

COLORADO DIVISION OF WATER RESOURCES

VOLUME II, NUMBER 3

SEPTEMBER 1989

COLORADO DROUGHT CONDITIONS REPORT By Jeris A. Danielson, State Engineer

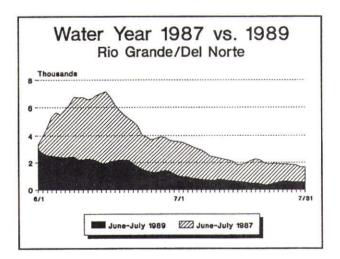
As most of our readers are aware, all indications at the beginning of the summer months were that Colorado was in the grip of a severe drought. Due to the serious socioeconomic impacts a natural phenomenon such as this can impose upon the citizens of this state, I have decided to prepare and distribute a monthly drought report which will compare and document differing indicators in relationship to the stream systems of the state and individual cases of water rights administration.

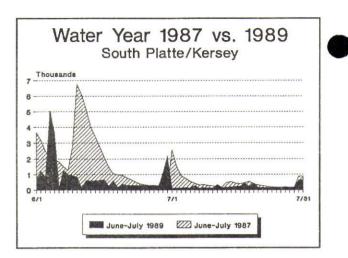
In 1981, my office developed the Surface Water Supply Index (SWSI) as a means of considering reservoir storage amounts, precipitation, and streamflow components for each of the seven major river basins in Colorado. Each component is weighted based upon its impact on the water supply in the basin and allows a comparison based on all of the various factors combined. The basins most affected by low stream flow are the Yampa/White and Rio Grande, where the streamflow component is 90% of the SWSI, followed by the San Juan/Dolores (85%), the Colorado (70%), the Gunnison (60%), and the Arkansas (55%). The South Platte Basin is the least affected at 25% due to its large reservoir storage capacity. The SWSI values for each basin computed on July 1, 1989, August 1, 1989, and September 1, 1989 are as follows:

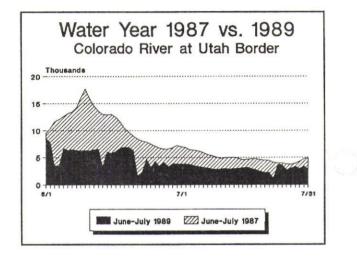
		July 1,	1989		August	1, 1989	Sept.	1, 1989
Basin		SWSI VALUE			SWSI VALUE		SWSI VALUE	
South Pl Arkansas Rio Grand Gunnison Colorado Yampa/Wh San Juan	de ite	+2.6 -0.3 -1.8 -2.1 -2.6 -3.5 -2.9			+1.7 +1.2 -1.4 +1.9 -2.3 -2.8 -2.0		+1. 1 +1. 3 -1. 6 -2. 5 -1. 2 -2. 2 -1. 1	
-4	-3	-2	-1	0	+1	+2	+3	+4
Severe Drought	Moderate Drought		low rmal	Near Norm		Above Normal		Abundant Supply

As can be seen by the tables above, while all of Colorado's river basins were affected by the drought to some extent, the Yampa/White, Colorado, San Juan/Dolores and Rio Grande basins were hit the hardest. While unusually hot and dry weather conditions were prevalent throughout the state during the period of March through the first three weeks of July, warm, moist air moved into Colorado from the Gulf of Mexico in late July, resulting in significant amounts of precipitation in the mountains and foothills, temporarily easing the effects of the drought. It remains to be seen whether the drought will continue over the next few years. Hopefully, an abundant snowfall this upcoming winter will ease the effects of this year's summer drought.

A graphic hydrograph comparison using the State's Satellite Monitoring System gives further indications of the severity of the drought. The following graphs give a yearly comparison of stream flows for the months of June and July of 1989 versus the same months in 1987 at three selected gaging stations.







The Division of Water Resources plans to continue providing the drought conditions report on a monthly basis, with emphasis during the winter months placed on snowpack conditions in the mountains. For further information regarding this please contact John program, Kaliszewski in the Denver office at (303) 866-3581.

LEGAL NEWS

By Joseph Grantham

On May 30, 1989, the Colorado Supreme Court issued its long awaited decision in <u>People ex rel.</u> <u>Danielson v. City of Thornton</u>, Case Nos. 87SA172 and 87SA173, a/k/a the Heim Wells cases. The court, in a close 4-3 decision, found that the evidence presented to the trial court was sufficient to support the determination that there was never an intent to abandon the water rights in question.

This case originally arose from a protest to the placement of the Heim Well water rights on the Division Engineer's 1984 revised abandonment list for Water Division No. 1. The Water Court found that the Division Engineer had established a presumption of abandonment by showing that the water rights in question, specifically the Heim Wells Nos. 1 & 2, had not been beneficially used for a period of 10 years or more. See section 37-92-402(11), C.R.S. (1988 Supp.) However, the lower court also ruled that the presumption of abandonment had been rebutted by the protestants' showing of a lack of intent to abandon those rights. That rebuttal of the presumption involved efforts by various owners of the water rights to sell those rights during the period of time in question.

In writing for the majority opinion, Justice Lohr stated that, "[t]he state engineer correctly asserts that statements of intent by the owner of the water rights are insufficient by themselves to rebut a presumption of abandonment." However, "[i]n the present case, the totality of the evidence of the water rights owners' testimony, the documentary evidence of attempts to sell the water rights, and the testimony of counsel for a potential purchaser are sufficient to support the...finding that there was never any intent to abandon the...water rights." Further, "[it] would be inconsistent...to hold that an owner who no longer intends to put to use water available under a water right but instead plans to sell the right to another has thereby abandoned that right..." and "[a]ctual good faith efforts to sell a water right...are strongly indicative of absence of intent that a water right not be abandoned."

In the dissenting opinion of this case, Chief Justice Quinn, joined by Justice Rovira and Justice Mullarkey, wrote, "I believe that the rule adopted by the majority ... " (intent to sell a water right at an advantageous price, coupled with some evidence of an effort to sell, sufficient is to rebut the presumption) "... frustrates the long-standing principle of Colorado water law favoring the maximum beneficial use of a water right in manner consistent with a the purposes for which the water right was decreed. "

RETIRED JUDGE WILLIAM EAKES DIES

Former District Judge William S. Eakes, a former La Plata County water attorney and past president of the Colorado Water Congress, died August 31, 1989, in Chandler, Arizona at the age of 74. Judge Eakes presided over the lengthy and arduous rules and regulations case for the Rio Grande and Conejos River Basins in 1979.

LOWER SOUTH PLATTE RIVER RECHARGE PROJECT

LODGEPOLE CREEK

By Brian Ahrens

The ever increasing demand for water to meet domestic, municipal, agricultural and industrial needs makes it imperative to put available supplies to maximum beneficial use. Conservation and use of surplus water whenever it exists can help achieve that maximum beneficial use. Storing surplus stream flows of the South Platte River in the alluvial aquifer during the winter months is one method of achieving these objectives. Artificial recharge of relatively the aguifer is a inexpensive and practical means of maintaining adequate water table levels for contribution to the base flow of the river during critical irrigation months.

The South Platte River Compact between Colorado and Nebraska was signed into law in 1926. The prominent provisions of the compact are: 1) from May 1 through October the State of Colorado must 15, curtail water rights of the Lower South Platte River (downstream of Balzac) that are junior to June 14, 1897 whenever the flow at the interstate station drops below 120 cfs; and 2) from October 16 through April 30, Colorado has unrestricted use of the river flows.

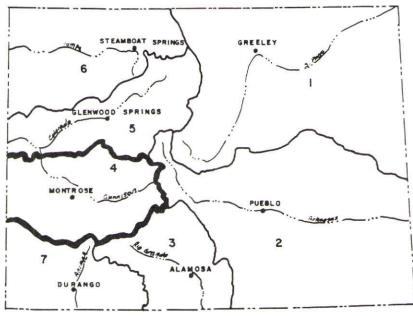
Almost all of the surface water rights in the Lower South Platte junior to June 14, 1897 have been abandoned. However, many wells were installed and placed in use in the 1950-60 period due to the growth of well technology. In 1969, the Colorado legislature recognized that alluvial wells were an integral part of the natural surface water system and that they must replace their depletions to the stream to prevent injury to senior water right appropriators. Although wells located east of Lodgepole Creek may not materially injure water rights in Colorado, they may potentially impact the stream system in Nebraska.

In order to bring the wells east of Lodgepole Creek into compliance with Colorado statutes and the interstate compact, a recharge/augmentation plan has been proposed. It is anticipated the project will transport available water during the October 16 to April 30 period Peterson Ditch to through the recharge the aquifer in the Sand Hills area using a spreading basin approach rather than a ponding approach. The main objective of the is to generate the project methodology of developing a decreed augmentation plan utilizing computer modeling techniques to design the monitoring system, size the recharge system, and design the operational and water-budgeting methods.

The Office of the State Engineer has offered to assist the Lower South Platte Water Conservancy District in the development of the project by providing engineering expertise and other up-front assistance, such as coordinating and testing of the project. It is envisioned that the District will ultimately be responsible for the operation of the project.

The project is considered to be a viable method of ensuring that obligations of the interstate compact are met while preserving and maximizing the beneficial use of Colorado's water resources.





WATER DIVISION NO. IV GUNNISON RIVER BASIN Thomas A. Kelly, Division Engineer

Division No. 4 is located in West Central Colorado and its boundaries include the following drainage basins: the Gunnison River and its tributaries, the San Miguel River, the Little Dolores River, Coates Creek, and the Dolores River in Montrose and Mesa counties. Some of the larger communities in the Division are Gunnison, Montrose and Delta; and the smaller communities include Ouray, Norwood, Nucla, Naturita, Cedaredge, Hotchkiss, Paonia, Uravan The northern boundary of Water District 42 includes part of and Crawford. Grand Junction which is the largest community in Western Colorado. The total population for the Division is approximately 60,000 people. The Gunnison River basin encompasses the largest portion of Division No. 4 with a drainage area of approximately 1,600 square miles. Several other small drainage basins make up an additional 1,800 square miles. A total of approximately 11,000 square miles (7,040,000 acres) of area make up the Division. There are presently 390,000 acres under irrigation and the major crops include hay, corn, small grains, onions and various types of fruits (peaches, pears, plums, apricots, cherries and apples). Beef cattle, pork and sheep are the primary livestock products.

Eleven water districts are located in the Division. Those districts are: Nos. 28, 40, 41, 42, 59, 60, 61, 62, 63, 68 and 73. The Division employs 23 water commissioners, one dam safety inspector, an Assistant Division Engineer, one senior secretary, and one part-time typist. Six of the 23 water commissioners are full-time, with the remainder being part-time employees.

Elevations within the Division range from 4,500 feet to over 14,000 feet in the San Juan mountain range. The overall climate is semi-arid with an annual precipitation amount varying from eight to fifteen inches in much of the agricultural area.

Agriculture, stock production and tourism contribute to the primary economic activities of Division No. 4. Some logging and lumber production contribute, with a major particle board mill owned by Louisiana Pacific Lumber Company near Olathe. The general economic conditions in Division No. 4 have been greatly curtailed since the closing of the major oil shale research areas along the Colorado River drainage. The impact of Division No. 4 is measured by the number of vacant homes and closed businesses in the major communities of Montrose and Delta.

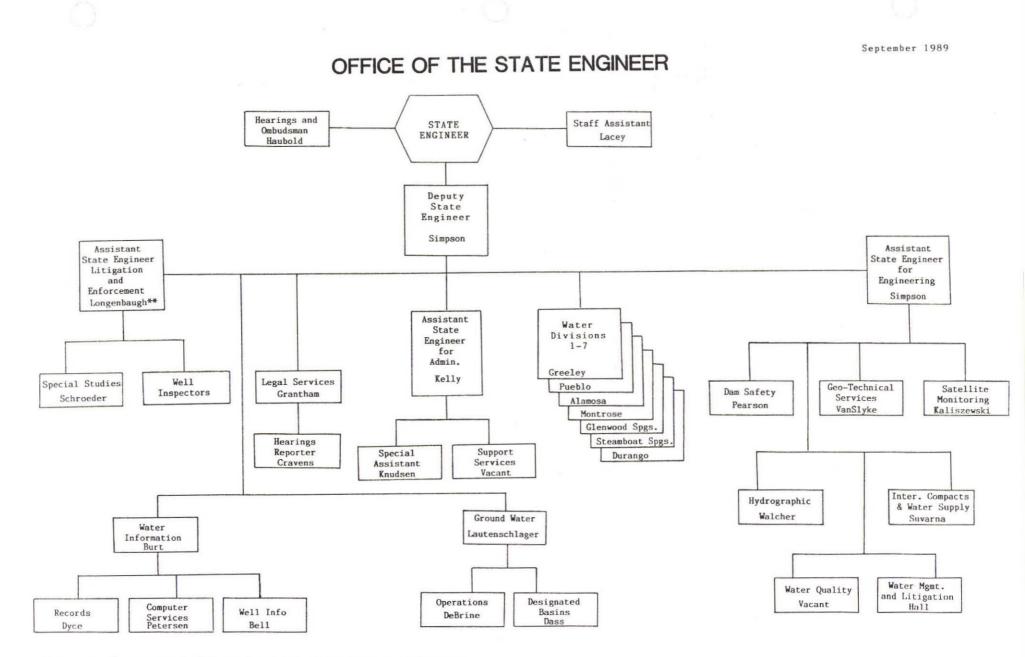
The recent completion of Ridgway Reservoir completes active U.S. Bureau of Reclamation projects in the Division. These activities have included the last 20 years of the development of the Aspinal Unit of the Upper Colorado River Project (Blue Mesa, Morrow Point and Crystal Reservoirs), the completion of Ridgway Reservoir, and some limited repair and rehabilitation work to some of the existing U.S. Bureau of Reclamation dams. Federal government activity in water resources is now limited primarily to aspects of Colorado River salinity. Currently, the two major projects in the Division with regards to salinity are the Uncompander Valley and the Paradox Valley control programs.

Another important factor in the Division 4 economy is the recent difficult times for the Colorado-Ute Electric Company which is headquartered in Montrose. The company has had to reduce their staff by more than 30% and is presently attempting to reorganize in such a way that they do not have to declare bankruptcy.

On the bright side of the economic picture within the Division, tourism is booming. Ongoing developments in the Telluride and Crested Butte ski areas have been a boost to the economy. Tourism on the whole is becoming the number one economic activity and more and more water resources are being changed and directed toward the recreational tourism type of use. This involves increased water court activity utilizing existing water rights and the development of new plans for augmentation and water supplies for these tourist related activities.

Water court activities in the Division were somewhat reduced during the past two or three years. In 1987 there were 314 water right filings and in 1988 there were 183 water right filings. However, as of this writing, there were 150 applications filed with the court during 1989, which indicates that the decline may be reversing. The water judge in Division No. 4 is Judge Robert A. Brown, Aaron R. Clay is the water referee and the clerk of the Water Court is Kay Phillips. Presently of major significance before the court are related applications by the City of Aurora, Arapahoe County, and Natural Resources Energy Company involving transmountain diversion of waters from the Upper Gunnison Basin/Taylor River to cities on the front range. (An in-depth article regarding these applications can be found in Volume II, No. 1, March issue of STREAM LINES).

The Division office is located in the Montrose County Courthouse on the third floor, South First Street. The telephone number is: (303) 249-6622. A satellite office for Districts 42, 63, and 73 is located in Grand Junction at 2893 Music Avenue. Richard Belden is the Water Commissioner for those Districts and can be reached at (303) 245-7023.



** Serves as Secretary to the Colorado Ground Water Commission and provides staff support to the Board of Examiners of Water Well Construction and Pump Installation Contractors.

STATE ENGINEER'S OFFICE UNDERGOES ORGANIZATIONAL CHANGE

As of September 1, 1989, the Division of Water Resources underwent a reorganization to improve efficiency and provide better service to the public. Although numerous positions were affected by the reorganization, major personnel changes included:

Tom Kelly, former Division Engineer in Montrose promoted to Assistant State Engineer for Administration

Robert Longenbaugh, Former Assistant State Engineer for Ground Water to Assistant State Engineer, Litigation and Enforcement Branch

Reiner Haubold, former Supervisor in Ground Water to Hearings Officer and Ombudsman

Steve Lautenschlager, former head of Ground Water Operations promoted to Principal Water Resource Engineer, Ground Water

Bruce DeBrine, assumes Supervision of Ground Water Permitting Outside Designated Basins

Due to the appointment of Tom Kelly as Assistant to the State Engineer, Keith Kepler has been appointed as Acting Division Engineer for Water Division No. 4 in Montrose. Keith was formerly the head of the Designated Basins Branch and was transferred to Division No. 4 in 1987 and has been the Assistant Division Engineer since that time.

COLORADO DAM SAFETY FACT SHEET

By Bill McIntyre

Listed below are a few facts regarding dams and dam safety in Colorado.

1. Estimated retail value of all stored water in Colorado is \$991,000,000.

2. The approximate retail value of stored water is 35.7 cents per 1000 gallons. The annual cost of the Colorado Dam Safety Program is .0027 cents per 1000 gallons.

3. 90% of total failures and 88% of overtopping failures involved dams that did not have prior approved plans/specifications.

4. 78% of saturated downstream slope incidents involved dams that did not have toe drains and were steeper than *DESIGN OF SMALL DAMS* downstream ;lope recommendations.

5. 25% of total failures involved dams that had no documentation of their existence in the State Engineer's Office.

6. 25% of all recorded incidents occurred in Mesa/Delta counties.

7. Since April 30, 1984 (when 5 new full-time field engineers were hired) there has been a 70% increase in the number of restrictions but a 35% decrease in volume restricted (the partial lifting of the restriction on Antero Reservoir accounts for most of the decrease).

8. Since April 1984, 234 new restrictions have been issued.

9. As of April 30, 1984, when the additional 5 field engineers were added to the Dam Safety Branch, 170 storage restrictions were in effect; as of July 31, 1989, 245 storage

restrictions were in effect.

10. 12% of Colorado's 1,931 jurisdictional dams are restricted.

11. Since April 1984, there have been 3 recorded dam failures - Sage Creek, Huntington, and Grand Mesa #8. None of the failures involved loss of life.

12. Only one of the 181 Soil Conservation Service designed jurisdictional dams has failed (Frankton M1).

13. Since 1890, 145+ dam incidents have been recorded, of which 50 were total failures.

14. High hazard dams store 90% of reservoir water in the state.

15. Eleven hundred of the $1930 \pm$ jurisdictional dams are designed for irrigation use.

16. The aggregate length of embankment for all jurisdictional dams is equivalent to driving on I-70 from Grand Junction to Burlington, about 400 miles.

17. The volume of water stored east of the Continental Divide is 28%, while the West Slope stores 72% of the water. (Note: These percentages neglect transbasin diversions.)

18. There are 1131 jurisdictional dams east of the Continental Divide and 800 dams west of the Divide.

19. No recorded dam incidents have occurred in either December or January. Eighty-two percent of all recorded dam failures/incidents occurred during the following four months: April, May, June and July.

ONE PART PER TRILLION

Is a Very Finely-Split Hair

Worker exposure to certain chemicals is limited to a few parts per *million*. Regulations reduce an industrial waste discharge to one part per *billion*. Pesticide residues are found in drinking water in the low parts per *trillion*.

Extremely low measurements, and laws and regulations based on them, are growing more commonplace as science perfects increasingly sophisticated sensors. Such infinitesimal figures probably don't register with most people. Only scientists and plant managers trying to get exposures and effluents down to levels as fine as a frog hair comprehend and appreciate their meaning.

Shedding light on the subject, Dr. Warren B. Crumell of the Down Chemical Company has made some comparisons that put the figures in perspective.

-TRACE CONCENTRATION UNITS-

UNIT	1 PART PER MILLION	1 PART PER BILLION	1 PART PER TRILLION
Length	1 inch/16 miles	1 inch/16,000 miles	1 inch/16,000,000 miles (a 6-inch leap on a journey to the sun)
Time	1 minute/2 years	1 second/32 years	1 second/320 centuries
Money	\$.01/\$10,000	\$.01/\$10,000,000	\$.01/\$10,000,000,000
Weight	1 oz./31 tons potato chips	1 pinch of salt/10 tons potato chips	1 pinch of salt/10,000 tons potato chips
Volume	1 drop vermouth/ 80 "fifths" gin	1 drop vermouth/500 barrels gin	1 drop vermouth/ 250,000 hogsheads gin
Area	1 sq. ft./23 acres	1 sq. ft./36 sq. miles	1 sq. in./250 sq. miles
Action	<pre>1 bogey/3,500 golf tournaments</pre>	1 bogey/3,500,000 golf tournaments	1 bogey/3,500,000,000 golf tournaments
	1 lob/1,200 tennis matches	1 lob/1,200,000 tennis matches	1 lob/1,200,000,000 tennis matches
Quality	1 bad apple/2,000 barrels	1 bad apple/2,000,000 barrels	1 bad apple/ 2,000,000,000 barrels
Rate	1 dented fender/10 car lifetimes	1 dented fender/10,000 car lifetimes	1 dented fender/ 10,000,000 car lifetimes

Chemecology, December 16, 1976

NEW PUBLICATIONS

By George VanSlyke

Three new publications are available for purchase from the Division of Water Resources. The first is a brochure entitled CONSTRUCTION AND OPERATION OF DAMS IN COLORADO by Mike Cola. The brochure gives a brief description of the dam safety program; the statutes governing the design, construction and operation of dams; resources available; and contact agencies. The brochure is free and may be obtained through our Records Section.

The second publication is the annual report of WATER LEVELS IN THE DENVER BASIN BEDROCK AQUIFER, SPRING 1989 by John Romero and Howard Bainbridge. The report contains a brief report, water level measurements of 214 bedrock wells in four aquifers, and hydrographs of selected wells. The report is available through our lecords Section for \$5.00.

The third new publication available is entitled A SYNOPSIS OF COLORADO WATER LAW by Joseph Grantham. This handbook-size publication provides an introduction to Colorado water law in layman's terms, with an overview of the priority system, surface ground water, water, reservoirs, and responsibilities of ditch owners. This publication is also available through the Records Section at a cost of \$5.00.

DENVER BASIN WATER LEVEL MONITORING

By John Romero

During the spring of 1989, 214 wells tapping the Denver Basin bedrock aquifers were measured as part of the state-wide observation well

network established by Senate Bill 200 (1987). The 1989 measurements show a wide variation from the 1988 measurements due to the fact that many of the wells were actively being pumped when the readings were taken this spring due to the dry As a result, winter of 1988/89. water level changes range from a rise of 155 feet to a decline of 168 feet with such differences occurring over a distance of only one or two Due to these changes and miles. the short record for most of the wells, water level contour maps were not prepared as part of this years' Hydrographs were prepared report. for selected wells in the basin and generally show a downward trend.

Continuation of this project in future years will allow better definition of ground water trends throughout the basin. Copies of the report are now available through the Records Section for \$5.00.

FROM THE EDITORS

The editors of STREAM LINES would like to thank Rob Molloy of the Division of Water Resources Computer Services Branch for his invaluable help and expertise in producing this newsletter. His advice and consultations in designing this publication allow us to provide a professional, informative document to the water users of this state. Thank you Rob.

DESERVING RECOGNITION

The Division of Water Resources has had a busy 3 months since we last visited with regards to personnel in the Denver office and various division offices. Changes in staffing, retirements and new personnel have occurred.

The Division would like to welcome David Fox to our staff as a professional engineer who formerly worked for the City of Aurora. David will be working in the Water Management and Litigation Branch of the Denver office and his expertise in water rights administration is a welcome addition to our professional staff.

Melissa Long was recently hired to work in the Well Information Section of the Denver office and will assist in permit processing as an Engineering Aide while she studies civil engineering at Metro College in Denver.

Bob Hamburg retired as of July 31, 1989 after 8 years of service for the Division and numerous years of service at the U.S. Bureau of Reclamation. We wish him luck in his retirement and hope to see him soon.

Ken Fisher, an employee with the Division for 6 years, recently accepted a position as an engineer in Sacramento, California, while George Moravec, geologist, has announced he has accepted a position with the Department of Health. We wish both of them luck in their new endeavors.

Other changes of note include the transfer of David Nettles from our Designated Basins Branch to the Water Management and Litigation Branch. Bill McIntyre transferred from the Dam Safety Branch to the Interstate Compacts and Water Supply Branch and Keith Vander Horst has accepted a transfer from Groun Water to the Interstate Compacts an Water Supply Branch. Also, Sally Lewis will be transferring to Steamboat Springs as the resident dam inspector for Division No. 6.

Employee recognition was given to the following individuals during the months of July, August and September:

Brian Ahrens was honored as Employee of the Month for July. Brian is a member of the Interstate Compacts and Water Supply Branch and was recognized for his efforts beyond the call of duty in data preparation for the <u>Colorado v. Kansas</u> litigation. Brian worked many hours of overtime to complete the project and the Division appreciates his extra efforts.

August recognition was given to Paula Lacey, Staff Assistant to the State Engineer. Paula has worke for DWR for 14 years and was selected as Employee of the Month in recognition of her dependability, organizational skills, and willingness to assume additional responsibilities, as well as generally "running the office." Her abilities as "social director and interior decorator" are also greatly appreciated.

September's Employee of the Month was Dennis Miller. Dennis works in the Design Review Unit of the Division's Dam Safety Branch and received the award for his expertise in the seismic evaluation of dams, his attention to detail, his diligence and his reliability.

GOVERNOR APPOINTMENTS

Paul R. Berglund, founder and president of Arrow Drilling Company, was recently appointed by Governor Romer to serve on the Board of Examiners of Water Well Construction and Pump Installation Contractors. Paul has been involved in the water well drilling industry since the mid-1960s, and became licensed in Colorado in 1977. He is currently Chairman of the Legislative Committee for the Colorado Water Well Contractors Association and was an active participant in the recent revision of the Board's rules and regulations.

As we welcome Paul to the Board of Examiners, we must also extend our thanks and best wishes to George Hier of Hier Drilling in Castle Rock. George has been a member of the Board since 1981, and has been instrumental in guiding the upwards direction of the water well industry in Colorado. George devoted a lot of time and energy as chairman of the Board and as the well drilling industry's representative during the recent major revision of the rules and regulations, and we thank him for his commitment and devotion to the industry.

CALENDAR OF EVENTS

October

October 11	"State and Federal Water Quality Developments Seminar" sponsored by the Colorado Water Congress, Holiday Inn, Northglenn, CO. Contact: Dick MacRavey, CWC. (303) 837-8012.			
October 20-21	Trout Unlimited Western Region Instream Flow Conference, Jackson Hole, WY. Contact: Suzanne Van Gytenbeek, Wyoming Trout Unlimited. (307) 733-6991.			
November				
November 7	"Drought and Water Shortages" workshop sponsored by the Water Issues Forum, CSU Cooperative Extension and Colorado Water Resources Research Institute, Wyatt's Cafeteria Lakeside Shopping Center, noon-2:30 p.m. Contact: Jim Loftis, CWRRI (303) 491-7923.			
November 13-14	Colorado Water Conservation Board Meeting, Denver, CO. Contact: Maria Martel, CWCB. (303) 866-3441.			
November 15	Colorado Ground Water Commission, Room 112, State Capitol Building, Denver, CO, 9:00 a.m. Contact: Rolynda Bain. (303) 866-3581.			
November 17	"Colorado in the Wake of the Two Forks Decision," sponsored by the University of Denver College of Law. Contact: Susan Barber. (303) 871-6118.			

CALENDAR OF EVENTS CONT.

December

- December 3 Board of Examiners of Water Well Construction and Pump Installation Contractors, Room 821, 1313 Sherman Street, Denver, CO, 8:30 a.m. Contact: Rolynda Bain. (303)866-3581.
- December 6-8 46th Annual Meeting of the Colorado River Water Users Vegas, Association, Las NV. Contact: Tommy Thomson, President, CRWUA. (719) 544-2040.
- December 12 Annual Meeting of the Arkansas River Compact Administration, Cow Palace Inn, Lamar, CO. Contact: Bill McDonald, CWCB. (303) 866-3441.

January

January 10 58th Colorado General Assembly convenes.

January 18-19 Water Conservation Board Meeting, Colorado Denver, CO. Contact: Maria Martel, CWCB. (303) 866-3441.

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