

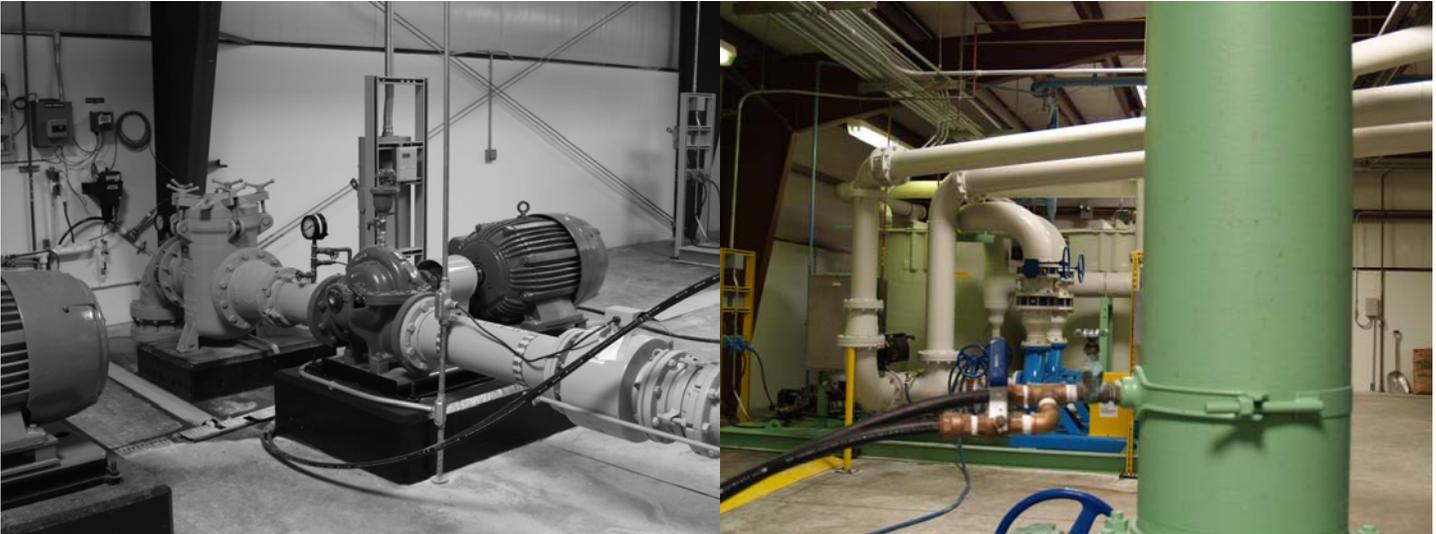
# Water Lines



## Featured Facility:

### Carson City Quill WTP: Diatomaceous Earth Filtration

By: Bob Foerster, NvRWA



Raw water pump with strainer and flow meter. On wall is the raw and finished water instrumentation panel. Flexible lines in foreground are DE slurry feed, to injection point ahead of DE filter vessels.

Slurry tanks with pre-coat pumps (background right side) and body feed pumps (left side). Injection point into pumped raw water line, foreground.

The Quill Water Treatment Plant was completed in 1991, and was designed to produce water with a turbidity of less than 0.5 NTU. This then is the requirement for the plant, as compared to the Federal standard of 1.0 NTU for Diatomaceous Earth technologies. There is room in the building for three sets of dual pressure filters, but the plant has not been expanded beyond the original two sets of two filters. Raw water sources are the nearby Kings Canyon and Ash Creek water sheds, and the Marlette-Hobart system located higher in the Carson Range. The line coming from Kings Canyon also picks up water from spring sources. The source water is blended in settling ponds then continues to gravity-flow to the raw water pumps. Each pump is equipped with a rough strainer to protect the pump and

downstream equipment. This is the only pumping needed to move water through the filters and up to the chlorine contact tank. From the contact tank, water flows by gravity to the clearwell and then into the distribution system. Chlorine (NaOCl) is added post-filtration, and for CT determination, detention time continues up to the point where water enters the clearwell.

Depending on source water quality (and each of the sources has its own characteristics), the plant can produce approximately 4.6 MGD. Product turbidity is typically in the range 0.2 to 0.3 NTU. The 2004 Waterfall Fire impacted raw water quality, especially for the Ash Canyon watershed. During high runoff events when raw water exceeds about 6 NTU, it is not cost-

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## ***Cont' - Carson City Quill WTP: Diatomaceous Earth Filtration***

effective to operate the Quill plant at high production rates. At that point select sources are turned out.

This is the only surface water treatment plant for Carson City. This type of technology keeps Carson City's production costs low. The Quill Plant runs continuously, and without the pump motor starts and stops associated with groundwater wells and the associated demand charges, this water is by far the least expensive of the sources. Other sources used by the City are wells located throughout the valley, and some of the well water is treated for arsenic removal. In addition, regional water supply systems are being developed in the area, with water currently available from adjacent Lyon County, and in the near future from the Town of Minden in Douglas County. The city minimizes fresh water use by means of an advanced wastewater reclamation system, with all of the waste stream being processed and recycled for appropriate reuse applications such as golf courses and the cemetery.

Over the years, the Quill Plant has been automated so that now an operator starts then monitors the process. A large labor input is mixing diatomaceous earth (DE) in the pre-coat and body feed DE slurry tanks. DE is a batch process, and once the plant is started, the control system runs through the pre-coat, production and backwash steps. Backwashing can be as infrequent as weekly, the drivers being production rate and raw water quality.

Spent backwash water, along with the inert accumulated DE and material removed from the water, flows to evaporation ponds. The ponds are manually cleaned with the material going to landfill.

The only additions needed are diatomaceous earth and sodium hypochlorite. A specific NSF approved DE product has been found to work for this application. At this facility, slurries for Pre-coat (5:1 ratio of DE to water) and body feed (3:1 ratio) are made up in separate tanks. Each slurry is then pumped to its application point at the appropriate time in the batch cycle. DE is a silica material and it is abrasive. The body feed metering pumps were recently replaced using peristaltic pumping equipment. Properly operating DE filtration is typically awarded 2-log Giardia and 1-log virus removal, leaving 1-log Giardia and 3-log virus inactivation needing to be accomplished through disinfection. Hypochlorite is metered into the filtered water using diaphragm pumps. The disinfection system includes a baffled contact tank, and the control system is set up to process signals from temperature, pH, flow and chlorine residual instruments to maintain a CT set point. Operations specialists regularly verify the CT through hand-calculation.

DE works by first building a coating of material (cake) on the supporting media (leaves or septa). Each flat leaf is a fine mesh stainless steel screen, and thirty-five of these are mounted to a manifold within each horizontal filter vessel. Seals are o-rings, and the leaves are approximately one inch apart. Once the pre-coat is established, approximately 1/8 inch thick, body feed is initiated at a lower concentration of DE material. When turbidity in the product stream meets the standard, the valving is switched and the production phase of the cycle begins. Filtration occurs by straining action at the surface of the DE media, where new DE material is being constantly applied. Finally,

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## ***Cont' - Carson City Quill WTP: Diatomaceous Earth Filtration***

cake accumulation results in differential pressure across the media building up to a point where backwashing is needed. At this point, for the Quill Plant, the cake has almost filled the gaps between leaves. Should the gap become filled, water would find paths to short-circuit and turbidity breakthrough would occur. Upon reaching the terminal headloss set point, valving is turned to wash all of the media off the leaves, and we are ready to again begin the batch cycle. In this facility, backwash water is from

the finished water side without re-pumping. Approximately every six weeks, each filter is opened and the screens of the leaves are pressure washed to clear off a small amount of biological material.

*Thanks to Rit Palmer, Water Operations Manager and Brandon Mathiesen, Water Production Supervisor for providing a plant tour and information for this article.*



*One set of filter vessels with pipe headers and valves.*



*Quill Plant filter vessels showing hinged access doors for manual cleaning.*

## **2013 Post Legislative Session Report**

*By: Darrin Price, General Manager of Sun Valley GID*

Nevada lawmakers have now finished up for this legislative session. There were several important bills in both houses that passed and failed including many related to water, public records, and open meeting laws. For historical perspective, the 2013-15 general fund budget is essentially equal to that approved by the 2009 Legislature for the 2009-2011 biennium. Governor Sandoval vetoed a total of 17 bills this session, down from 28 vetoes in 2011.

Here is a look at bills signed by the Governor:

### **AB13 (R1) Local Government Employee-Management hearings**

Revises provisions relating to hearings conducted by the Local Government Employee-Management Relations Board. (BDR 23-353)

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## Work It! Q & A

1. How many pounds of nitrate are sent to the wastewater treatment system in a year, by a water treatment plant removing 85% of the nitrate from water containing 14 ppm where the average production is 2.3 MGD?
2. A lift station is pumping 735 gpm at 43 psig. How many kW will the system use if the pump efficiency is 65% and the motor efficiency is 90%?
3. Jar tests show that floc settling will be optimized if 0.02 ppm of a cationic polymer is applied. The raw water rate of flow is 5.6 MGD. A polymer solution was prepared by adding one gallon of polymer having a specific gravity of 1.18 and diluting to a final volume of 125 gallons and mixing. The maximum output for the peristaltic chemical feed pump is 16 gpd. What is the speed setting for the pump?
4. What is the maximum raw water flow, MGD, that can be treated using the above chemical feed pump and polymer dose, if the polymer solution strength is doubled?

## Answers to the Work It! questions

1.  $0.85 \times 14 \text{ ppm} = 11.9 \text{ ppm removed and sent to waste stream}$   
 $\text{Lbs per day} = 11.9 \text{ ppm} \times 8.34 \times 2.3 \text{ MGD}$   
 $\text{Lbs per day} = 228.3$   
 $\text{Lbs per year} = 228.3 \text{ pounds per day} \times 365 \text{ days/year} = 83,317 \text{ lbs / year}$
2.  $1 \text{ hp} = 33,000 \text{ ft-lb/minute} \div 8.34 \text{ lb water/gal} = 3,957 \text{ ft-gal / min}$  (conversion sheets use 3,960/hp)  
 $43 \text{ psig} \times 2.31 \text{ ft / psi} = 99.3 \text{ ft head}$   
 $99.3 \text{ ft head} \times 735 \text{ gal/min} \div 3,960 \text{ ft-gal/min / hp} = 18.44 \text{ hp}$  horsepower needed to move the water  
 $\text{Account for pump and motor inefficiencies: } 18.44 \text{ hp} / (0.65 \times 0.90) = 31.5 \text{ hp wire to water}$   
 $\text{Convert to units of electric power: } 31.5 \text{ hp} \times 0.746 \text{ kW/hp} = 23.5 \text{ kW}$
3.  $0.02 \text{ ppm} \times 8.34 \times 5.6 \text{ MGD} = 0.93 \text{ pounds of chemical per day}$  (in this case, lbs neat polymer)  
 $1 \text{ gal poly} \times 1.18 \times 8.34 \text{ lb poly / 1 gal poly} \div 125 \text{ gal solution} = 0.079 \text{ lb polymer / gallon solution}$   
 $0.93 \text{ pounds poly / day} \times \text{gallon solution} / 0.079 \text{ lb polymer} = 11.86 \text{ gallons solution/day}$   
 $11.86 \text{ gallons solution/day} \div 16 \text{ gpd maximum pump output} \times 100 = 74 \text{ percent pump setting}$
4.  $16 \text{ gal soln. / day} \times (2 \times 0.0787 \text{ lb poly / gal soln.}) = 2.51 \text{ lb poly / day}$   
 $2.51 \text{ lb chemical / day} / (0.02 \text{ ppm} \times 8.34) = \text{MGD}$   
 $15.1 = \text{MGD}$

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**Cont' 2013 Post Legislative Session Report**

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**AB31 (R1 Exempt)** Public records

Revises various provisions relating to public records. (BDR 19-211)

**AB65 (R1)** Open meetings

Revises various provisions relating to open meetings. (BDR 19-402)

**AB68 CTX** Revises various provisions relating to the distribution of certain taxes to local governments. (BDR 32-247)

**AB172 (R3)** Bidder preferences

Revises provisions governing bidder preferences on certain public works. (BDR 28-110)

**AB185 (R1)** Labor Commissioner, US Dept. of Labor

Revises provisions to increase the cooperation between the Labor Commissioner and the United States Department of Labor to promote compliance with labor laws of common concern. (BDR 53-795)

**AB231 (R1)** Local governing bodies, filling vacancies

Revises provisions regarding local governing bodies. (BDR 20-1039)

**AB303 (R1 Exempt)** PEBP, subsidy for coverage

Revises provisions relating to the subsidy for coverage of certain retired persons under the Public Employees' Benefits Program. (BDR 23-681)

**AB310 (R1)** Irrigation districts

Revises provisions governing irrigation districts. (BDR 48-941)

**AB436 (R1 Exempt)** Water utilities

Revises provisions governing the regulation of public utilities which furnish, for compensation, any water for municipal, industrial or domestic purposes, or services for the disposal of sewage, or both. (BDR 58-1196)

**SB15** Water and sewage utilities

Authorizes certain public utilities to request a waiver from the requirement to submit a resource plan to the Public Utilities Commission of Nevada. (BDR 58-323). PUCN will start the rule making process to come up the the regs this summer.

**SB65 (R1)** Public water systems

Revises provisions relating to public water systems and certain laboratories. (BDR 40-349)

**SB74 (R1)** Public records

Revises provisions relating to public records. (BDR 19-603)

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**Summer 2013 Issue Quote by Marilyn Vos Savant:**

*"To acquire knowledge, one must study; but to acquire wisdom, one must observe."*

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## Wastewater Operators Certified



The following wastewater professionals passed their Wastewater Treatment, Laboratory, Collection, Industrial Waste Inspector, and Nevada Plant Maintenance exam in March, May and June of 2013.

### WASTEWATER TREATMENT GRADES

**Grade 1:** Marty Christensen, Kyle Ellis, Clifford Simpson

**Grade 2:** Anthony Freitas, Donald Junger, Chad Payne, Joel Pepper, Marc Rohus

**Grade 3:** Brian Carlson, Randy Mark, Robert Wallace

**Grade 4:** Vincent Salomone

### NEVADA WASTEWATER INDUSTRIAL WASTE INSPECTOR

**Grade 1:** Juliette Garrett, William Hurd

### NEVADA COLLECTION

**Grade 2:** John Coffey

### NEVADA PLANT MAINTENANCE

**Grade 1:** Lee Jaszkowski

**Grade 3:** Matthew Sunseri

### Wastewater Exam dates for 2013:

Exam date - 9/19/13	Deadline - 8/19/13
Exam date - 12/19/13	Deadline - 11/19/13

## Water Operators Certified



The following water professionals passed their Water Treatment and Water Distribution exams in June 2012.

### Water Distribution Grades:

**Grade 1:** Martin Wildeman, Dean Ailor, Steve Antonopoulos, Mark Bailey, Armando Bautista, Jorge Chacon, Michael Chee, Eric Chittum, Timothy Cole, Francesco Delio, Patrick Doyle, Bernard Elvin III, Bobby Felbab, John Flaherty, Ryan Galligan, Esther Gandolfo, Russell Giles, Michael Gleason Jr., John Hamilton, Tyler Harmon, Noah Hoefs, Lita Humphreys, Justin Jones, Michal Lloyd, Carol Lovell, Derric Marshall, Bret McCoig, Roger McLain, Roger McRae, James Moore, Michael Morgan, Jack Morris, Daniel Mueller, Joel Murphy, Todd Myers, Adam Owsley, Jason Preston, Peter Rossini, Daniel Rotter, Lorne Schmutz, Tera Schwartz, Jeffrey Scott, Brett Shewmaker, Chad Steelmon, Craig Stevens, Brooke Winter

**Grade 2:** Kevin Amen, Robert Capehart, Dean Cernick, Lexido De Los Santos, Erik Hanson, Phil Johnson, Christopher Lauborough, David Linge, Mel Long, Louis Mercado, Juan Moreno, Willard Nusser II.

**Grade 3:** Michael Hiler, Daniel Kistler, Shawn Walker

### Water Treatment Grades:

**Grade 1:** Matthew Copthorne, Mathew Gleason, Malcom Harris, James Poulsen, Chuck Sweeney, Troy Tanner, Shawn Walker

**Grade 2:** Christopher Carter, Jung Min Shin, Christopher Skvarna, John Stock

**Change of Mailing Address Requested Operator Certification Administrators have noted that a number of certificates are being returned to the State, because Operators have not updated their mailing addresses after moving. Operators are asked to promptly notify the State when they have changed addresses. Please contact The Bureau of Safe Drinking Water at: 775-687-9521**

## TRAINING CALENDAR

**Ongoing On Site - Various Management, Board, Wastewater and Water Topics, at your request -** NvRWA, <http://www.nvrwa.org/>

Contact: Bob Foerster at 775-841-4222

Upon Request: Instructor-Lead CSUSac Courses: Distribution or Treatment, 6 - 8 weekly trngs.

Contact NvRWA for details and to schedule. Gain the approved post-secondary training while preparing for your exams. Also offering water and wastewater classes powered by SunCoast Learning Systems. Water Courses have been approved for recertification hours. Visit the NvRWA web page and select the SunCoast Learning target.

The NvRWA's Fall Conference will be located in Laughlin on September 17 –18, 2013 and don't forget the Annual Conference in March 2014.

<http://www.nvrwa.org/>

Contact: Bob Foerster at 775-841-4222

**NDEP Bureau of Safe Drinking Water** - training calendar for approved classes:

<http://ndep.nv.gov/dwo/main/calendar.html>

**Nevada Section of the American Water Works Association.** Visit the web site [www.ca-nv-awwa.org](http://www.ca-nv-awwa.org) for many more education opportunities

**American Water College** -

<http://americanwatercollege.org/>

**Montana Water Center** -

<http://watercenter.montana.edu/training/ob2005/default.htm>

**Office of Water Programs at the California State University, Sacramento** -

<http://www.owp.csus.edu/courses/catalog.php>

Check out ongoing Training from RCAC at:

<http://www.rcac.org>

RCAC is holding a free two day Water Distribution Operator grades 1-3 test preparation workshop at the North Tahoe Events Center in Kings Beach, CA. September 10th and 11th. Details and registration at: Check out ongoing Training from RCAC at:

<http://www.rcac.org>

RCAC is holding a free two day Water Distribution Operator grades 1-3 test preparation workshop at the North Tahoe Events Center in Kings Beach, CA. September 10 and 11. Details and registration at: <http://www.rcac.org/event/1084>

Nevada Water Environment Association (NWEA) has an approved course list on their website:

<http://nvwea.org/> and they also grant blanket approval for training from the following organizations:

NWEA online Training Calendar -

<http://nvwea.org/certification/training-opportunities>

NvRWA's Annual Conference -

<http://www.nvrwa.org/>

Tri-State Seminar On-the-River -

<http://www.tristateseminar.com/>

Water & Wastewater Education and Training -

<http://wwet.org/>

Water Environment Federation – [www.wef.org](http://www.wef.org)

**Obtaining Contact Hours and Continuing Education Units (CEUs) is a crucial requirement for every Water Operator that works in the State.**

These classes allow Water Operators to further develop their skill levels, they will not only be better prepared to provide and protect safe drinking water, but will become more familiar with new developments in their field as technology and regulations change.

The NDEP's Bureau of Safe Drinking Water has a Calendar of Events for approved contact hour classes for certification renewal. The NDEP requires operators to take courses from International Association of Education Training (IACET) authorized providers or accredited colleges in order to apply for the Grade 3 & 4 exams.

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**Water Lines**  
**Summer 2013**

<b>NV Water and Wastewater Operator's Forum Members:</b>	<b>Training Contacts</b>
<p>Dale Johnson, Chair 775-738-6816 Elko Co Public Works - <a href="mailto:djohnson@elkocountynv.net">djohnson@elkocountynv.net</a></p> <p>Mike Ariztia, Vice Chair 775-673-2220 Sun Valley GID - <a href="mailto:mariztia@svgid.com">mariztia@svgid.com</a></p> <p>Bob Foerster 775-841-4222 NvRWA - <a href="mailto:nvrwa@pyramid.net">nvrwa@pyramid.net</a></p> <p>Harvey Johnson 775-832-1289 Incline Village GID - <a href="mailto:Harvey_johnson@ivgid.org">Harvey_johnson@ivgid.org</a></p> <p>Cameron McKay, 775-588-3548 Kingsbury GID - <a href="mailto:cam@kgid.org">cam@kgid.org</a></p> <p>Dave Johnson 702-567-2051 Southern NV Water Authority - <a href="mailto:dave.johnson@snwa.com">dave.johnson@snwa.com</a></p> <p>Lynn Forsberg 775-738-6816 Elko County Public Works - <a href="mailto:lforsberg@elkocountynv.net">lforsberg@elkocountynv.net</a></p> <p>Tom Georgi 702-822-8026 Las Vegas Valley Water Dist - <a href="mailto:Thomas.Georgi@lvvwd.com">Thomas.Georgi@lvvwd.com</a></p> <p>Nathan Adams 775-962-5840 Pioche Public Utilities - <a href="mailto:pputilities@lcturbonet.com">pputilities@lcturbonet.com</a></p>	<p><b><i>Nevada Rural Water Association</i></b> videoconference classes for water system operators and managers are available in most communities. Please send requests for training to <a href="http://www.nvrwa.org">www.nvrwa.org</a> or contact staff directly at 775-841-4222</p> <p><b><i>Community College of Southern Nevada Wastewater Water Technology Program</i></b> <a href="http://www.cleanwaterteam.com">www.cleanwaterteam.com</a> LeAnna Risso at 702-668-8487 or <a href="mailto:LRiso@cleanwaterteam.com">LRiso@cleanwaterteam.com</a></p> <p><b><i>WWET Training in Clark County</i></b> - <a href="http://www.wwet.org">www.wwet.org</a> Training for water treatment and distribution system operators, wastewater treatment and collection system operators, and other professionals in these fields. Contact Jeff Butler 702-258-3296</p> <p><b><i>State of Nevada Water Certification Exams</i></b> Exam applications and fees are due to the State Bureau of Safe Drinking Water 45 days before exam dates. A proctor will contact examinees to schedule testing. Contact: Ron Penrose at 775-834-8017 for information about the exam dates. Additional information call: 775-687-9527 or <a href="http://ndep.nv.gov/bsdw/cert_home.htm">http://ndep.nv.gov/bsdw/cert_home.htm</a></p> <p><b><i>Nevada Water Environment Association</i></b> - <a href="http://www.nvwea.org">www.nvwea.org</a> Jennifer McMartin (775)465-2045 or <a href="mailto:jenniferm@nvwea.org">jenniferm@nvwea.org</a></p>