



Quarterly Newsletter of the Office of the State Engineer

Pot Creek Ramp Flume

Erin Light, Assistant Division Engineer, Division 6

Pot Creek, an unusual stream drainage for the state of Colorado, arises in the Uinta Mountains of Utah and flows in an easterly direction into Colorado before flowing into the Green River.

In 1954, a Memorandum of Understanding (MOU) was signed by the states of Utah and Colorado to allow for the equitable distribution of the water of the Pot Creek drainage according to priority without regard to the state line. Fifty years later, this MOU is being reevaluated by the states as to its adequacy in the changing times and needs for water. The two states have been working cooperatively to revise and update the 1954 MOU. This article,

however, is not to present the work being done on the revised MOU.

In October 1957, the U.S. Geological Survey (USGS) began operation of a gaging station on Pot Creek above Matt Warner Reservoir, which is presently owned and operated by the Utah Division of Wildlife Resources. The USGS ceased its operation of this gage in September 1993. Since this time, the Utah Division of Water Rights has operated and maintained this station for administrative purposes under the Pot Creek MOU.

A rating table for this gage is very difficult to keep accurate due to an ever-changing channel bed. To provide more accurate readings, it

was decided several years ago that a control structure needed to be installed. Finally, in October 2004 a prefabricated ramp flume was installed upstream of the gaging station with plans to relocate the station to the location of the flume in the near future. The ramp flume was designed by the State of Utah Division of

Water Rights using the program WinFlume and was prefabricated by the Pot Creek water commissioner, Mike "Stoney" McCarrell. Because there is little flow into Pot Creek below Matt Warner Reservoir, the quantity of inflow to the reservoir is critical for water administration within the entire Pot Creek drainage.

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Photo 1. Tracing out where flume is to be installed.

Pot Creek Ramp Flume (cont.)

The State of Utah asked Colorado to be involved in the installation to provide our expertise. Kathy Bower and Erin Light of the Division 6 office participated in this installation and believe that the flume will prove to be a great asset to the administration of Pot Creek.

It was suggested by Colorado that railroad ties be placed beneath the flume to allow for ease of leveling the structure in the future. However, during construction, only one tie could be installed at the upstream edge of the flume. At the time of installation, there was very



Photo 2. Completion of flume installation.

little flow in Pot Creek, thus it is unknown how the flume will operate. The flume was installed

properly, and should operate well.

Within the state of Colorado, several ramp flumes have been constructed, particularly in Divisions 3 and 7. All of those flumes, however, are cast-in-place concrete flumes. Provided the prefabricated flume operates properly and can sustain the higher flows of Pot Creek, this type of flume may warrant consideration as a potential measuring device for use within the State of Colorado.

A Book Review by Steve Witte, Division Engineer, Division 2

Silver Fox of the Rockies, Delphus E. Carpenter and Western Water Compacts, By Daniel Tyler, University of Oklahoma Press, 2003

The readers of *Streamlines* will undoubtedly appreciate the efforts of Daniel Tyler to reveal both the humanity and the innovative genius combined in the person of Delph Carpenter, known as the father of the interstate compact idea and acclaimed at the time of his death as, "Colorado's most valuable citizen of all time...." This is a personality worth learning more about. To those of us who, through our work, are committed to preserving and protecting the legacy he helped create, gaining understanding of how it came to be is a gift.

Tyler describes the life of a native-born second generation pioneer, exploring his genealogy and the culture that served as a background for both his early successes and the motivations that compelled him to his career accomplishments. The principles and fears that motivated the man are enlightening. Imagine, a lawyer who disdained litigation! One can only be inspired by this demonstration of leadership and the power of persistence. The reader is reminded of both the rewards and the costs associated with success. Perhaps my favorite part of the book can be found in the last few pages, in the summation of Carpenter's legacy and the principles that were the foundation of agreements forged among equals.... principles just as difficult to practice then, as they are today, but no less effective.

In just under 300 pages distilled principally from the Carpenter Papers, which at the time of publication were housed at the offices of the Northern Colorado Water Conservancy District, the author presents a well documented, yet readily readable historical account of the man, Delph Carpenter and his achievements that affect every major watershed of Colorado. (*Okay, well maybe the description of the maneuvering prior to ratification of the Colorado River Compact may not be best read before bedtime.*) But, on the whole, I believe that all readers of this publication will find something of interest in this book and, therefore, I recommend it to you.

Division 1 Augmentation Plan Strategies and Associated Administration and Accounting Issues

Scott C. Cuthbertson, P.E., Assistant Division Engineer, Division 1

Background

From the enactment of the "Water Right Determination and Administration Act of 1969" until the recent Supreme Court ruling in Simpson v. Bijou Irrigation Company, et al (02SA377), large capacity, mainly irrigation, wells had operated under three principal plans in Division 1. While there were several augmentation plans decreed in the mid-70's and early 80's, the majority of the wells were covered by either the decreed Poudre Plan or one of two annually renewed Substitute Water Supply plans operated by Central Colorado Water Conservancy District or the Groundwater Appropriators of the South Platte (GASP).

In contrast, since the 2003 Supreme Court ruling and the resultant changes in legislation, there have been approximately 40 new crop-oriented irrigations plans covering some 3400 wells filed in water court. As of the writing of this article, only two of these plans have actually been decreed by the court. Because of the highly competitive market for augmentation supplies brought on by the drought and development along the Front Range, most of the new plans rely heavily on recharge operations, reservoir releases, augmentation well pumping and bypassing senior ditch water to offset the depletions associated with operating the wells. The result is an intensive new demand on both engineering resources and the affected water commissioners.

The Office of the State Engineer has the primary responsibility for

reviewing and approving the annual substitute water supply plans (SWSP) under which the wells operate until such time as the plans are decreed in water court. In addition to refocusing existing engineering resources, additional temporary engineering staff has been utilized specifically to ease the burden associated with reviewing the annual plan applications.

The Division Engineer's office was not provided with any additional resources to handle the onslaught of augmentation plan issues. However, with a sense of simple determination, a modicum of innovation and some modest realignments in personnel, two existing positions have been redefined to try and accommodate the substantial new work load associated with the administration and coordination of 40 new, field intensive plans. The first change was the restructuring of an existing position into the Well Augmentation Coordinator. This position is responsible for coordination and receipt of monthly plan accounting, well tagging activities and assembling the data required to pursue enforcement against wells that pump without a plan for augmentation and in violation of a cease and desist order.

Second, a Ground Water Engineer position was created from the recently vacated metro area engineering position by expanding the duties and upgrading the District 2 water commissioner position and realigning another engineer's responsibilities. This new position will be primarily responsible for

the oversight and enforcement of non-exempt well administration and will hopefully be in place by mid-summer 2005.

Even with this realignment of staff, Division 1 will be limited in the administration that can be accomplished with so many complex plans covering such a large number of wells.

Depletions Accounting

The magnitude and timing of depletions impacting the river as a result of well diversions are determined by modeling. Several models have been approved by the Division Engineer for use in the South Platte system. Colorado State University's AWAS program using Glover-based alluvial aquifer transport equations appears to be the emerging model and interface of choice by most plans. The USGS correlated SDF method, however, is also accepted by the Division Engineer and is the basis for virtually all the augmentation plan related decrees in the past. As needed, finite element models such as MODFLOW are also being used.

A special case when it comes to depletions accounting are wells that have been decreed as alternate points of diversion to senior surface water structures. Unless otherwise required by the alternate point of diversion decree, if the diversions are recorded daily, only the diversions made out of priority must be input into the depletion model. The in-priority

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Division 1 Augmentation Plan Strategies (cont.)

diversions by the well are simply subject to surface water rights administration like the ditch for which the well has been decreed an alternate point. If there is no verifiable daily accounting, however, the policy of the Division Engineer is that all diversions must be included in the depletion model. In order for the out of priority operation of a well to not result in injury, the plan for augmentation or SWSP must replace all out of priority DEPLETIONS. Depletions are what impact the river as a result of diversions at the well. The depletions are “out of priority” if there is a call for water (or compact condition) senior to the well downstream of the well location on the day when those depletions report to the river.

Recharge Sites

The protocol established by the Division Engineer to guide the development of recharge sites has the following primary components:

- The Water Commissioner must be notified as to the location and approve the set up of the recharge site **before** any water may be diverted into the structure.
- All inlet flows must be metered or measured to the satisfaction of the water commissioner before water will be credited toward recharge.
- The recharge site must be maintained in such a way as to minimize losses to plants.
- The recharge credit must be reduced by the net evaporation from any pooled water, any surface withdrawals from the site and any phreatic

tophytic losses if the site is not maintained free of vegetation.

- The recharge site may not be used to grow crops in the same irrigation season that it is used as a recharge site.

Augmentation Supplies

A primary source of augmentation supply, especially in the lower South Platte, is the use of changed reservoir water. The basic requirement to use the historic consumptive use associated with reservoir shares as a supply of augmentation water is that the plan must show where the water would have been used as irrigation water and maintain the associated historic return flows that would have occurred with that use. The exception to this requirement is if water is delivered to recharge ponds located on the farm owning the released shares of reservoir water.

Fully consumable water that has been decreed for augmentation has no restrictions on its use.

Augmentation wells have been identified as potential short term supplies of augmentation water. Because they create their own depletions that must also eventually be replaced, the plan must include other replacement sources. As with irrigation wells, however, only the out of priority depletions must be replaced. So, depending upon the timing of the use, some depletions may not occur out of priority and, therefore, would not need to be replaced. Any losses that occur during delivery of the water to the river will reduce the augmentation credit. All evaporation and losses

to vegetation must be subtracted from the volume discharged at the well. Infiltration losses, however, may be modeled back to the river like a recharge site.

Ditch Bypass Credits

The key requirement to using bypassed irrigation water as a source of augmentation supply is to demonstrate how the bypassed flow would have otherwise been beneficially used. Once that demonstration is accepted by the Division Engineer, the plan for augmentation must maintain the historic return flows that would have been associated with its beneficial use, the same as in the use of changed reservoir water. Any increased depletions created by additional well pumping created by bypassing water at the headgate must also be replaced.

Augmentation Plan Responsibility

The plan for augmentation has several points of responsibility for the non-injurious operation of the plan. First, it must provide a projection of the plan operation by April 1 of each year that shows how the plan will be operated that year; i.e. planned diversions, historic diversion and return flow obligations and available augmentation supplies. This projection must then be updated monthly with real data through the end of the irrigation season.

The plan for augmentation is responsible for not just report-

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Division 1 Augmentation Plan Strategies (cont.)

ing, but curtailing any and all pumping required to prevent a negative impact on river. This may be done on a farm by farm basis or for the whole plan. The accounting must be submitted to Div1Accounting@state.co.us within 30 days after the end of the month for which the accounting is being made. The accounting must be submitted every month.

All depletions that exist when a well drops out of the plan for augmentation remain the obligation of the plan and must be replaced by the plan. Any depletions that have yet to impact the river at the time a well joins the plan must be replaced by the plan unless those depletions are already covered by another plan. Evidence acceptable to the Division Engineer that another plan is obligated to make replacements must be in the form of either a decree or valid written contract.

Accounting

The monthly accounting must consist of real data collected at least monthly (daily for APOD wells). The data may be in the form of flow meter readings or power meter readings with a certified power coefficient and dedicated utility meter. The data must be submitted by WDID (the number assigned by the Division office during the Substitute Water Supply Plan or water court process).

The monthly summary must show:

- Diversions (Well Pumping) – Current and historic
- Current depletions projected through the end of the current

irrigation season or as much as three years in advance, depending upon the dynamics of the plan area

- Replacement water from each source (recharge, reservoir delivery, etc.)
- Net impact on the river

The accounting must apply standard audit principles, meaning numbers may not simply appear out of thin air. Each input must show the real source of the number. For instance, if four recharge sites are receiving water from a release of changed reservoir water, the accounting must show the reservoir balance sheet with the volume of water being released on that plan's behalf. It must then show the portion of that water being delivered to each of the four recharge sites, corroborated by the inlet flow recorder and accounting for transit losses, etc. Accounting that simply provides flow into a recharge site "out of thin air" would not be acceptable.

In addition to the above summary information, the plan may be required to submit: copies of raw data collection forms, modeling input/output, spreadsheets showing formulas, etc. for verification and other information as required.

Data Accessibility

All data is accessible for public review. The division office is currently working with the SPMAP work team, exploring an accounting module for the CSU AWAS program that is internet accessible and would be hosted by CSU. Pending funding, the initial tool (targeted for use during the

2005 irrigation season) will create a geographic representation of the basin with a node for each significant augmentation plan in the approximate location of the plan area. By "clicking" on the node, one could drill down for information regarding the plan. The first level of information would show the summary accounting supplied to <http://www.Div1Accounting@state.co.us> for the current period of operation. Eventually, additional levels may be added to access or even perform (using AWAS) modeling, weather data, relevant stream flow data, historic accounting, etc.

DWR Focus

The primary focus of the DWR is to gain compliance so that potential injuries to the river are prevented, as opposed to enforcement against parties that cause injury. The goal is a level playing field with a single set of rules that is protective of all water rights in accordance with the doctrine of prior appropriation. Noncompliant groups will be the primary focus of enforcement. Enforcement, because of limitations in the process and staffing, will be at least a year in arrears for the next several years.

Another significant focus area is automating the data collection process. In the last several years for instance, over 300 recharge sites have been added along the river system. SUTRON is currently working to develop a digital flow measurement/recorder directly in response to

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Division 1 Augmentation Plan Strategies (cont.)

the water commissioner inquiries and the water user's needs. Inexpensive radio transmitters also make the possibility of remote data acquisition feasible. For well operations, the Division Engineer may eventually be able to obtain monthly power data from power

companies, saving everyone time and effort for that one source of data.

The Division office is also working to improving data accessibility. A totally electronic system of data submission is now being

used with the <http://www.Div1Accounting@state.co.us> site. The CSU AWAS accounting module may also be a significant step toward allowing any interested party access to not just accounting, but a broad range of data.



CFWE Presents Water Educators' Conference

Marta Ahrens, Public Information Officer

The Colorado Foundation for Water Education presented the second annual Water Educators' Conference at the Hotel Colorado in Glenwood Springs, Colorado, on March 29-30, 2005. This conference was designed to assist the state's water professionals and informal educators who teach both adults and children about the importance and management of Colorado's water resources.

The first day of the conference provided a focus on K-12 education. Some of the topics included teaching the poetry of rivers, by Dr. Kathryn Winograd, of Arapahoe Community College, and a panel of K-12 teachers reported on the successes and failures of water education in the classroom.

The second day provided a focus on adult and community education. The speakers on this day shared their expertise in developing successful public information campaigns, lecture series, and professional development programs geared to educate adults from around the state. Scott Hummer, Water Commissioner in Water District 36, in Division 5, gave a



Scott Hummer, Water Commissioner

presentation entitled, "Turning the Headgate: Educating Water Users." Mr. Hummer's presentation included a history of water commissioners, and his duties related to administration of water in the Blue River Basin. Other presenters included Jerd Smith, of the Rocky Mountain News, who reported on water and the environment, and on tracking water-related trends. Ms. Smith's re-

cent articles in the Rocky Mountain News, particularly *Dividing the Waters*, *Running Dry*, and *The Last Drop*, raised awareness of the readers on water issues in Colorado. Mr. Nolan Doesken, of Colorado State University, reported on monitoring and tracking climate, state-wide average annual precipitation, and his involvement with the state drought response plan.

The evening of March 29 featured the Education in Action Reception. This event allowed all registered participants to exhibit their displays, programs, publications, and activities.



DWR's exhibit at CFWE conference

Human Resources

New Employees

Melissa van der Poel started on February 7, 2005 with the Designated Basins team in Denver. Melissa filled the vacant PE I position on the team. Her main focus will be the issuance of final permits in the Designated Basins. Melissa was previously employed at the Adams County Public Works Engineering Department. She has a Bachelor's and Master's Degrees in agricultural/civil engineering, in addition to a Bachelor's Degree in medical microbiology.

Retired Employees

Jim Daxton, Water Commissioner in Water District 51, which encompasses the Upper Colorado and Fraser Rivers, retired on March 25, 2005. Jim began working for the Division of Water Resources on July 5, 1983. He was born and raised in the Fraser Valley and his family was among the original settlers. His wife Judy, who passed away in 2003, was a big help to Jim in his Water Commissioner duties. Jim's "unique style" of approaching his water commissioner duties, his timeliness, and his infamous "ditch bank" meetings, will be sorely missed in the Fraser Valley. Jim plans to devote his retired years to writing a book of his adventures.

Gerald Figueroa retired from DWR on March 31, 2005 after serving six years as a Water Commissioner in Water District 40. Gerald's duties included water administration on Currant and Escalante Creeks, as well as the Gunnison River mainstem. Gerald came to the Division after a career with the U.S. Navy. His experience in management, technical writing and human resources will be sorely missed. Gerald plans to devote more time to volunteering in the community, particularly regarding water matters. We wish him well and look forward to working with him in his new capacities.

Dave Dzurovchin retired on April 1, 2005, after working for the Division for 20 years. Dave worked for the Hydrographic Branch and stated that working for DWR has been a great learning experience. Dave recently stated that he came in quite a novice, with extremely limited experience, and left knowing that water is the life blood of our state, and stated that he has worked with a lot of great people and enjoyed nearly every minute of it. Dave was recently nominated by many of his peers, and received the Technical Employee of the Year Award for 2004. Dave and his wife, Ginger, are retiring the same day and hope to travel and see a lot of the country that they haven't had the opportunity to see.

Colorado State University's COCO RAHS is Seeking Statewide Weather Watchers

Nolan Doesken of the Colorado Climate Center, Department of Atmospheric Science, Colorado State University is once again offering the opportunity for volunteers to participate in the Community Collaborative Rain and Hail Study. This program is a state-wide network of weather observation and reporting. Visit the CoCoRaHS web site (<http://www.cocorahs.org>) to learn more and review information on how to participate or forward the information to others that may be interested. The Division supports this program and has several staff participating as volunteer observers. For more information, contact Nolan Doesken at nolan@atmos.colostate.edu, or phone (970) 491-3690.

"CoCo RaHS volunteers learn about weather from top professionals while making a difference by providing valuable information to researchers and water managers throughout the state," said Nolan Doesken, research climatologist at Colorado State's Colorado Climate Center and director of the CoCo RaHS program. "As Colorado continues to make important decisions regarding water, CoCo RaHS weather watchers are making a big difference in helping track both water supply and demand."



CALENDAR OF EVENTS

- April 5** Colorado Board of Examiners of Water Well Construction and Pump Installation Contractors Meeting, Denver, Colorado; for more information, contact Gina DeArcos at 303-866-3581
- May 20** Colorado Ground Water Commission Meeting, Parker, Colorado, Colorado; for more information, contact Marta Ahrens at 303-866-3581
- May 24-25** Colorado Water Conservation Board Meeting, Cañon City, Colorado; for more information, contact Catherine Gonzales at 303-866-3441
- June 7** Colorado Board of Examiners of Water Well Construction and Pump Installation Contractors Meeting, Denver, Colorado; for more information, contact Gina DeArcos at 303-866-3581

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