the within instrument, and acknowledged to me that they executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my Notarial Seal the day and year in this certificate first above written.

NOTARY PUBLIC for the state of Montana
Residing at
My Commission expires:

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Protecting the Area Around Your Wellhead - *continued from page 15*

You should know that many community wells, especially older ones, don't have easements or other agreements in place to protect the control zones. But all new wells are required to have something in-place to make sure the items on the list are excluded from the area within 100' of the wellhead. If you don't own the land that your PWS well sits on and you want to develop long term protection, you should consider trying to develop an agreement with the landowner. Since you may be asking a landowner to give up certain uses on his property, you should expect to incur a cost for his concession. Given the high cost of developing a new well, the cost of obtaining an easement is almost always going to be less than constructing a new well. ■

Top Ten List for all Water Systems

Public Water & Subdivision Bureau
Security & Emergency Preparedness Program
www.deq.mt.gov/wqinfo/pws/securitylinks.asp
1-406-444-4400

1. In case of an emergency – call "911" then use ERP
2. Plan (update) & Prepare – Emergency Response Plan, NIMS command system, training courses, practice exercises, cross-train staff, supply availability, employees' families, alternate work sites, and post contact numbers
3. Inspect facilities daily
4. Make security & preparedness everyone's job
5. Limit & control access to facilities through identification
6. Establish relationships with Emergency, Law, & Health Officials
7. Continue to assess threats & identify vulnerabilities
8. Fence, lock, light, maintain, and secure all facilities
9. Know, handle, and dispose of chemicals properly
10. Use necessary computer software & access protection

"Working together to respond and protect our Public Water and Wastewater facilities"

Montana Department of Environmental Quality

DEQ Disaster Preparedness Planning

by Dusti Lowndes, DEQ

Lots of things are happening in the world of disaster preparedness. A committee is being formed to oversee some of the preparedness tasks and issues that affect Water & Wastewater Systems and operators. In just the few months that I have been working on this program, I have come to learn that there are some wonderful people in our state who are diligently working toward awareness and preparation for any disaster. We need to collaborate with these people in the planning process so that the water and wastewater industry has a voice and is working toward disaster preparedness. This cooperative effort and response will be necessary should a disaster strike our state. Representatives of core agencies and organizations are being contacted. If you feel you know of a key participant or group that may be an asset to the committee, please give me a call. Here is a brief description of the committee.

Montana Water and Wastewater Critical Infrastructure Committee:

Montana Department of Environmental Quality, Public Water Supply Section supports the intent and goals of a Montana Water and Wastewater Critical Infrastructure Committee. The committee will act as a panel of interested parties that will oversee and advise on emergency planning and security issues associated with water and wastewater systems within the state of Montana. This group would initiate necessary policies, working groups, and act as a water and wastewater contact to assist in collaboration of response planning.

The Montana Water and Wastewater Critical Infrastructure Committee will act as a core multi-disciplinary group that will facilitate communication and cooperation among water and wastewater systems, emergency responders, public health, and law enforcement. This committee is a necessary effort in order to streamline information and create a functional water and wastewater group for intrastate and national all hazards response planning.

Other Preparedness NEWS:

1 By mid-July, the program webpage **http://deq.mt.gov/wqinfo/pws/securitylinks.asp** should be updated. Watch for information on: DEQ-PUBLIC WATER/Security & Emergency Preparedness, including updates, training available, sources for grant funding, table top exercises, equipment, current events, technology, baseline monitoring before a contamination event, pandemic flu utility preparedness checklist, contacts, links to preparedness documents, contractors and assist organizations. Please offer any suggestions and return an email to me.

2 **What Water Utilities Should Know About NIMS Established by Homeland Security Presidential Directive 5 (HSPD-5)**. The National Incident Management System (NIMS) helps responders from different jurisdictions and disciplines coordinate response efforts after both natural and man-made disasters. NIMS is a unified approach to incident management that emphasizes preparedness, mutual aid and resource management.

Drinking water and wastewater utilities should be aware of NIMS since city and county governments will be following this protocol in the event of an emergency.

Beginning in FY07, which begins October 1, 2006, all federal preparedness funding will be conditioned upon full NIMS compliance. States can become fully compliant by completing the FY05 and FY06 NIMS activities. Local and tribal jurisdictions only need complete the FY06 activities. Both FY05 and FY06 activities can be completed online through the NIMS training page at **www.fema.gov/emergency/nims/nims_training.shtm**.

Under NIMS, the water sector falls under Emergency Support Function (ESF) 3, Public Works and Engineering. Under the National Response Plan (NRP) the U.S. Army Corps of Engineers oversees the federal response to national incidents with assistance from U.S. EPA. For more information, visit the NIMS homepage at **www.fema.gov/emergency/nims/**.

3 **WaterSC Provides Central Location for WARN Resources.** WaterSC has a new webpage aimed at providing tools to water utilities about Water/Wastewater Agency Response Network (WARN) systems. By establishing mutual aid agreements before a crisis occurs, WARN participants pave the way for member utilities within (and outside) of their respective states to send valuable aid in a quick and efficient manner.

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DEQ Disaster Preparedness Planning - *continued from page 17*

The webpage **www.watersc.org/warn.html** links to established WARN programs, hosts a statement of support from the major water and wastewater associations and lists resources that include a sample mutual aid agreement.

Montana Water and Wastewater Critical Infrastructure Committee will be working to establish a regional or statewide WARN network.

4 **DHS Makes Changes To National Response Plan**. The Department of Homeland Security has announced changes to the National Response Plan (NRP). The NRP establishes a single, comprehensive approach that the federal government follows for domestic incident management to prevent, prepare for, respond to, and recover from terrorist attacks, major disasters, and other emergencies. Most of the changes are designed to give the government more flexibility in coordinating responses across agencies and within affected areas. The NRP is an all-hazards plan built on the template of NIMS.

5 **Pandemic Flu Preparedness**: To learn more about the state's preparedness efforts, as well as how you can prepare and protect yourself and your family, please check out the resources on this page. **http://www.dphhs.mt.gov/pandemic.shtml.**

6 **Resources Available:**

http://www.amwa.net/SC/watersc_waterisac.htm

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Water & Wastewater Pandemic Flu Preparedness

by Dusti Lowndes, Security & Emergency Preparedness Specialist, DEQ

Pandemic Preparedness is one way of using your all hazards emergency response plan and adding an emphasis of sanitation and communicable disease control.

According to Montana's Department of Public Health & Human Services, draft Pandemic Influenza Response Plan, (*should we have a pandemic flu event*) 330,000 people could become infected in Montana, with 165,000 patients requiring outpatient care, 3,600 needing hospitalization and close to 900 people dying. These are estimated figures but scary enough to ask the question, "if a third of our state's population is sick, who is running our water and wastewater systems?" What other utilities and public service jobs will be affected or bottle-necked? **http://www.dphhs.mt.gov/pandemic.shtml**

Center for Disease Control has assembled a series of checklists to help people and businesses prepare for a pandemic event. Please familiarize yourselves with the lists and use them to begin your preparation and add them to your emergency response plan. **http://www.pandemicflu.gov/plan/checklists.html**

Example of Water /Wastewater Utility Pandemic Preparedness

Denver Water has prepared by cross-training staff, stockpiling supplies, and stashing emergency kits that contain first aid supplies, duct tape, rope, flashlights, batteries, toilet paper, cook kit (*ramen noodles, canned ravioli, canned fruit, dried fruit, jelly…*), portable stove, sleeping bag, masks, gloves, and hand sanitizer with the idea that enough supplies would be on hand for 1 or 2 people to be self-sustained for three days at a water/ wastewater facility. Their concern during a pandemic event is that they will be understaffed at a critical time when clean water must be provided in order to combat a communicable infection. Mitigating the impact is to keep essential services going so folks can stay in their homes and don't have to go out and get exposed to people with influenza. If people are able to stay in their homes, it changes the way the epidemic moves through a community. It reduces the number of people infected and shortens the duration of the epidemic locally.

(Information from an article titled: Denver Water readies for flu pandemic. New danger pushes agency to complete emergency planning. By Jim Erickson, Rocky Mountain News, April 17, 2006) ■

Implementation Plan for the National Strategy for Pandemic Influenza

Sustaining Infrastructure, Essential Services and the Economy:

Movement of essential personnel, goods and services, and maintenance of critical infrastructure are necessary during an event that spans months in any given community. The private sector and critical infrastructure entities must respond in a manner that allows them to maintain the essential elements of their operations for a prolonged period of time, in order to prevent severe disruption of life in our communities.

Roles and Responsibilities

Because of its unique nature, responsibility for preparedness and response to a pandemic extends across all levels of government and all segments of society. No single entity alone can prevent or mitigate the impact of a pandemic.

The Private Sector and Critical Infrastructure Entities

The private sector represents an essential pillar of our society because of the essential goods and services that it provides. Moreover, it touches the majority of our population on a daily basis, through an employer-employee or vendor-customer relationship. For these reasons, it is essential that the U.S. private sector be engaged in all preparedness and response activities for a pandemic.

Critical infrastructure entities also must be engaged in planning for a pandemic because of our society's dependence upon their services. Both the private sector and critical infrastructure entities represent essential underpinnings for the functioning of American society. Responsibilities of the U.S. private sector and critical infrastructure entities include the following:

- Establishing an ethic of infection control in the workplace that is reinforced during the annual influenza season, to include, if possible, options for working off-site while ill, systems to reduce infection transmission, and worker education.
- Establishing contingency systems to maintain delivery of essential goods and services during times of significant and sustained worker absenteeism.
- Where possible, establishing mechanisms to allow workers to provide services from home if public health officials advise against non-essential travel outside the home.
- Establishing partnerships with other members of the sector to provide mutual support and maintenance of essential services during a pandemic.

Individuals and Families

The critical role of individuals and families in controlling a pandemic cannot be overstated. Modeling of the transmission of influenza vividly illustrates the impact of one individual's behavior on the spread of disease, by showing that an infection carried by one person can be transmitted to tens or hundreds of others. For this reason, individual action is perhaps the most important element of pandemic preparedness and response.

Education on pandemic preparedness for the population should begin before a pandemic, should be provided by all levels of government and the private sector, and should occur in the context of preventing the transmission of any infection, such as the annual influenza or the common cold. Responsibilities of the individual and families include:

- Taking precautions to prevent the spread of infection to others if an individual or a family member has symptoms of influenza.
- Being prepared to follow public health guidance that may include limitation of attendance at public gatherings and non-essential travel for several days or weeks.
- Keeping supplies of materials at home, as recommended by authorities, to support essential needs of the household for several days if necessary. ■

Security Issues

Where in this photo did security fall short?

First person to call Dusti at (406) 755-8985, Ext. 106 wins a prize.

Billings Airport Emergency Response

This report is based on a Lee newspaper report by Lorna Thackery in the Billings Gazette in March 2006. An unidentified, apparently unlabeled can was left at an airport ticket counter. It turned out to be a pocket-sized canister of Mace left by an unidentified passenger. The result was a test of airport and City of Billings emergency response teams.

The event caused delays in some flights, affected others and portions of the airport were evacuated by the emergency responders as the city's emergency resources were put to the test.

While the canister was small in size, and the problem eventually was probably considered 'minor,' the coordination of the various agencies dealing with public safety were tried, tested and reviewed with an eye to handling future, more disastrous, situations. Thackery reported that the problem, "drew a major, well-coordinated response from local public safety agencies." Sounds like things went well.

An alert ticket agent in the terminal apparently set the emergency response in motion by reporting a smell that made her cough and caused a burning sensation in her throat.

The response teams included firetrucks, ambulances and the Hazardous Materials Emergency Response van for the City of Billings.

Passengers on the east end of the terminal and the floor above were evacuated to the other end of the terminal. This happened during the morning 'rush hour.' Airport officials called the fire department about a respiratory irritant about 7:23 a.m. The event ended about 8:50 a.m.

While only the ticket agent was checked by the paramedics, she didn't require further assistance, to which we all can breathe a sigh of relief. Certainly this sort of situation could be much more severe and/or deadly.

The Hazmat team members weren't taking chances and followed protocol by donning protective suits and breathing apparatus. Fire hoses were readied to spray down the unidentified item or items.

Dealing with the unknown is always daunting … dealing with security problems that could affect lots of people and affect an important hub of transportation adds even more potentially serious concerns. All communities would be well-advised to plan, prepare, practice, review and practice emergency response and coordination efforts over and over. ■

Montana Officials Conduct Biomonitoring for Metals in Humans

A biomonitoring study by state and local public health officials has found elevated levels of heavy metals in some Montana residents.

The goal of the study was to find out whether Montanans have higher levels of arsenic and other metals in their drinking water and bodies compared to people in other states. Biomonitoring is the measurement of people's exposure to substances in the environment.

The study was conducted by the Montana Department of Public Health and Human Services (DPHHS) in collaboration with county health departments. It was part of a six-state project that also involved Arizona, Colorado, New Mexico, Utah, and Wyoming. The study focused on 13 metals: arsenic, antimony, barium, beryllium, cadmium, cesium, cobalt, lead, molybdenum, platinum, thallium, tungsten, and uranium.

Because of Montana's unique geology, many parts of the state have naturally high levels of arsenic and other metals in the groundwater that is used for drinking, according to Dr. Kammy Johnson, epidemiologist for the Montana Biomonitoring Program of DPHHS.

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Montana Officials Conduct Biomonitoring for Metals in Humans - *continued from page 21*

People can also be exposed to heavy metals through food, air, or soil.

Some metals are monitored and regulated in public drinking water supplies, but less is known about the quality of water drawn from individual private wells, Dr. Johnson said. This study focused on folks using domestic wells as their primary source of drinking water.

"We welcomed this opportunity to measure metals in humans and drinking water," she said.

Eighty-seven people from Park, Jefferson, Madison, and Lewis and Clark counties volunteered to take part in the study. They were selected because they live in areas known or suspected to have high levels of metals in the groundwater.

Participants were asked to provide a urine sample and a drinking-water sample from their homes; both were tested for metals. They also were asked about daily activities to determine whether other factors might influence metal levels.

Participants received the results of both tests, along with a comparison of their results to human levels found in the U.S. population as a whole and to levels found in regulated water supplies.

"People from the Rocky Mountain West aren't usually included in national exposure surveys," Dr. Johnson said. "So the results will help determine the normal range of metal exposures for residents of this region."

The study found that 54 percent of the participants had levels of arsenic or other metals in their bodies that were higher than national averages, Dr. Johnson said. Forty-seven percent of the wells tested had higher levels than are recommended for drinking water by the Environmental Protection Agency.

"But these results didn't surprise us since we only tested people and water from areas we knew had a history of high levels," she added. "We also need to remember that the test we used for the urine samples are screening tests and don't mean that people may get sick."

Participants were referred to their medical providers if they had concerns about test results. They also were given tips for making their well water safer to drink.

Knowledge about the quality of drinking water from private wells is often an overlooked aspect of health.

"Improving water quality has been one of the 10 greatest achievements of public health in the past century," according to Dr. Steven Helgerson, state medical officer with DPHHS. "It is important to continue this tradition. This collaborative study between the Montana Biomonitoring Program and local health departments allows us an opportunity to understand and educate the public about how Montana's unique geology may affect drinking water quality and, ultimately, public health."

For more information about the biomonitoring study, visit **www.cdc.gov/biomonitoring** or call the Montana Biomonitoring Program at (406) 444-0273.

For questions about drinking water quality and steps to protect your drinking water, contact the Montana Department of Environmental Quality, Public Water Supply Section, at 444-4400.

To have private well water samples tested for drinking water quality (including heavy metals), contact the DPHHS Environmental Laboratory at (406) 444-2642. ■

Pesticides in the Nation's Streams and Ground Water, 1992-2001

The U.S. Geological Survey (USGS) released a report, "Pesticides in the Nation's Streams and Ground Water, 1992-2001," describing the occurrence of pesticides in streams and ground water during 1992-2001. The report summarizes a 10-year assessment by the National Water-Quality Assessment (NAWQA) Program, synthesizing data collected in 51 major river basins and aquifer systems across the Nation, from Florida to the Pacific Northwest and including Hawaii and Alaska.

The assessment concludes that pesticides are typically present throughout the year in most streams in urban and agricultural areas of the Nation, but are less common in ground water. Findings also show that pesticides are seldom found at concentrations likely to affect humans, but do occur in many streams, particularly those draining urban and agricultural areas, at concentrations that may affect aquatic life or fish-eating wildlife.

The report and companion materials are available on the Internet at **http://ca.water.usgs.gov/pnsp/pubs/circ1291**.

In-depth technical information and raw data also are available on the Internet site, including graphs, maps, and tables in the USGS report with explanations and downloadable pesticide data associated with each; more than 200 maps on pesticide use; and detailed information on NAWQA's sampling methodology, monitoring design, and analyses.

For printed copies of the report, please contact Carise Barbour (703) 648-5716, cbarbour@usgs.gov.

Questions on the pesticide assessment can be directed to Bob Gilliom, lead scientist of the Pesticide National Synthesis program (916) 278-3094, rgilliom@usgs.gov.

Other information can be obtained from:

Pixie Hamilton, USGS
1730 E. Parham Rd.
Richmond, VA 23228
Or call: Phone: (804) 261-2602, Fax: (804) 261-2659
Internet site: **http://water.usgs.gov/nawqa**

For more information you may contact Bonnie Lovelace, DEQ, (406) 444-4969 . ■

Wastewater Decontamination Assistance

The National Association of Clean Water Agencies (NACWA) announced on 4-14-06 that it was creating a Decontamination Wastewater E-Library.

In conjunction with the release of its Planning for Decontamination Wastewater: A Guide for Utilities document (**http://www.nacwa.org/getfile.cfm?fn=2005-10decon.pdf**), the National Association of Clean Water Agencies (NACWA) has created an online e-Library to support clean water utility responses in the event of a chemical, biological, or radiological attack.

The e-Library provides live links to many of the resources and references used in the development of the Guide, which is intended to increase the level of awareness within the wastewater community, on dealing with decontamination wastewater, and offers guidance on how to ensure that wastewater infrastructure and public health are protected in the event of a future attack.

The e-Library also includes links that provide access to ongoing research projects or technical efforts related to decontamination wastewater.

NACWA members can access this e-Library through NACWA's website: **http://www.nacwa.org/advocacy/security/decon/** and copies of the Guide can be purchased through NACWA's Bookstore **http://www.nacwa.org/pubs/**. ■

Announcements

Montana Section American Water Resources Association Annual Conference

23rd Annual AWRA Meeting

October 12 and 13, 2006 • Polson, Montana

Montana's Lakes and Wetlands: Improving Integrated Water Management

A Free Wetlands Workshop in Polson on October 11, 2006
by Greg Kudray and Pete Husby

View or download the PDF flyer at:
http://water.montana.edu/attachments/2006_Workshop_Announcement.pdf

Please mark your calendars and plan to attend both the workshop and conference!

Pharmaceuticals in the Environment

A recent NACWA White Paper on Pharmacy Waste in the environment is available to the public. Please contact Linda Eichmiller of the ASIWPCA organization to check on availability and method for obtaining this critical report. Her e-mail address is: l.eichmiller@asiwpca.org

The website where the paper is on file is:
www.nacwa.org/getfile.cfm?fn=PCP_White_Paper.pdf

World Water Monitoring Day is Now a Program of the Water Environment Federation!

Mark your calendars for World Water Monitoring Day, Wednesday, October 18, 2006. WEF and its primary international partner, the International Water Association (IWA), are inviting citizens and organizations from around the globe to share in this unique experience of water quality monitoring.

Held annually between September 18 and October 18, the program engages communities around the world in performing basic monitoring tests of the condition of local rivers, streams, estuaries and other water bodies. An easy-to-use test kit enables everyone from children to adults to sample local water bodies for a core set of water quality parameters including temperature, acidity (pH), clarity (turbidity) and dissolved oxygen (DO). Results are shared with participating communities around the world through the World Water Monitoring website.

Test monitoring kits can be ordered at a cost of $13.00 (U.S.), plus shipping and handling within the U.S.; international costs may vary. Kits include step-by-step instructions, one set of hardware (includes collection jar, pH test tube, DO vial, Secchi Disk decal, and thermometer), pH and dissolved oxygen reagent tablets for 50 tests, and a material safety data sheet.

Registration is NOW open. To register, for this event, please visit **http://www.worldwatermonitoringday.com/**. For more information on this program, please contact WEF staff, Stephanie Kavanaugh, e-mail: skavanaugh@wef.org.

Interested in Nondegradation Issues Affecting Subdivisions?

Subdivisions are big business in Montana, and DEQ has developed standards for assessing the impacts of the developments on state waters. DEQ standards and policies covering nondegradation are posted on the DEQ website at: **http://www.deq.mt.gov/wqinfo/Nondeg/Index.asp.**

You may also contact Eric Regensburger, Montana Department of Environmental Quality, Water Protection Bureau, by writing him at 1520 E. Sixth Ave., Helena, MT 59620-0901,or by e-mail at: eregensburger@mt.gov.

Eric's phone contact is: (406) 444-0916. He will be glad to assist you in applying the standards. ■

Final Thoughts

Membrane Bioreactors

For many years I have postulated that the person who discovered a membrane treatment process to remove pollutants in wastewater would become wealthy. Among us operators in our classes we discuss the process controls and operational strategies that would grow a biomass in our activated sludge plants that exhibit the qualities of a good sludge. This would be a biomass that settled well in the clarifier so that solids would be captured and would not pass out the effluent into rivers, streams and lakes.

For the most part, due to the nature of the pollutants - greases, oils, organic material – membrane technology seemed a vision of a science fiction future. The fouling of membranes would preclude any advantages, similar to the manner in which conventional water treatment systems aren't suited for wastewater treatment. Algae plug sand filters. Greases and oils don't back wash well from filtration processes. Reverse osmosis systems haven't been cost-effective methods to handle wastewater flows.

Membrane bioreactors are here and they look to make our traditional wastewater treatment processes look positively old-fashioned. DEQ is developing design standards for designers to follow as this new technology is implemented in various subdivision developments and other smaller communities. The operations do not appear to be vastly more difficult and the results can be startling. MBR plants are being proposed for discharging systems and water reuse situations.

The plants can achieve solids reductions to less than 1 mg/l, taking biochemical oxygen demand (BOD) levels down to that level, too. There are positive results for reducing phosphorus levels and nitrogen reductions can be achieved with these processes. Higher biomass concentrations reduce overall footprints of WWTPs and settling clarifiers may be eliminated. As these plants are approved and placed into service DEQ will continue to monitor the operations, maintenance, costs of operations, performance and other key parameters to see if they live up to their billing. Stay tuned for further developments.

Trees on Dikes of Lagoons

The Dam Safety Program of DNRC has released some important information about the effects of trees and large brush growth on the integrity of dikes and dams. Remove the trees and brush, or a dike failure and washout could occur, sending millions of gallons of treated and raw wastewater down the drainage. You don't want to be the operator in a community where that happens. Two instances in the recent past have caused substantial property damage and caused the affected communities to take on unnecessary expenses to rebuild the lagoon systems. These are very expensive undertakings.

Remove trees and brush from the inner banks, the outer banks and the toes of the lagoon dikes. Trees on the top of dikes can blow over opening a channel for water to wash through, cutting the dike. Trees on the outer dikes and near the toe of the dikes are fed by seepage and can be a channel for that seepage to increase. Inner dikes should always be kept clear of excessive plant growth to allow the lagoon surfaces to be kept clear of scum mats and allow cleaning and maintenance of the dikes to prevent erosion effects.

Contact Windy Pennington of the DNRC Dam Safety program at (406) 444-6632 for more information.

Water Facts and Operators Corner

What per cent of the Earth's water is freshwater?

On average, what per cent of the adult body is water?

How many gallons of water does the average American use in a day?

There is the same amount of water on earth today as there was 3 billion years ago.

On calm water, one pint of oil can cause an oil slick the size of two football fields. For those of you not familiar with football, that's 200 yards long and 50 yards wide.

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A leaking faucet, believe it or not, can waste 100 gallons of water per day.

What is a part per billion (ppb), the level to which many drinking water pollutants must be measured? Well, if there are 5 billion people in the world, say, "Hi," to 5 people today and you have been in contact with 1 part per billion of all the Earth's people. Or, you receive an inheritance of $10 million dollars … lose a penny and that's 1 ppb. If you are 32 years old, you have lived about 1 billion seconds … close your eyes for a second and imagine that 1 ppb of your life.

Calculate the chlorine dosage, in parts per million, of the wastewater flow of 0.5 mgd treated with 15 pounds of chlorine daily.

If an operator treats a volume of water with 40 gallons of ferric chloride per day and achieves a concentration of 3.8 ppm, how many gallons would it take to get a concentration of 6.0 ppm?

Answers to Questions:

Fresh water makes up 3% of all water on our planet; the adult human body is 65-70% water; American's use about 200 gallons of drinkable water each day; the chlorine dosage would be 3.6 ppm; and, the operator would need to apply 63.2 gal/day to achieve the desired concentration. ■

photo by Montana Water Center