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DEPARTMENT OF
WATER RESOURCES

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ATTORNEYS FOR THE IDAHO GROUND WATER APPROPRIATORS

BEFORE DEPARTMENT OF WATER RESOURCES

STATE OF IDAHO

**IN THE MATTER OF DISTRIBUTION OF
WATER TO WATER RIGHT NOS. 36-02551 &
36-07694
(RANGEN, INC.)**

Docket No.: CM-DC-2011-004

**SECOND AFFIDAVIT OF
CHARLES M.
BRENDHECKE**

STATE OF COLORADO)
 : ss
County of Boulder)

Charles M. Brendecke, being first duly sworn under oath deposes and states as follows:

1. I am employed by AMEC, 1002 Walnut, Suite 200, Boulder, Colorado 80302. I am a Licensed Professional Engineer in Idaho, Colorado, Wyoming and Washington. I have a Bachelor of Science degree in Civil Engineering from the University of Colorado, and Master of Science and Doctor of Philosophy Degrees and Civil Engineer from Stanford University.

Attached hereto is my updated resume.

2. As evidenced in prior pleadings, I have been retained by IGWA to provide expert reports, testimony and technical assistance in this delivery call regarding the hydrogeology of the ESPA, the ESPAM, among other technical and scientific matters.

3. I am competent to testify in this matter.

4. My Expert Report dated December 21, 2012 and submitted to IDWR on December 21, 2012, my corrected report dated January 29, 2013, and submitted to IDWR on January 29, 2013, and my Rebuttal Report dated February 8, 2013 and submitted to IDWR on February 8, 2013 (collectively, my "Expert Reports") are based upon:

- a. my personal knowledge and professional expertise; and
- b. information known to me at this time.

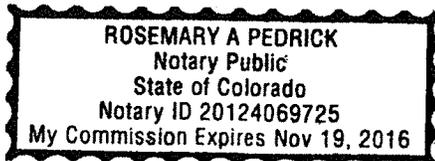
Subject to these bases, my Expert Reports reflect my true and correct opinions in this case.

FURTHER YOUR AFFIANT SAYETH NAUGHT.

DATED this 6 day of February, 2013.


CHARLES M. BRENDECKE

SUBSCRIBED AND SWORN TO before me this 6 day of February, 2013.




NOTARY PUBLIC FOR COLORADO
Residing at: 1002 WALNUT
BOULDER, CO
My Commission Expires 11-19-2016

CERTIFICATE OF SERVICE

I hereby certify that on this 8th day of February, 2013, I caused to be served a true and correct copy of the foregoing *Second Affidavit of Charles M. Brendecke* upon the following by the method indicated:


Signature of person making form

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Charles M. Brendecke, PhD, PE

Principal

Professional summary

Dr. Brendecke has more than 40 years of diverse experience in hydrology, water rights, water resources engineering, and water resources planning and management. He has directed a wide variety of projects addressing local and regional water supply planning; management of complex water supply systems; simulation modeling of surface and groundwater systems (including water right administration); municipal and agricultural water demand forecasting and conservation; and water rights development and transfer. His work as lead expert in a variety of water rights proceedings includes historical consumptive use analysis, evaluation of surface/groundwater interactions, conjunctive administration of surface and groundwater rights, development of protective terms and conditions, settlement negotiations, and expert witness testimony. He has been qualified as an expert witness in numerous venues, including the U.S. Supreme Court.

Expertise

- Water rights
- Water supply planning /management
- Surface/ground water interaction
- Reservoir system operations
- Statistical hydrology
- Negotiation/litigation support
- Expert witness testimony

Representative projects

Land Application (Spray Field) Plan for Wastewater Disposal, Tessengerlo-Kerley, Inc.

Project Manager. Work involved development of land treatment plan for agricultural products facility near Kennewick, Washington.

Long Range Water Demand Forecast, Idaho Water Resource Board, Boise

Project Manager. Work involved development of long-range water demand forecasts for Rathdrum Prairie Aquifer, Idaho.

Golf Resort Water Management, The Valley Club, Sun Valley, Idaho

Project manager. Work involved water supply planning and water rights transfers for golf resort.

Quick Summary

Years of Experience 41

Education

PhD, Civil Engineering, Stanford University, Stanford, California/USA, 1979

MS, Civil Engineering, Stanford University, Stanford, California/USA, 1976

BS, Civil Engineering, University of Colorado, Boulder, Colorado/USA, 1971

Public Policy Mediation Training – CDR Associates, Boulder, Colorado/USA, 2004

Professional Qualifications

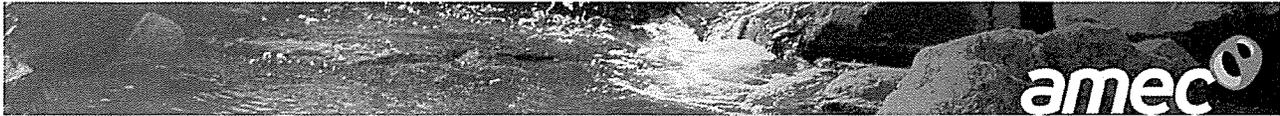
Professional Engineer: CO (1980), WY, ID, WA

Professional Affiliations

American Society of Civil Engineers

American Water Resources Association

American Geophysical Union



Interstate Water Litigation, North Carolina Department of Justice, Raleigh, North Carolina.
Project Manager. Work involved hydrology, water supply and reservoir operations studies.

Municipal Water Storage Planning, Colorado Springs Utilities, Colorado Springs, Colorado
Project manager. Lead a reconnaissance-level evaluation of potential water storage projects for major municipal water utility in southern Colorado.

Spear T Ranch v. Knaub, et.al., Hageman and Brighton, Attorneys, Morrill County, Nebraska
Project manager. Performed groundwater modeling analysis regarding effects of pumping on surface flows at points of diversion on Pumpkin Creek in Morrill County, Nebraska.

Conjunctive Administration of Ground Water Rights, Idaho Ground Water Appropriators, Boise, Idaho
Project manager and testifying expert. Testified in proceedings related to administration of surface and groundwater rights. Work has involved oversight of regional ground water model development of the Eastern Snake Plain Aquifer, groundwater modeling in support of management and mitigation plans, and analysis of historical water use data.

Rio Grande Basin Groundwater Management, Rio Grande Basin Confined Aquifer Use Rules, Conejos Water Conservancy District, Manassa, Colorado
Testifying expert. Testified regarding proposed methods for replacement of injurious depletions caused by groundwater pumping in Special Improvement District No. 1 of the Rio Grande Water Conservation District and regarding the use of the RGDSS groundwater model in developing rules governing new withdrawals from the confined aquifer system of the San Luis Valley.

Columbia River Basin Reservoir Operations, Busch Agricultural Resources, Inc., Kootenai Valley, Idaho
Project manager. Performed studies of the impact of modified reservoir operations on agricultural interests in the Kootenai River basin.

New Mexico Surface Water Studies
Project manager. Performed a program of surface and ground water studies on the Pecos River in support of State initiatives.

Interstate Compact Litigation, Colorado Division of Water Resources, Denver, Colorado
Expert witness. Testified in litigation between Kansas and Colorado regarding Arkansas River water uses.

Interstate Compact Litigation, Wyoming Attorney General, Cheyenne, Wyoming
Project manager and expert witness. Testified in litigation between Nebraska and Wyoming regarding storage project operations and water deliveries to agricultural users on the North Platte River.

Rio Grande Decision Support System, Colorado Division of Water Resources, Denver, Colorado
Quality assurance officer. Developed a comprehensive surface water model of the Rio Grande River basin in Colorado.



Agricultural Water Conservation, U.S. Bureau of Reclamation, Denver, Colorado

Project manager. Developed a water conservation guidebook for use by irrigation districts. The guidebook describes planning approaches and methods for evaluating specific conservation measures.

Colorado City Metropolitan District

Project manager. Performed water supply planning studies and water rights litigation support for municipal water provider.

Gunnison Basin Planning Model

Project manager. Developed an interactive PC-based computer model of hydrology and water rights administration in the Gunnison River basin. The model uses a network solution algorithm and incorporates a Windows™-based interface.

Boulder Creek Water Rights, City of Boulder, Boulder, Colorado

Lead expert. Testified in a variety of water rights proceedings related to applications, changes, and transfers of agricultural rights in the Boulder Creek basin.

Yampa River Basin Planning Studies, Colorado River Water Conservation District, Glenwood Springs, Colorado

Project manager. Performed a comprehensive water supply planning study that included demand forecasting, development of a basin computer model, and evaluation of potential water storage project operations.

Snake River Basin Water Supply Study

Project manager. Performed a comprehensive review of water use in the Snake River basin and computer model evaluation of potential water management strategies, including agricultural water conservation, to enhance anadromous fisheries.

Upper Colorado River Water Rights, Colorado River Water Conservation District, Glenwood Springs, Colorado

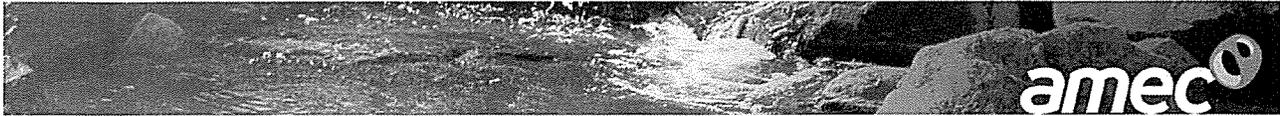
Performed engineering analysis of the historical use of irrigation rights located on the Blue River, determining the portion of consumptive use made possible by Green Mountain Reservoir releases. Analyzed the historical consumptive use of the irrigation water rights associated with the Gary Hill Ranch on Muddy Creek, in support of water rights acquisition associated with the construction of Muddy Creek Reservoir.

Summit County Small Reservoir Study, Colorado Water Conservation Board, Denver, Colorado

Project manager. Performed a water management study for the Blue River basin involving development of a hydrologic model and evaluation of new storage facilities for instream flow maintenance.

Gunnison Basin Planning Study, Colorado River Water Conservation District, Glenwood Springs, Colorado

Project manager. Developed a detailed hydrology and water rights model of the 8000 square mile Gunnison River basin as part of a comprehensive river basin planning study.



Windy Gap Delivery Study, City of Boulder, Boulder, Colorado

Project manager. Developed detailed computer models of Colorado-Big Thompson Project operations to support analysis of the yields of the Windy Gap Project, which shares common facilities.

Superconducting Super Collider Water Supply, State of Colorado

Project manager. Determined industrial water needs and developed the water supply strategy for a proposed Department of Energy physics research facility.

Boulder Raw Water Master Plan, City of Boulder, Boulder, Colorado

Project manager. Prepared a comprehensive report concerning water rights holdings and water supply system operating policies for a Front Range municipality of 100,000 persons.

Standley Lake Pollutant Loading

Project manager. Developed hydrologic and pollutant loading model of Standley Lake to assess relative effects of non-point sources and a proposed effluent exchange by a major industrial water user.

Pecos River Compact

Consultant to the Special Master of the U.S. Supreme Court. Advised on technical issues in a lawsuit between Texas and New Mexico concerning river depletions and water deliveries.

Rocky Ford Ditch Transfer

Project manager. Performed engineering analyses of historic irrigation practices and Arkansas River depletions associated with a 4100-acre tract in southeastern Colorado.

Buena Vista Water Rights

Project manager. Analysis of the historic use of irrigation water rights and development of engineering data supporting their transfer to municipal use.

Dillon Clean Lakes Study

Project manager. Development of a comprehensive hydrologic monitoring network to determine lake inflow patterns and non-point source pollutant loadings from various land uses.

Restoration of West Tenmile Creek

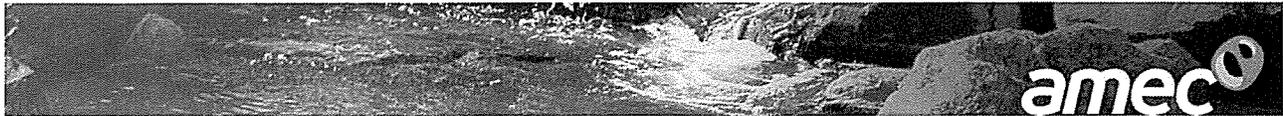
Project manager. Performed hydrologic and hydraulic analysis and design of comprehensive stream habitat improvements at Copper Mountain ski area.

Publications

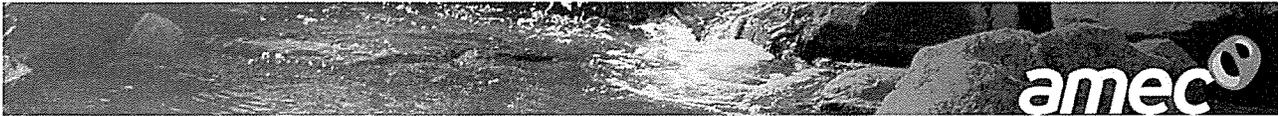
"Toward Conjunctive Management of the Eastern Snake Plain Aquifer," poster presentation, by Charles Brendecke at Natural Resources Law Center *25th Summer Conference Groundwater in the West*, Boulder, Colorado, June 16-18, 2004.

"Interstate Water Conflict: Compacts, Adjudications and Decrees," Charles Brendecke, *Water Policy Seminar: Freshwater Conflicts in the United States*, Stanford, California, May 19, 2004.

"Water Rights, Compact Entitlements and Endangered Fishes of the Yampa River Basin," Brendecke, C.,



- and R.D.Tenney, Proceedings of the *Annual Water Resources Conference*, American Water Resources Association, November 12-15, 2001. Albuquerque, New Mexico.
- "Conjunctive Management: Science or Fiction?" Brendecke, Charles M., presentation to Idaho Water Users Association *18th Annual Water Law and Resource Issues Seminar*, November 8-9, 2001. Boise, Idaho.
- "Planning for Water Development and Endangered Species Recovery in the Yampa River Basin." Tenney, Ray D., and C.M. Brendecke, Proceedings of the *Wetlands Engineering & River Restoration Conference*, American Society of Civil Engineers, March 26, 1998, Denver, Colorado.
- "Agricultural Water Conservation Planning & Pricing-Tools & Technologies." Payton, E., C. Brendecke, B. Harding, E. Armbruster, T. McGuckin and C. Huntley. Proceedings of the *Irrigation Association's 18th International Conference*, November 2, 1997, Nashville, Tennessee.
- "Achieving Efficient Water Management: Hydrosphere Resource Consultants, Inc., Agricultural Water Conservation Planning," workshop for U.S. Bureau of Reclamation staff, December 16 - 18, 1996. Las Vegas, Nevada.
- "PC-Based Decision Support Tools: Lessons from a Dozen Applications," Brendecke, C., B. Harding and E. Payton, Proceedings of the *Fifth Water Resources Operations Management Workshop*, Water Resources Planning and Management Division (ASCE). March 4, 1996. Arlington, Virginia.
- "The Value of Water Supply Reliability in Urban Water Systems," Howe, C.W., M. Smith, L. Bennett, C. Brendecke, J. Flack, R. Hamm, R. Mann, L. Rozaklis, and K. Wunderlich, *Journal of Environmental Economics and Management*, 1994. v. 26, pg. 19-30.
- "Managing Snake River Operations for Juvenile Salmon Migration," Brendecke, C. Proceedings of the *ASCE Water Resource Planning and Management Conference Division 20th Anniversary Conference*, Seattle, Washington, May, 1993.
- "The Hydrosphere Snake River Operations Model", Brendecke, C., *9th Annual Water Law and Resource Issues Seminar*, Idaho Water Users Association, Boise, Idaho. 1992.
- "Logical Intransitivities and Other Administrative Nightmares: Can Models Help?," Brendecke, C., and B. Harding. Proceedings of the *26th Annual AWRA Conference and Symposium*, November 4-9, 1990. Denver, Colorado.
- "Legal and Economic Disincentives in the Transfer of Models to Users," Harding, B., C. Brendecke, and R. Kerr. Proceedings of the *26th Annual AWRA Conference and Symposium*, November 4-9, 1990. Denver, Colorado.
- "Network Models of Water Rights and System Operations," Brendecke, C., W. DeOreo, E. Payton, and L. Rozaklis. *Journal of the Water Resources Planning and Management Division (ASCE)*. 1989.
- "Modeling Water Allocation Problems Under Complex Hydrologic and Institutional Settings," Rozaklis, L., E. Payton, C. Brendecke, and B. Harding, paper presented at the *24th Annual AWRA Conference and Symposium*, November 8, 1988. Milwaukee, Wisconsin.
- "Water Rights Analysis and System Operation Using Network Optimization Models," Brendecke, C., W. DeOreo, and L. Rozaklis, paper presented at the *14th Annual ASCE Water Resources Planning and Management Division Conference*, March 16-18, 1987. Kansas City.



- "Network Optimization Models for Water Rights Analysis and System Operating Studies for the City of Boulder," Bredecke, C., E. Payton, and R. Wheeler, Proceedings of the *Colorado Water Engineering and Management Conference*, February 17-18, 1987. Ft. Collins, Colorado.
- "Rainfall and Snowmelt Frequency in an Alpine Watershed," Payton, E., and C. Bredecke, Proceedings of the *53rd Western Snow Conference*, April 16-18, 1985. Boulder, Colorado, pp. 25-36.
- "A Simulation Model of Boulder's Alpine Water Supply," Bredecke, C., and J. Sweeten, Proceedings of the *53rd Western Snow Conference*, April 16-18, 1985. Boulder, Colorado, pp. 63-71.
- "The Redistribution and Sublimation Loss of Snowpack in an Alpine Watershed," James, E., and C. Bredecke, Proceedings of the *53rd Western Snow Conference*, April 16-18, 1985. Boulder, Colorado, pp.148-151.
- "Comparison of Two Daily Streamflow Simulation Models of an Alpine Watershed," Bredecke, C., D. Laiho, and D. Holden, *Journal of Hydrology*, 1985, v. 77, pp. 171-186.
- "Management of a Municipally Owned Alpine Watershed Using Continuous Simulation," Bredecke, C., D. Laiho, and J. Sweeten, Proceedings of the *11th International Symposium on Urban Hydrology, Hydraulics, and Sediment Control*, July 23-26, 1984. Lexington, Kentucky, pp. 79-87.
- Eutrophication and Land Use, Lewis, W., D. Crumpacker, J. Saunders, and C. Bredecke, *Ecological Studies Vol. 46*, Springer-Verlag, 1984. New York, 202 pp.
- "A Comparative Evaluation of Streamflow Simulation Models in a Colorado Alpine and Subalpine Environment," Bredecke, C., D. Laiho, and D. Holden, Proceedings of the *American Geophysical Union Front Range Branch Hydrology Days*, April 24-26, 1984. Ft. Collins, Colorado, pp. 40-55.
- "Seepage from Oilfield Brine Disposal Ponds in Utah," Baker, F., and C. Bredecke, *Groundwater*, 1983. 21(3), pp. 317-324.
- "Environmental Considerations in Corps Planning," Bredecke, C., and L. Ortolano, *Water Resources Bulletin*, 1981. 17(2), pp. 248-254.