

The background of the cover is a photograph of a sunset over a body of water. The sun is a bright orange orb on the horizon, partially obscured by a range of dark mountains. The sky is filled with soft, orange and yellow clouds. In the foreground, the dark silhouettes of evergreen trees are visible, with a large tree on the left and several smaller ones on the right.

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Fall 2011
Vol. 33, No. 4

Summer Classic XVII Highlights

Hemenway Retires

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COVER PHOTO

Crater Lake at dusk,
Mark Russell, OAWU

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H2Oregon is the official publication of the Oregon Association of Water Utilities, and is published quarterly for distribution to representatives of rural and municipal suppliers. Issues are mailed free of charge to member and nonmember rural water/wastewater associations. Articles and photos are encouraged with payment in complimentary copies.

H₂Oregon is published for the
Oregon Association of Water Utilities by
Mt. Angel Publishing, Inc.
135 N. Main St., Mt. Angel, OR 97362
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*OAWU's mission is to provide service, support and solutions for Oregon
water & wastewater utilities to meet the challenges of today & tomorrow.*

A New Chapter

by Jason Green, Executive Director

The title of this brief article initially conveys the thought of turning a page, entering into unknown territory or something fresh and anticipated. The familiar foundations and events leading to a new chapter can easily be forgotten or passed over - we desire this not be the case in this circumstance.

Bruce Hemenway's official last day as a full-time employee and OAWU Training Specialist was August 31, 2011. Congratulations Bruce! He will continue to work as an OAWU consultant and occasional trainer as he enters his new chapter in life - retirement (we did not wish to completely turn him out to pasture nor let his experiences and wisdom go to waste!).



For all who know Bruce, his character and reputation as a hard worker, we know he will continue to work even though "retired" - that is what Bruce did, does and will continue - with a smile on his bearded face. It has been a great blessing, privilege and pleasure to share and learn from Bruce these last five years. We will sorely miss his daily presence as part of the OAWU crew.

As we were preparing for his final working day, which included an OAWU staff meeting and BBQ prime rib, we wished to acknowledge and honor both Bruce and his dear wife, Jackie with our thoughts, recognize his dedication, work and most importantly, his character attributes and examples he has provided.

Bruce was instructed and learned how to work hard and efficiently at an early age. He grew up during a time when it was still expected and usual for people to work hard. He had friends that he would traipse the Northern California mountains and valleys with and stories to go with the years. He married Jackie right out of high school and family soon followed. Bruce held various jobs including cutting trails on the Pacific Crest Trail, construction and others, but was eventually hired by a gas company working in the field installing services and lines which led to working in the water industry and at several cities. Bruce was eventually hired on at South Fork Water to run the water treatment plant and did so with the crew there for 25 years until retiring. OAWU was fortunate enough to hire him from retirement; working an additional 5 years of his 42+ year working career.

What we noticed most about Bruce Hemenway were: his word was his bond; he indeed worked, worked hard and enjoys work; a man of great integrity and honesty; as dependable as the sun rising every morning and always up before the sun having already drank two pots of coffee; cares about others and ready to offer help to any who truly needs it; holds a great store of knowledge, both practical and technical that is shored up with experience; a problem solver, trouble shooter and team builder of people; the type of person that respects people based upon what they say, believe and do or acknowledges what they don't do; love of the outdoors and a great day is simply being up in the mountains hunting, walking or visiting with a friend away from man's contraptions and business; a great family man and dedicated to his loving wife; the builder of several beautiful homes that he and his wife have lived in; and a man of the Bible and of God who believes right is right and wrong is wrong - of convictions and action.

May your shoes remain dusty, your hands strong, your mind and vision clear and your love for the Lord, your bride and life a shining example for others! We look forward to reading this next chapter! ♦





Moving Day!

by *Bruce Hemenway, Training Specialist*

Unfortunately, moving day is almost always, an understatement. It's more like moving week or weeks. It seems the longer we live at the same location the more 'stuff' there is to move. In any event, moving is always a long, arduous task.

In early 2010, my wife Jackie and I sold our home near Sisters. We had been there since 2002. Jackie kept telling me we needed more boxes. So, we got MORE orange and apple boxes from the local grocery stores and packing boxes from Home Depot. We used 8 rolls of packing tape. Countless trips to storage, three weeks later, we were finished.

Moving means change, change means things will be different than they were. For us, we have relocated to a new area, Baker City, where we are building another new house. We have moved many times in our 46 years of marriage. More often than not, the change was exciting and fresh. My mother-in-law however, many times told me, that I had to have Gypsy blood in my veins because of our frequent moving.

I started my career with utilities as a heavy equipment operator. My dad told me that he knew I was having fun operating equipment. He went on to say that when I got to be in my 40's and beyond, it would no longer be so enjoyable, especially during inclement weather, when snow could accumulate on your lap. I had recently had snow on my lap while operating a backhoe, which was just before he had this life changing talk with me.

The following spring, while I was working on the natural gas crew, which was combined with the water crew, Mr. Nicks, the district manager, came to our job site and wanted to speak with me. As I climbed out of the ditch brushing the mud from my pants, Mr. Nicks told me of an opportunity to become a water treatment plant operator with the company. Actually, I almost said no. Then I remembered the conversation my father had had with me. Dad had suggested that I find some line of work that was steady, meaningful, and would allow me to work inside during inclement weather.

Mr. Nicks offered me the prospect to begin training in the two water plants owned by the company, as well as go to night school to

acquire the knowledge I would need to pass my WTO II. I said yes. As he walked away I called after him; "Mr. Nicks, what is a water treatment plant operator?" I found out. That was in 1971.

I became certified as a WTO II in 1972. Certification requirements were different then, and I was in a different state. With the exception of one year, I have worked either as a water plant operator or on a distribution crew. That part of my career lasted from 1971 until 2006 when I started with OAWU. The one year deviation was also spent working for utility systems. Only difference; mistakes could have had a shocking outcome compared to water works.

With the addition of relocating to a different part of Oregon, as I mentioned, there will be other changes as well. Along with this relocation, I am going to try something entirely different, for me at least. I have been employed since 1959. I was 14 at the time. My first job, aside from yard work for folks in our neighborhood, was working Monday, Wednesday and Friday after school, then all day Saturday and Sunday in a restaurant. This new and very different life style is called retirement.

One day as I reflected on my work history, it occurred to me that I have been in the water industry for 4 decades. Now, as I make plans for retirement, I feel blessed for the day I was offered the opportunity to become a water plant operator. I can't express how fortunate I have been to work in this field, among so many dedicated men and women.

I am also very honored and privileged for the opportunity to have worked with the dedicated men and women who are also employees of OAWU. The Board of Directors for OAWU has always been a pleasure to work for as well.

When I was hired, our Executive Director Jason Green explained what he would expect from me, and what I could expect from him. Honestly, in the time I've spent with OAWU, Jason has never disappointed me, not one time. Not one minute. I think that says it all.

I love to work. That being said, I'd like to look at it from another perspective; I like to

Oregon Association of Water Utilities

accomplish things. So beginning September 1, 2011 I will be accomplishing other types of things, such as the items on that honey-do list.

Although the last 5 years with OAWU have been busy and at times challenging, I will miss being the Training Specialist. I will miss visiting the towns and cities in Oregon, learning from all of you, and occasionally being able to offer some assistance.

As I prepare to leave OAWU, I reflect back on these years I have spent as the Training Specialist. During that time I have made numerous phone calls, sent countless emails, and have made a bunch of on-site visits. It seems, as I ponder these contacts, what has most often been discussed is the rules, the regulations, and OHA.

Please keep in mind; even though the new rules that are here as well as the ones that



are coming are cumbersome, they are tools to protect the people you serve. In addition, operators that have educated themselves, that are able to keep their systems in compliance, and can explain the rules to their supervisors and boards, are looked on as intelligent people. Not only will you have respect for what you do, but for what you know.

Keep up the good work. I know where many of the public works shops are now, so don't be surprised if some day you look around and see me standing there. Stay safe and remember integrity is the most valuable asset that a person can possess. ♦

God Bless,

Bruce Hemenway,
(Former) OAWU Training Specialist



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OAWU's Summer Classic 2011

The weather was fantastic and the activities were extremely enjoyable. Monday's pre-conference provided for those looking for a few extra CEUs. Tuesday held the evening outdoor barbecue with a meet and greet social, exhibitor prize give aways followed by a bonfire and horseshoe games on the beach. Wednesday continued with a full day of classes or the option of the annual Golf tournament at the very scenic Gearhart Links. There was also a tour of the Camp Rilea water and wastewater facility. Thursday concluded at noon with final words from OAWU's Executive Director and the anticipated grand prize raffle drawings and cash prizes.

- Thank you to Biolyneus, Godwin Pumps, Schneider Electric, The Automation Group and United Rentals Trench Safety for being this year's conference sponsors
- Bonfire beverages sponsored by Ferguson
- Annual golf tournament at Gearhart Links which hosted seven teams

- Thursday, during closing session, OAWU gave away over \$300 in merchandise.
- \$300 in cash prizes to the lucky winners: Justin Riggs, city of Willamina, Ralph Horn, city of Fairview and Phil Chick, Arch Cape Water & Sanitary Service
- This year's OAWU raffles were a Garmin GPS unit, won by Tom Bennett from the city of Newport and the 32" flat screen TV was won by Eric Sather from the city of Prineville
- Lollipop board prize for a full registration to the OAWU Sunriver Conference in March 2012 was won by Susan Bush of Greenhoot Properties.



Mark your calendars for next year's Summer Classic XVII to be held in Seaside, Oregon August 20-23, 2012. See you there!





in Seaside, Oregon

OAWU's Annual Golf Scramble

Seaside, Oregon – Gearhart Links Golf Course – August 24, 2011

The sun was shining and the weather was warm, the grass was green, the sky was blue and the greens were fast; it was a perfect day to hit the links for the competitors of this year's scramble.

For yet another year the staff at the Gearhart Links Golf Course was accommodating, friendly, and professional making the day even more enjoyable.

Four teams of four and three teams of three (with a ghost player making up the fourth player) challenged the course this year. No one was safe from the errant drive, misjudged chip shot, the stray golf cart, or the mocking one received from both your team and the team two fairways away where your shot had finally landed. The day was very pleasant and the banter helped to build camaraderie throughout the golf scramble.

Special thanks to our sponsors this year: Ford Meter Box Co., GC Systems, and DYK for their support of both the attendees and the association.

1st place – Team Ford Meter Box; for the second year in a row: Bill Huntley, Joe Morrow and Ed Pettett

2nd place – Steve Wabschall, Paul Miller and Christopher Young

3rd place – Bob Ulrich, Wayne Bush, Jim Provonost and John Cobb

The winners of the golfing competition games were:

Longest Open Putt 1 – Rick Ezell

Men's Longest Drive – Bill Huntley

Ladies Longest Driver – DJ Ezell

Men's KP – Steve Wabschall

Ladies KP – DJ Ezell

Longest Open Putt 2 – Steve Wabschall

Special thanks go out to Mike Collier, our Source Water Specialist, and Tim Tice, our Projects Manager, who helped make sure the scramble went off without a hitch again this year.

1st



2nd



Mark your calendars for OAWU's next Summer Classic at Seaside August 20-23, 2012. It's a great location to enjoy while you earn CEUs and network with the associate members and your peers.

3rd





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The Caliber of a Man

by Heath Cokeley, Circuit Rider

How do you measure a man's caliber? I think it is a fairly simple question when ask, but its implication can be a little more difficult. I use the term caliber because it is something I can relate to fairly easily from the caliber of a gun to the caliber of a person. For instance, I know during deer or elk season, I carry a 30-06 with 165 grain bullets. With this set-up my rifle is dead on at 100 yards and at 200 yards the bullet will drop 2 inches. That fall is increased to 7 inches at 300 yards and at 400 yards my bullet will fall a full 19 inches short of its intended target. Do you know anyone who follows those same types of rules? There initial starting place may be good and solid but they fall short of their mark the further out they get. These may be people in your life that you have found you cannot count on and it may have affected your relationship, weather it is a working relationship or a personal one.

What about the other side of that coin. The men and women in life whose caliber is so true that no matter how far out the target their bullet always stay the course. These are the people who keep projects in your utilities on track, on time, and on budget. Many of

the traits these individuals posses are the same traits you may recognize in a good management role or any type of leadership position. Their core beliefs get down to honesty, integrity and reliability. I say that because I would like to take this opportunity to recognize a man in our industry with an incredibly high caliber. A man who has dedicated over 42 years of his life to the water industry and has graced us with his presence for the last five years of his career at OAWU. Bruce Hemenway will have retired by the time you read this but I just wanted to recognize him for the vital role he has played to the water industry and to his OAWU family. Thank you for your camaraderie Mr. B and I will look forward to hearing how retirement is.

So with all of that said, what is your caliber? You see, unlike my rifle that carries the one caliber by which it was forged, people have the unique ability to change their caliber by moving a degree up or down depending on their free-will and their motivation. If you don't like the caliber you are then simply change it. ♦

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“Witching” or “Wishing”?

by Scott Berry, *Circuit Rider/ Programs Manager*

When I was very new to the water industry, I was introduced to the phenomena known as water witching. This practice was purported to be able to show you where the underground water pipes were located. It looked interesting and the guy showing me how to do it said he was sure it worked. However, he was not sure enough to show me where the pipe was and then turn me loose on the backhoe without doing a lot of slow hand-digging, as is prudent in any underground excavation. I remained skeptical and over the years I kept asking those in the industry about this practice and started doing some research on my own.

Whether you call it Witching, Wishing, Rhabdomancy, or Divination, it's all the same practice. Some say it has roots in the Bible and that Moses was the first practitioner (Numbers 20 9:11) or that it originated in 1540 in the publication *De re Metallica* by Georgius Agricola. The questionable nature of the phenomenon has drawn suspicion since the beginning. There has always been a struggle between skeptics and believers, neither group being able to persuade the other by reasoning or experiments. Numerous times, dowsing has been tested scientifically without producing any significant positive results.

Over the proceeding centuries, there have been many theories as to how it works. Everything from E-Rays (from German *Erdestrahlen*, earth-rays) that are believed to originate within the earth and penetrate the crust to form an invisible latticework of lines. Local circumstances such as underground streams, minerals, and geographical formations also are said to cause fields that radiate from the ground. These fields are believed by some to affect health, animal behavior, human “auras”, plant growth, and many other things. The believers will emphatically tell you that these fields can be easily detected and demonstrated with the use of a dowsing rod. Skeptics will tell you that there is no scientific basis to support the existence of these fields and that they can only be demonstrated by

the use of a dowsing rod. Dowzers fancy a notion that they call “polarity”. All E-rays and other obscure energy fields have this polarity, either positive or negative. The meaning of polarity differs depending on which dowser is asked; some say it refers to the effects the fields have on humans, others say it refers to electrical polarity.

Man's capacity for self-delusion is infinite.

—Dr. Elie A. Shneour, Biosystems Research Institute.

In the multitudes of studies that have been done on this topic over the past five centuries, it has been proven that the “positive” results of dowsing are attributable to three key factors:

THE IDEOMOTORIC EFFECT

Take a paper clip and tie a 12-16 inch thread to it. Rest your elbow on the table, hold the loose end of the thread with your fingers and let the paper clip swing like a pendulum right above the table. Hold still and try not to move your arm at all. Now visualize that the paper clip moves back and forth but do not move your arm. Does the pendulum swing? If not, concentrate harder because it will eventually move. Ideomotoric Effect is a subconscious movement governed indirectly by your expectations rather than conscious muscle activity. In the case of dowsing rods, a very small movement away from equilibrium causes great fluctuations in the rods. Rods do not move by themselves!

INSTABILITY AND EXTERNAL ATTRIBUTION BIAS

As in the case of L or Y shaped rods, the instability of the instrument itself enhances the instrument's credibility. An unstable system is very difficult to keep in equilibrium and deviations must be compensated for at all times. This unpredictability causes the dowser to believe that he has no control over the rod's movements, which, so far, is correct. It is when the dowser interprets the cause of the movements to be of exterior origin that an illogical conclusion is drawn. Note that nothing is

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stated about whether the dowser is actually right or wrong, but an illogical conclusion is no more than a questionable assumption, which, of course, might be true. What's psychologically interesting is the proneness to think that "if I can't control the moving instrument resting in my hands, then something else does!" This tendency to attribute a self-caused effect to external sources, is called external attribution.

EXPECTATIONS AND SUGGESTIVE ENVIRONMENTS

The influence of expectations on the subconscious and random activities of the system can cause just about any effect. A suggestive environment, for example, supportive and enthusiastic onlookers, makes the positive outcome all the more probable regardless of contingent physical

effects involved. After spending some time in the industry and installing many miles of pipeline, excavating for leaks and service installations, I began to get "better" at witching. The reason for this is that I subconsciously put myself in the shoes of the original pipeline installer and based on my surroundings, ie; the location of ditches, property lines, roads, curbs, trees, rights of way, etc. I subconsciously decided where I would have placed the pipeline and sure enough... that's where the witching sticks said it was. The primary task of the experimenter is, in the case of dowsing, to try to eliminate the test result's dependence on the subject's expectations, a principle not commonly practised among dowsers. Why would they try to falsify their own hypotheses when they're already convinced that dowsing works? The answer to this simple

question essentially differentiates science from pseudoscience. I believe that rigorous testing is happily abstained from for several reasons: ignorance, lack of knowledge, fright of disconfirming results, and the will to believe. These aspects not only make the mind susceptible to anything, they can also unjustly rule out the validity of proper test results. If a test gives a negative or unexpected result, the test itself is concluded to be erroneous.

I fully expect to be engaged in debate about this article as I'm out in the field visiting with you all. In the spirit of "letting sleeping dogs lay," I'll concede that some of you have a better than average percentage with dowsing rods, though I still believe that it's only because some of you have a better than average understanding of how your system is laid out. ♦

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Quality Control in the Wa

by David Branham, Wastewater Technician

In the beginning of my wastewater career, I was fortunate to have worked with Corky Yarbrough who I consider to be one of the best laboratory technicians in the industry. He used to say to me "Accuracy, precision, and quality assurance are the mainstays of any laboratory," and woe be to anyone who was unfortunate enough to track mud into the lab on their shoes or, heaven forbid, leave the door open after entering the facility. A perfectionist he was, and a perfectionist one must be to become a top notch lab technician.

As most of you are aware OAWU, Circuit Riders and the Wastewater Technician, work mostly with smaller systems, 10,000 population and smaller. Larger wastewater systems with populations of about 2,000 and above usually have a well-defined laboratory quality control program in place.

One of the most important things I teach a smaller system is to treat the lab as a separate entity, that is to say, make it a separate part of the daily routine. Quality control and quality assurance is and will be the backbone of any lab. So with that, let's take a look and see what the text books say.

LABORATORY MANAGEMENT

The laboratory, like the rest of the plant, requires a management system. However, laboratory management needs special emphasis on:

- Quality assurance and quality control.
- Record keeping and records retention.
- Analysis scheduling.

QUALITY

Laboratory analyses must meet the needs for important process decisions, regulatory reports, industrial waste enforcement action, and facility sizing. Quality assurance and control systems must be in place to ensure the necessary

quality of sampling and analyses. The quality procedures vary with the type of procedure and end use of the data. Some data for the process control require quick turnaround, allowing for few quality checks. Data reported to regulatory agencies or for industrial enforcement must meet extensive quality checks as detailed in "Standard Methods." Plant management must ensure the adequacy of laboratory equipment, staff time, laboratory environment, staff qualifications, and training. These controls also apply to analyses performed by a contract laboratory. When contracting for analyses, the level of quality assurance and control must meet applicable requirements.

RECORDS

Any analysis that can be challenged requires a record system that shows a clear chain of custody, sample preservation steps, and analysis records. These records and the related quality and analysis records must be kept for a time prescribed by your regulatory agency, state law, and federal requirements. A typical requirement is 3 years. Often retention requirements are stated in a plant's discharge permit.

SCHEDULING

Sample scheduling is basic to any laboratory. Plant management develops a schedule so that its needs are met and the laboratory workload is reasonable. Schedule consideration includes sample preservation and processing requirements and ensuring that all quality standards can be met with the available staff. Without a schedule, samples can be forgotten, analyses will not be timely, and the laboratory operations will be inefficient. Furthermore, schedule development provides an opportunity for management to discuss issues and adapt to various problems.

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stewater Laboratory

Part Two of a Two-Part Series

Just a few more things I would like to add. As the wastewater operator, it is your responsibility to see that each and every one of the above mentioned procedures is carried out properly and timely. If your system uses a contract lab it is your obligation to see that the samples are gathered at the correct location, are preserved correctly, and analyzed correctly. When the bench sheet arrives from the lab, don't assume that everything on it is correct. Look it over *and* make sure that there are no mistakes and that the proper tests have been performed. One last point I would like to mention. Make sure that you, as an operator, have enough time to perform these very important tasks of the wastewater treatment facility. 💧

See ya down the road!

—Dave

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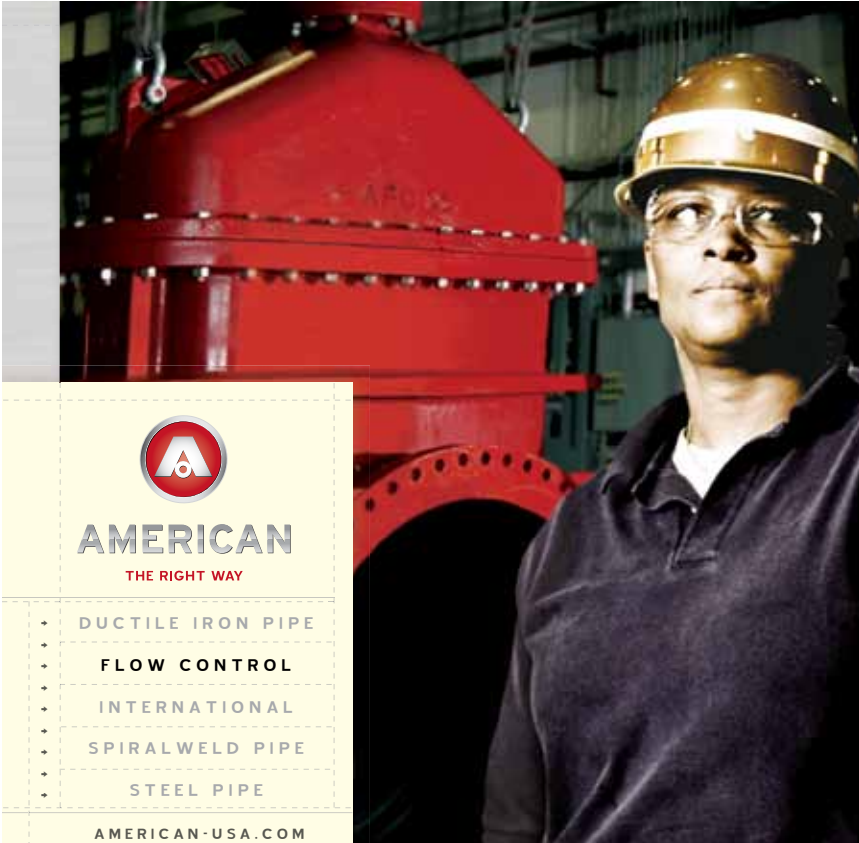
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Storm Water Pollution & S

by Jack Hills, Source Water Specialist

Back in the old days, not that I care to date myself, little consideration was given to what became of runoff waters from new development. We just built it black or gray with impervious AC pavement or concrete, designed slopes to collect the water, and put it in a pipe to deliver it to a natural drainage feature; those natural drainage areas we used to take for granted. There ended the consideration of any further downstream concerns. That would become someone else's problem.

As with all things, times gone by have found ways for needed changes, upgrades in thinking, and improvement in our technologies. Just as we now take a second thought to simply throwing out our litter on the ground, or leaving behind the remains of our pet's exercise, information and education are bringing us to recognize that stormwater runoff from our infrastructures has a serious impact on the water in our streams.

There are more issues, ideas and concerns about stormwater runoff than I have room to discuss here so I'll only touch on a few to spike your thoughts on what we do, and don't do to help keep our rivers and streams pristine. What we do about stormwater runoff pollution becomes the Source Water Protection Plan for the next neighbor downstream.

Is it point source or non-point source pollution?

I only want to mention these two terms for clarification; otherwise they could both overwhelm the reader and the writer with in depth discussions and definitions. Point source pollution is defined by the Clean Water Act (CWA), generalized, as a discernible conveyance (pipe, ditch, channel, etc...) from which a pollutant could be discharged. Non-point source pollution is the result of runoff of precipitation from large areas, agricultural fields, and impervious urban infrastructures; basically whatever is not considered a point source. Runoff, as a result of rainfall, flowing over the surface picks up natural or man-made materials that are

on the ground and carried into our streams, rivers and lakes, likely to be our sources of drinking water.

Since point source pollution is identifiable where ownership and responsibility for it is determined. It becomes controllable or manageable under the CWA by enforcing regulations of the permit system known as the National Pollutant Discharge Elimination System (NPDES) permit program.

However, Non-point source pollution is not as easily defined and thus not nearly as manageable. It includes natural and man-made pollutants from natural and man-made environments: sediment from stream erosion and farming practices, nutrients like phosphorous and nitrogen from agriculture practices, toxic contaminants and chemicals from mining operations, vehicle emissions and industrial operations, pathogens, which cause disease when present in our drinking water supplies resulting from livestock operations, septic systems, pet waste and municipal storm sewer and sewer overflows.

What can we do about this situation?

In the rural and agricultural areas, farmers are implementing erosion control practices to prevent the washing away of their topsoil such as contour plowing, buffer strips, crop rotation, and conservation tillage. In our watersheds, forestry practices are implemented particularly in the logging industry to plan skid trails and logging roads to reduce the amount of sediment that could end up in the streams. Vegetative buffers are maintained along the streams. New trees are planted to replace those from the logged area to re-establish the stability of the land. Urban and suburban developments not only contribute to the polluted runoff, but the impervious nature of our streets, parking lots, and building foot prints prohibit the natural restoration of the rainfall to percolate downward and maintain the ground water table.

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Source Water Protection – Do They Mix?

There are several areas or concepts from which stormwater pollution can be managed.

Storm Water Pollution Prevention Plan

Most states have been authorized to implement the NPDES stormwater program. Construction sites and development excavation are subject to receiving rainfall and resulting in runoff eroding excavations and carrying off sediments to natural drainages and eventually our streams. Construction sites are subject to compliance of the NPDES regulations which results in the contractor needing to furnish a Storm Water Pollution Plan to the owner and regulatory agency for approval of their means of pollution control. Best Management Practices (BMPs) for the applicable activities will usually include silt fences, sedimentation basins, matting, bio

bags on catch basins to prevent erosion of site sediments from leaving the premises and site specific requirements.

Storm Water Management

Many states report that non-point source stormwater runoff is a leading cause of water quality problems. The effects of nonpoint source pollutants on specific waters vary and may not always be fully assessed. We do know, however, that these pollutants have harmful effects on drinking water supplies, recreation, fisheries, and wildlife. Rain gardens have become a way of diverting urban runoff, and allowing it to permeate the ground thus returning to ground water instead of just collecting it in pipes and diverting it to creeks and streams. Many innovative designs are showing up to allow the runoff from streets and parking lots to be

beneficially used to water trees and landscaping thus adding transpiration to the natural purification of the waters. Even roof-top gardening is being used to put rainfall on otherwise impervious surfaces that can be put to a beneficial use.

Detention and Infiltration

Underground detentions systems are structures built beneath parking lots and streets to maximize property usage and lower development costs. They are an integral part of the stormwater system that stores excess runoff during peak rainfalls then discharges to the storm system at a manageable rate. Where soils drain well and the water table is low enough, a stormwater infiltration system might be the solution to runoff. This system allows the stored runoff to percolate in to the

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subsoil. It also reduces the lowering of the water table.

Storm Water Treatment

Industrial complexes are finding that treatment of the storm water prior to its leaving the site is a solution to the problem of allowing its surface runoff to degrade the quality of receiving streams. Some methods are as simple as a gravity separator vault to remove dirt, oil, and floatable materials. More sophisticated equipment will include automated filtering using pressure tanks and back-washing capability. Further complex system will address site specific chemicals that need to be removed from the stormwater.

Local and Individual Responsibility

Locally we can inform and educate people and children about the importance of keeping our water clean and training ourselves to recognize the activities that we have in the past taken for granted that result in contaminating our runoff waters. So here are just a couple of simple reminders of everyday tasks that we do and how we do it that will assist in protecting our drinking water.

Washing our cars on the lawn, a pervious surface or at a carwash prevents the soap, oily grit and scum from going down street and into the streams.

Keeping litter in its proper place and not just tossing it out on the ground prevents it from being washed into the storm drains and eventually to the streams. This goes for cigarette butts as well.

Lawn care is another area where we forget to be careful in how much fertilizer we put on our yards. Too much applied can result in runoff carrying fertilizer to the streams which depletes the oxygen in the water that the fish need for survival. Remember too, the grass clippings and fall leaves. Placed in the street they clog the drains and also pollute the stream waters. Put them to beneficial use a fertilizer by mulching, composting, or bagging for yard waste collection day.

Pet waste should also be considered as a potential pollutant to our streams. If we don't pick it up and properly dispose of it, then rainwater runoff will eventually carry the waste and bacteria into the water we drink.

There are many causes of stormwater pollution, commercial, industrial and right down to individual activities. Technology and concern for the environment are changing how we do things on a large scale in the development of our urban and suburban areas. Industries too are stepping up to meet the challenges of polluted stormwater from their facilities. As individuals we also can do our part in keeping our rivers clean. There is an abundance of materials to help inform folks and instruct children about the prevention of pollution, and specifically this topic of stormwater runoff.

I remember long ago, after having moved from the farm to the suburbs, seeing the fish painted by school children on the curbs by the catch basins. What an effective reminder that what we let go into the street and down the gutters to the catch basins is what the fish will have to live and swim in. One day I might be catching those same fish, intending them to be a campfire delicacy.

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Sustainable Infrastructure

Scout Camp Revealed

by *Tim Tice, Projects Manager*



Each year I feel rewarded to attend scout camp for a week during the summer. The preparation that a scout master goes through from details of stuffing back packs, to filling out medical forms and schedules can only be compared to a sixty-hour work week. Then we go to camp.

Day one is orientation of the camp, ensuring the boys know their schedules and locations. Day two until the end of the week is all about learning, competition, and laughter. All so important, but not as much as what I wish to share with you now!

The boys at scout camp range from eleven to eighteen years of age, and in such a short span of time there is so much growth in these boys and young men, it is humbling to observe. Let's first explain their method of communication: uncommon leadership skills in commanding a small group to function at a particular task or the constant sparring to determine a pecking order that teenage boys go through; passive to aggressive; short to tall; confident to unsure-many are challenged in ways never considered according to their small world, but growth begins here.

How many of you are told to jump into a cold mountain lake, swim 100 yards with white caps splashing you in the face? It is something that most of us are not asked to do, especially at such a young age. Some pass the swim test, some on their first attempt do not, but by week's end many do push on to complete the task. One boy who dislikes the water so much that the anxiety is shown in facial expressions, is the same boy who puts five 22 caliber rounds in a circle the size of a dime, eliminating all such anxiety, standing on top of the world.

To continue on a difficult task and not give up results in growth. Mix in the equation of hitting the wall of tiredness and frustration, short attention spans and many distractions. These are the hurdles the boys get over and claim a successful week.

Observing a scout master or camp councilor taking the time to work one-on-one teaching a better approach for a particular task, to group activities in preparing a skit, these boys do lots of methods of communications through the week.

The atmosphere created at scout camp is one of unity, character building, and learning. All of our boys are given tasks. One boy must get up 30 minutes prior to camp awakening to get the fire started. One boy, usually the senior patrol leader, must consult the duty roster to ensure each scout is completing their daily tasks. Setting up camp involves everything such as, flying the flag each morning, checking water jugs at each tent, tent cleanliness, food prep, to calling out the daily events. The boys are encouraged to be self sufficient. Towards the end of the week and from their own doings, the levels of responsibility are raised, while at the same time, their level of fatigue increases. Growth!

With all that goes on at camp, the week-long event simply creates and accomplishes one thing, memorable experiences for a life time. As a young man, I never participated in scouting, but as a father watching the growth in all the boys, it is something incredible. Some may read this and say there is a bias to the story. My response is, "I agree."

Watching a young staff member work as "range master" for an entire week, handling the position with utmost confidence, yet open to new ideas is more than most teenagers can accomplish. Maturity at its best! Seeing that same young man shedding a tear for patriotism during a flag retirement ceremony is one example of the character building qualities we all strive to instill in all of our children.

Conversations that teach responsibility towards the twelve core values such as, trustworthy, helpful, courteous, kind, and obedient, are heard throughout the day, but mostly at day's end around the campfire. ♦





Source Protection & Other

by Mike Collier, Sourcewater Specialist

Flush, Flush... Flush, Flush, Flush... Flush. We have all experienced it, or at least know of someone who has; "The Big D", that is The Big Decision, or better known as food poisoning. It is such a horrible feeling; a greatly aching gut, the cold sweats, an increasingly bad headache, and knowing that at all times you must be within 20 feet of a bathroom. The doctors say to remain hydrated, but you can't imagine leaving the security of your throne to purchase an electrolyte packed sports drink; it is much safer to stay at home.

There are many cases where bacteria are on food, the food is not cooked properly, and when the food is ingested someone gets sick. However, in some "food poisoning" cases you can continue to trace the bacteria either to the water supply (with water you can also get parasites and viruses) that was used to wash, grow, or process the food (this is especially a concern in under-developed countries); or to improper cleaning of the food, processing equipment, or the hands that prepared the food.

World-wide poor water quality is responsible for 1.8 million deaths every year (WHO.2007). It was estimated that 88% of that is attributable to unsafe water supply, sanitation, and hygiene. So what can we do to help prevent such illness and death? First thing is to wash your hands.... You know who you are. Those that do not wash after using the bathroom or playing in the muck are putting themselves and others at risk. It is also important to wash your hands before you prepare any meals regardless if you think that your hands are clean. Second, would be to educate residents about: washing their hands (after touching anything nasty), properly washing any food preparation items (dishes, knives, etc.), washing all foods (especially anything that will not be cooked), about their septic system, sanitary sewer, and protection of the wellhead.

If not properly managed, septic systems become a significant source of groundwater contamination that could lead to adverse health effects from bacteria, protozoa, and viruses. If too many nitrates (urine, feces, food waste, fertilizer, cleaning compounds)

get into the water supply, it may lead to blue baby syndrome (this is when babies drink water with high nitrate and the oxygen in their blood becomes unusable and can prove fatal).

Each person can play an important role in protecting the water supply from septic tank malfunctions. You can monitor the drain field for signs of failure: odors, surface sewage, and lush vegetation. Inspect the tank's internal structures and monitor scum level. Keep vehicles and heavy equipment off the drain field area to prevent soil compaction and damage to pipes. Never plant trees over the drain field because the roots can enter the perforated piping and lead to backups. Conserve water (water saving devices, repair leaks, shorter showers, and washing only full loads of laundry or dishes) and avoid sending surface runoff from roofs, patios, driveways, sump pump, or water softener water to the septic tank: septic systems can fail due to hydraulic overloading.

Reduce the food waste and never put grease, cooking fats, coffee grounds, sanitary napkins, or cigarettes down any drains or the toilet as they do not easily decompose contributing to the build-up of solids in the tank. Pump the septic tank every 2-5 years. Never flush or pour household chemicals such as: solvents, drain cleaners, oils, paints, pharmaceuticals, and pesticides down drains as these can interfere with proper septic system operation and cause groundwater contamination. Homeowners should take advantage of local hazardous waste collection programs to dispose of these wastes whenever possible. Do not use additives containing yeast, bacteria, enzymes, and solvents as they have not been proven to improve the performance of septic systems, may interfere with their normal operation, and may cause groundwater contamination.

Protecting the sewer collections, plant and receiving waters or discharge areas are important. Don't think that once you flush something it just goes to some magical land, never to be seen again. Never put FOG (Fat, Oil, and Grease), rags and clothing, medication, needles, gloves, condoms, personal hygiene products, diapers, paper products

er Practices

(other than toilet paper), animal or human hair, dental floss, or food waste (especially fruit pits, egg shells and coffee grounds) down the drain or toilet; collect these and put them into the garbage.

FOG, when in a warm liquid, may not appear harmful, but when poured down a drain it cools and hardens onto the surface of settling tanks, digesters, and the interior of pipes; this may cause overflows, a shutdown of wastewater treatment facilities, and require piping systems to be cleaned and replaced more often. FOG can instead be absorbed with coffee grounds, paper towels, or cat litter to be cleaned up for disposal into the garbage.

Never pour bleach directly down ANY drain; bleach dewater grease, making it as hard as concrete. Also, never discharge solvents, caustics, acids, or grease emulsifying

agents down any drain. These can all cause sewer line failure which can lead to contaminated water and potential illnesses.

Don't forget about protection at the source; at the wellhead or surface water intake. Keep these areas clear of contaminants. Fence around or otherwise protect the wellhead from any animals that may congregate and defecate at the location. Also, be sure that all surface water drains away from the wellhead. This will help insure that the surface water is not bringing contaminants directly into the groundwater supply at the well site. Don't store any chemicals, wastes, pesticides, or petroleum products at or near the wellhead.

Collectively these practices can be considered drinking water protection, but are not all-inclusive. We have educated ourselves, educated the neighbors, and have taken

steps toward protecting against potential contamination through Best Management Practices (BMPs). These are examples of how to help maintain a clean drinking water supply for you and your community. Don't get sick from your water; protect the source for today and tomorrow.

Water contamination can come in many different forms, the more precautions you take the less likely you are of getting sick. Protect the water supply and to wash your food, hands, and anything that will come in contact with the food. Remembering these steps and informing your neighbors about them will greatly reduce the chance of waterborne sickness or contaminants from occurring. 📌

World Health Organization (WHO). 2007. Combating Waterborne Disease at the Household Level.



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Do You Have a Line Flushi

by *Hans Schroeder, Circuit Rider*

Out of sight, out of mind. Yes, the water gets sampled weekly or possibly even monthly. We then go about our daily duties. Every once in awhile there is a complaint about stagnant water in a certain location of the distribution system. Cool, all we have to do is send a guy out and have him crack open the nearest hydrant and “presto” we solved the problem. Is this the extent of a line flushing program? No, there needs to be a little more thought and strategy involved in such a program.

Why should a line flushing program be implemented? There are at least three reasons that should be considered:

- Improve disinfectant residuals
- Resolve customer complaints- color, turbidity
- Clean lines for better hydraulics and to save water and energy

Imagine driving down the road at less than 1½ miles per hour. That’s about the rate that water moves through the water lines. This slow speed of movement can cause sediment such as rust and mineral particles to build up over time inside the lines. Also, a buildup of bacteria known as “biofilm” can also coat the inner surface of the water lines. The combination of sediment and bacteria can restrict water flow in the lines and ultimately, lead to poor water quality.

Line flushing is performed by causing enough water through the mains at a higher force and duration than normal flows to flush deposits and sediments that have accumulated in the line. By closing predetermined valves, an operator can isolate the main being flushed. Also this will force the water to the hydrant within that line. To properly flush a mainline the velocity should be a flow rate of 2.5 feet per second. For example, a 4” pipe requires about 100 gpm, a 6” pipe would be 220 gpm and an 8” would be 400 gpm. To calculate volume in gpm required, multiply the desired velocity in feet per second (fps), times the pipe diameter squared in square feet, times .785, times 7.48 gallons per cubic foot, times 60 seconds per minute. This

formula is quarter pi D squared. Let’s do the math on an 8” pipe.

An 8” pipe expressed as a decibel of a foot would be 0.66 (8 divided by 12). We want a flow of 2.5 feet per second to flush the water line.

So, 2.5 fps x .66 x .66 (pipe diameter squared) x .785 (1/4 pi) x 7.48 (gallons in cubic foot) x 60 (seconds per minute) = 384 gpm.

Now if that same pipe needed scoured, just change the 2.5 fps to 5 fps.

METHODS

There are 3 different ways to flush water lines:

- Conventional
- Continuous blow-off
- Unidirectional (UDF)

Conventional flushing is kind of the “quick fix” of the flushing program. This type of flushing is simply going to an isolated area, where there have been complaints of water clarity, odor or possibly a low-chlorine residual, and simply opening one or more hydrants to resolve the problem.

Continuous blow-off is more of a preventative technique used in dead end areas where it is essential to keep a lower velocity of flow. Basically there would be a valve partially opened to relieve the pressure so that there is less flow and pressure entering a possible plant or area sensitive to higher pressure of water, similar to a bypass of sorts.

Unidirectional Flushing is the approach most systems use on an annual basis. UDF is the flushing procedure in which a section of water main is isolated so that water can be moved at a high velocity to clean the main and then be discharged out of a fire hydrant. The velocity of the water will flush out any sedimentation that has occurred. Now if “scouring” is needed, the velocity would need to be in the range of 5 feet per second. Scouring is used to remove deposits from the inner walls of the water main.

Now there is one thing to take into consideration, make sure to be aware of the

Oregon Association of Water Utilities

ing Program?

System O&M Manuals Required

condition and type of pipe that is being flushed. Flushing should progress from the larger diameter pipes to the smaller pipes. Flushing also should be done later in the day if at all possible to take advantage of higher pressures and also to minimize customer complaints. Valves and hydrants should be exercised prior to starting the flushing. This may make the operator aware of any faulty valves or hydrants and ports within the system. Usually an operator will combine both the valve exercising program with the flushing program.

With a flushing program in place, this will save time and energy within the distribution system. If you need assistance putting together a flushing or valve exercising program, an OAWU Circuit Rider would be happy to assist in implementation. ♦

Have you completed your state-required Operations & Maintenance Manual?

Oregon Association of Water Utilities has prepared a full day class to assist operators in outlining an operations and maintenance manual per the Oregon Administrative Rule 333-061-0065 which requires each water system to develop an operations and maintenance manual.

This class will assist the water and wastewater system operator in outlining the specific points in developing the draft of the O&M manual. Step by step, each attendee will create their draft as it relates to their utility system during class. The e-file may then be completed back at the system office.

Class cost is \$150, or if you are unable to attend a class you may purchase a thumb drive with e-files for \$150.

To sign up for the October class, or to have a thumb drive mailed to you, contact your Association for further information.



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Win a Standing Ovation with Your U

Ever had to face the challenge of replacing one of your key people who suddenly quit or took sickness leave right at a critical time?

I went to see a well-reviewed play in another city once, only to discover that the star performer, one of my favorite actresses, had lost her voice.

The theater called in an understudy for the role and, to be honest, I would have taken a refund and rebooked if I hadn't been just passing through town.

I'm glad I didn't though because the understudy turned out to be brilliant and won a standing ovation. She was a smash hit!

Isn't that how you'd like things to be if you had to call on someone to fill a gap after losing a good employee or even to keep tabs on everything and make the right decisions for you when you're not around.

In management speak, they call it succession planning, but I prefer that theatrical term. So, have you got your understudies lined up?

I know, I know. You're too busy thinking about today to worry about tomorrow but if they'd done that in the theater I visited there'd have been no show. In business, that doesn't bear thinking about does it?

Well, the good news is that finding and preparing your understudies doesn't have to be difficult or time consuming. After all, if they're any good, like a pro actor, they'll take on the responsibility for learning the lines themselves.

So how do you go about the process? Here are a few simple tips to set the scene:

First, you need to identify the key jobs. This is a pencil and paper task. Just work out whose absence would hit the business hardest. (Don't forget you can get Key Person insurance for these individuals, but I'm thinking a little longer term here.)

Second, make a list of what you might call the core skills and competencies required for the job.

Next, identify your up and coming bright sparks. You can spot them a mile off by their attitude towards work, their willingness to take "ownership" of problems, their energy and their ideas.

Assess their potential suitability for your key roles plus their strengths and weaknesses, and arrange to address the latter through training and mentoring. Move them around the business a little so they get a broader insight of the operation.

If they're not already there, move them into the understudy position – but only after reassuring the current "star" their role is not threatened (unless it is!)

Follow these rules, and they'll be ready to earn a standing ovation!

Taking the idea a little further, I wonder if you've come across a great, recently-published book by Tony Hsieh, the co-founder of the billion-dollar online shoes retailer Zappos.com.



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nderstudies

Tammy Lesueur, Bancorp Insurance

Called Delivering Happiness, it's worth a read on many fronts, especially in dealing with customer service. But what's particularly relevant for this note is a succession planning program Hsieh (pronounced "Shea" by the way) calls The Pipeline.

The basic rule is that every person is trained to do the job of the individual above him or her in the pecking order. When someone leaves, both the individual above and below can fill-in temporarily before, under most circumstances, the "understudy" takes over.

Worth thinking about, isn't it?

There's a more vital succession planning issue to consider in a small or family-owned business – who's going to run it when you decide it's time to move on?

This isn't just about who's waiting in the wings to take over. There are also important financial/tax issues you need to take advice on. A good starting point for info on this

is the US Small Business Administration (www.sba.gov) and, of course, your financial professional.

That apart though, the mechanics of preparing your "understudy" are pretty much the same as I've outlined above. You'll find some useful advice on the website of the independent entrepreneurial advisory group Score, at http://www.score.org/article_succession_plan.html.

The key is to give your understudy the widest possible experience within the business, plus the opportunity to do a few "live rehearsals" – like getting them to run the business while you're away.

Sure, once you decide to move on, you want to hear that applause as you exit stage-left – but you also want the assurance of knowing the show will go on to enjoy continuing rave reviews!

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The Mechanical Man

Throwing My Loop
Michael Johnson

I had a hero when I was young. Even though it's been forty years since I've laid eyes on him, my vision of him is still crystal clear. I can see him now with his perfect silver belly Stetson, crisp jeans, and starched shirts that never knew a wrinkle. My dad and uncles were rarely impressed with anyone...but they were with him. They were impressed with that blood bay stallion of his who could run a hole in the wind, and even more by the way he threw his rope. When I was twelve, I *knew* he could rope a deer by the horns, a hawk by the tail, and a bee by his wings. When he entered a rodeo, we all went to watch. We watched him saddle his horse, and how he paid minute attention to every single detail. How he fixed his bits, and how he coiled his Billy Leach ropes. We watched him do everything - a small boy and all the men - we all watched the greatest roper any of us had ever known. We even watched him practice...

His routine was always the same. Every day, he ran a flawless dozen on his practice horse and every other day, two - and only two - on the blood bay. And what a sight it was. In that old dusty practice pen, he came from the box so hard and fast and when the lightning shot from his arm, the loop snapped on - always the perfect size for the particular calf's head, then he was down the rope like quicksilver. His hands would whirl and blur, then shoot skyward with a snap you would swear you could hear...and then silence. Once in a while, one of the men might say in a low voice, "Good run, Bill." He would nod his head and say, "Yeah, but there's still work to do." And my, my,

did he work. He practiced all his life, and in all that time, the most remarkable thing was - in all that time, I never saw him win a dime.

Now ain't that the strangest thing?

How in the world could this man be so skilled and yet never win? Took me forever to realize that he actually never visited the pay window, even longer to understand why. The answer is this poor fellow had a medical condition that most all of us suffer from now and then - that dreaded disorder known as the "heebie-jeebies." Here was his pattern...

"Mr. M" always had everything in order. This man was prepared. He had his horse ready, ropes ready, truck all tuned up, and air in the trailer tires. He would travel to the rodeo, and once there, he would saddle up, tune up, and warm up. Then he would make his run...and he would miss. Or he would make some slight bobble that always put him just out of the money. After packing up, he would return home, and head to the practice pen because obviously "there was still work to do." I watched this pattern for over a decade and never saw his problem. Can you?

No way on earth am I intending to convey the idea anyone should skip the practice and study grind no matter if they play the piano, play a violin, competitive golf, if they are a college student, or any other thing. You have to sweat. You have to work. But this fellow was leaving out a vital step. He was trying to do something I now believe

OREGON ASSOCIATION OF WATER UTILITIES 2011 TRAINING & EVENTS SCHEDULE

Date	Class Title	Location	CEU Information	ESAC#	Fee/Free
October 10	Developing Your O&M Manual	Baker City	0.6 Water/Wastewater	2113	FEE
October 25	Water Meters by Badger	Bend	0.6 Water	2069	FREE
October 27	Water Meters by Badger	Tillamook	0.6 Water	2069	FREE
October 31	Developing Your O&M Manual	Florence	0.6 Water/Wastewater	2113	FEE
November 1-3	Small System Operator's Conference	Florence	2.0 Water/Wastewater	TBA	FEE
November 15	Chemical Feed Basics & Chlorination	Lebanon	0.6 Water/Wastewater	TBA	FREE
November 16	Control Valves by GC Systems	Rainier	0.7 Water/Wastewater	1741	FREE
November 22	Chemical Feed Basics & Chlorination	Beaverton	0.6 Water/Wastewater	TBA	FREE
December 6-8	13 th Annual End of Year Operator's Conference	Hood River	2.0 Water/Wastewater	TBA	FEE
December 13	Safe Drinking Water Act Update	Tillamook	0.4 Water	1740	FREE
January 12	Control Valves by GC Systems	Salem	0.7 Water/Wastewater	1741	FREE
March 5-9	34 th Annual Management & Technical Conference	Sunriver	2.0 Water/Wastewater	TBA	FEE
May 15	Safe Drinking Water Act Update	Island City	0.4 Water	1740	FREE
May 22	Control Valves by GC Systems	Eugene	0.7 Water/Wastewater	1741	FREE
June 12	Safe Drinking Water Act Update	Salem	0.4 Water	1740	FREE
August 20-23	Summer Classic XVIII	Seaside	1.7 Water/Wastewater	TBA	FEE
November 5-7	Fall Water Operator's Conference	Hillsboro	2.0 Water	TBA	FEE
December 3-5	14 th Annual End of Year Operator's Conference	Hood River	2.0 Water/Wastewater	TBA	FEE

2011 State Water exam dates

October 20, 2011

For additional water exam information, please visit <http://oregon.gov/DHS/ph/dwp/certif.shtml>

Application Deadline

August 15, 2011

2011-2012 State Wastewater exam dates

March 30, 2012 (Statewide)

Year round, open schedule

Application Deadline

January 16, 2012

For further wastewater exam information, please visit <http://www.deq.state.or.us/wq/opcert/opcert.htm>

Training class dates, class topic and/or locations may be subject to change as needed.

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no one can do. He was trying to win without going through the fire. He was trying to develop perfection at home, and use that to win in the arena.

People who win – in athletics, in academics, in rodeo, and in life, real winners that is – have to learn how to go through the fire. People who win cannot avoid falling down, being humiliated, missing short putts, having hot tears on their face, and making a complete fool of themselves even on those occasions when everything is set up perfectly for them to win. People who *learn how to win* have to endure self-doubt, sitting in the bedroom for two days wondering “if I’m cut out for this,” and in general, learning to deal with truly difficult times. Somewhere in all that, those experiences cause us to seek out teachers. We might even learn perhaps it might be better to slow down. And finally, learning that maybe winning is the wrong focus - even though we would never admit that to anyone. There comes a time in the winner’s thoughts that maybe it would be fun to just go compete and actually enjoy the experience. Maybe thoughts like these...

“Okay, can’t beat these guys. But what if I went somewhere just one time, and didn’t beat myself. What if I just got out of my own way, stopped all the internal yelling and whining at myself, and just did what I know I can do. What if just one time I could relax and win the inner game?”

Guess what happens when you do that?

The world slows down, you see and feel things you didn’t feel and see before. Maybe you don’t win, but you do feel your self doing a little better...and you realize this time, at this place, you didn’t beat your

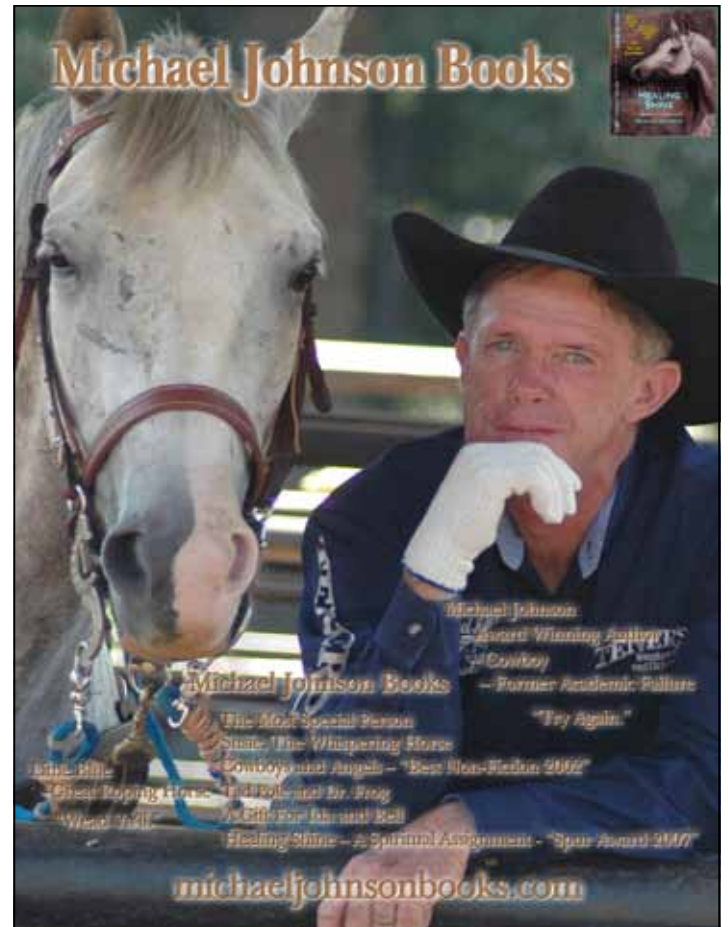
self. Then this very small light comes on inside. It’s a new thing and at first you don’t know what it is ‘cause you haven’t felt it before. It’s the thing called *confidence*. Your faith in you is refreshed. You start looking and learning about what winning really is.

My old hero tried to win by staying at home and becoming perfect.

Perfect practice is good. But to win, there is something else you have to do.

You gotta go to lots of rodeos – and fall down. And get up and try again.

That’s how you win.



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QUIZ CORNER

1. When is the annual CCR due by?
 - A. January 1st
 - B. August 31st
 - C. July 1st
 - D. December 31st
2. Who is the CCR supposed to be delivered to by this date?
 - A. The customers
 - B. The Oregon Drinking Water Program
 - C. All of the Above
 - D. None of the Above
3. Which of the following terms refers to excessive internal pressure, which may be several times the normal operating pressure and can seriously damage hydro-pneumatic tanks, valves, and the piping network?
 - A. Air charge
 - B. Flow rate pressure
 - C. Water hammer
 - D. Hydraulic charge
4. What are the two most important safety concerns when entering a confined space?
 - A. Corrosive chemicals and falls
 - B. Bad odors and claustrophobia
 - C. Extreme air temperatures and slippery surfaces
 - D. Oxygen deficiency and hazardous gases
5. Convert 100 watts to volts ($w/a=v$) if there is 10 amps.
 - A. 0.1V
 - B. 1.0V
 - C. 10.0V
 - D. 100V
6. Convert 1 amp to watts ($a \times v = w$) where there is a fixed voltage of 110.
 - A. 10W
 - B. 110W
 - C. 10.5W
 - D. 120W
7. To flush a main you need _____.
 - A. 2.5 gpm
 - B. 8 fps
 - C. 2.5 fps
 - D. to hire an engineer.
8. To properly scour a main, you need _____.
 - A. 5 fps
 - B. Sodium Hypo Chloride
 - C. 18 gpm
 - D. 100V
9. What is non-point source pollution?
 - A. Pollution that occurs over a wide area and enters streams in water that runs off from fields, parking lots, and other surfaces.
 - B. The process of filtering pollutants out of fresh water.
 - C. Pollution that can be traced to a particular place, such as an open pipe which drains into a body of water.
 - D. Pollution that results in many pollutants coming together.
10. What is point source pollution?
 - A. Pollution that occurs over a wide area and enters streams in water that runs off from fields, parking lots, and other surfaces.
 - B. The process of filtering pollutants out of fresh water.
 - C. Pollution that can be traced to a particular place, such as an open pipe which drains into a body of water.
 - D. Pollution that results in many pollutants coming together.
11. During a specific oxygen uptake rate, DO readings are taken at time intervals no less than:
 - A. 30 seconds
 - B. 1 minute
 - C. 15 minutes
 - D. 1 hour
12. Turbidity in wastewater is caused by.
 - A. Color
 - B. Colloidal particles
 - C. Dissolved calcium
 - D. Hardness

ANSWERS
1-C, 2-C, 3-C, 4-D, 5-C, 6-A, 7-C, 8-A, 9-A, 10-C, 11-B, 12-B



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Operator: _____

Contact Person: _____

Number of Hook-ups: _____

Were you referred? By whom _____

Type of System:

☐ Water ☐ Wastewater ☐ Both

Membership Category Amount of Dues

<input type="checkbox"/> Regular Member	\$ _____ See schedule below
<input type="checkbox"/> Associate Member	\$400.00
<input type="checkbox"/> Individual Member	\$75.00

Regular Member Dues Schedule

1 to 100	\$75 + 26 cents per hookup
101 to 500	\$80 + 26 cents per hookup
501 to 1,000	\$90 + 26 cents per hookup
1,000 and up	\$100 + 26 cents per hookup
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Name on Card: _____

Signature _____

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Annual Dues - See Dues Schedule

Associate Member

An Associate Member shall be any organization individual or corporation, supplying services or equipment to wastewater utilities. An Associate Member shall have one vote. For Associate Member Benefits, please contact OAWU.

Annual Dues \$400.00 per year

Individual Member

An Individual Member shall be an individual involved in the water/wastewater industry or a user of such utilities. The membership is informational in nature and shall be non-voting.

Annual Dues \$75.00 per year

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 Cimarron City Water Co., Inc.
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Rogue Lea Estates MHP LLC
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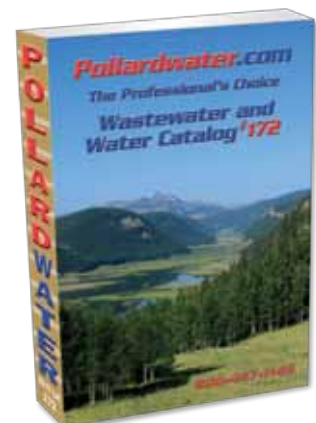
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