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**Education**

- 1987 M.S. Civil and Environmental Engineering, Utah State University, Logan, Utah.  
Thesis “*Pre-excavation of Riprapped Scour Holes Below Flip Bucket Spillways*”.
- 1986 B.S. Civil and Environmental Engineering, Utah State University, Logan, Utah.

**Professional Summary**

- Registered Professional Engineer in Utah
- Department of Defense Security Clearance
- 2013-present Research Associate Professor, Utah Water Research Laboratory - Civil and Environmental Engineering, Utah State University, Logan, Utah.
- 2006-2013 Research Assistant Professor, Utah Water Research Laboratory - Civil and Environmental Engineering, Utah State University, Logan, Utah.
- 2000-2009 Civil and Environmental Engineering course instructor for undergraduate and graduate students, Utah State University, Logan, Utah.
- 1999-2006 Adjunct Assistant Professor, Civil and Environmental Engineering, Utah State University, Logan, Utah.
- 1996-2006 Senior Engineer, Utah State University Research Foundation, Utah State University, Logan, Utah.
- 1992-1997 Consulting Engineer, Tullis Engineering Consultants, Logan, Utah.
- 1987-1996 Research Engineer, Utah State University Research Foundation, Utah State University, Logan, Utah.
- 1986-1987 Research Assistant, Utah Water Research Laboratory, Utah State University, Logan, Utah.
- 1985-1986 Research Assistant, Department of Agriculture and Irrigation Engineering, Utah State University, Logan, Utah.

**Research and Consulting Experience**

Over 1200 testing reports and proprietary reports have been written as a result of research and consulting experience.

## Hydraulic Structures and Physical Model Studies

- Extensive experience performing hydraulic structure physical model studies on dams and spillways, pumping pits, power plant intakes, erosion control issues, pipelines, channels, spillway basins, gated structures, control structures, outlet and energy dissipation structures, fish screens, bypasses, sewer and storm water systems.
- Principal investigator or team member on more than 100 physical models of hydraulic structures

### A sample of hydraulic structure and model study experience is shown below

Feb 2015	Physical model study of the Weber Basin Water Conservancy District bifurcation structure conducted for Carollo Engineers of Salt Lake City, UT
Feb 2015	Numerical model study of the Discharge Impacts of the Old Dominion Electric Cooperative (ODEC) on the Chester Water Authority (CWA) water supply conducted for Gannett Fleming of Harrisburg, PA
Nov 2014	Physical model study of the LCRA Lane City Reservoir river outfall conducted for CH2MHill of Denver, CO
Mar 2014	Physical model study of the Turkey Peak Dam spillway and outlet works conducted for HDR of Austin, TX
Dec 2013	Physical model study for the Monticello Nuclear Generating Pumping Station improvement project conducted for Xcel Energy of Monticello, MN
Jan 2013	Physical model study of the Folsom Dam Auxiliary Spillway conducted for McMillen, LLC of Seattle, WA
Nov 2011:	Physical Model Study of the Utah Lake Pumping Station conducted for Bowen Collins & Associates of Draper, UT
Feb 2011:	Physical Model Study of the I-84 overpass for the New York Canal conducted for Horrocks of Nampa, ID
Dec 2010:	Physical model study of the Success Emergency Spillway conducted for HDR of Folsom, CA
Dec 2010:	Physical model study of the Success Dam Outlet Works conducted for HDR of Folsom, CA
May 2009:	Physical Model Study of the SCOP Lake Mead Effluent Conveyance Discharge System conducted for MWH of Las Vegas, NV
Oct 2008:	Physical model study of the Folsom Dam Auxiliary Spillway conducted for Owen Ayres and Associates, Inc. of Sacramento, CA
Aug 2008:	Physical model study of the IPS1 pump station for low lake level conditions conducted for Southern Nevada Water Authority of Las Vegas, NV
Aug 2008:	Physical model study of the Lake Mead Reservoir Intakes for pump stations No. 1 (IPS1) and No. 2 (IPS2) conducted for Southern Nevada Water Authority of Las Vegas, NV
Mar 2008:	Physical model study of the L.L. Anderson Dam Spillway modification conducted for MWH of Walnut Creek, CA
Jan 2008:	Physical model study of the IPS1 reservoir intake on Lake Mead conducted for Southern Nevada Water Authority of Las Vegas, NV
Nov 2007:	Physical model study of the IPS2 reservoir intake on Lake Mead conducted for Southern Nevada Water Authority of Las Vegas, NV
Nov 2007:	Physical model study of the Lake Mead intake pumping station NO. 3 (IPS3) conducted for MWH and CH2MHill of Las Vegas, NV
Sep 2006:	Physical model study of the Kentucky River Intake conducted for Gannett Fleming of Harrisburg, PA
Nov 2005:	Physical model study of the Nacimiento Dam Spillway conducted for Boyle Engineering of Lakewood, CO
Sep 2004:	Physical model study of the Cooper Nuclear circulating water pump intake structure conducted for Nebraska Public Power District - Cooper Nuclear of Brownsville, NE
Sep 2004:	Physical model study of the Kern County Water Agency Cross Valley canal expansion project conducted for Boyle Engineering of Bakersfield, CA

Apr 2003: Physical model study of the Pflugerville Dam spillway conducted for HDR Engineering, Inc. of Austin, TX

Feb 2003: Physical model study of the Ginna Plant circulating water pump bay conducted for Rochester Gas and Electric Company of Ontario, NY

Nov 2002: Physical model study of the Piute Dam low level outlet gate structure conducted for Franson Noble Engineering of American Fork, UT

Feb 2002: Vibration analysis at Starcke dam due to negative nappe pressures, Lower Colorado River Authority, Austin, Texas.

Jul 2000: Physical model study of the Huntley Steam Station intake tunnel to units #67 & #68 conducted for NRG Huntley Operations of Tonawanda, NY

May 2000: Physical model study of Max Starcke Dam conducted for the Lower Colorado River Authority of Austin, TX

Dec 1999: Physical model study of screenhouse #2 at the Dunkirk Power Station conducted for Niagara Mohawk Power of Syracuse, NY

Dec 1998: Physical model study of the Davis Pumping Station conducted for Black and Veatch of Chesterfield, MO

Mar 1998: Physical model study of Dual-Flow and Thru-Flow Screens conducted for Brackett Green USA, Inc. of Houston, TX

Sep 1997: Physical model study of the Termovalle Combined Cycle Project intake conducted for Bibb and Associates of Shawnee Mission, KS

Nov 1996: Physical model study of the HIPDC Dalian #4 Power Plant intake conducted for Ingersoll-Dresser of Phillipsburg, NJ

Nov 1996: Physical model study of the Dandong Units #1 and #2 intake conducted for Ingersoll-Dresser of Phillipsburg, NJ

Oct 1996: Physical model study of the River Mountain Water Treatment Facility Flow Split Basin conducted for Montgomery Watson/CH2M-Hill of Las Vegas, NV

Sep 1996: Physical model study of the 78-inch fixed cone valves as part of the Eastside Reservoir Project conducted for the Metropolitan Water District of Southern California of Los Angeles, CA

Sep 1996: Physical model study of the existing SNWA Lake Mead Pump Structure - IPS-1 well shafts conducted for Montgomery Watson/CH2M-Hill of Las Vegas, NV

Aug 1996: Physical model study of the Paiton JAWA Power Plant Phase II Units 5 & 6 intake conducted for Black and Veatch Construction of Overland Park, KS

Feb 1996: Physical model study of the Southern Nevada Water Authority Lake Mead intake pumping station 2 conducted for Montgomery Watson/CH2M-Hill of Las Vegas, NV

May 1995: Physical model study of Wirtz Dam overtopping conducted for Freese & Nichols of Fort Worth, TX

Oct 1994: Physical model study of the Arkansas Nuclear One (unit two) Power Plant circulating water pump intake conducted for Entergy Operations of Russellville, AK

Oct 1994: Physical model study of the Cumberland Power Plant, Units 1&2 circulating water pump intake conducted for Tennessee Valley Authority of Knoxville, TN

Aug 1994: Physical model study of the Bin Qasim Unit-6 Thermal Power Station main cooling water intake structure conducted for Black and Veatch International of Kansas City, KA

Aug 1994: Physical model study of the Rabigh Stage III Power Plant circulating water pump intake conducted for Ingersoll-Dresser of Phillipsburg, NJ

May 1993: Physical model study of the Hubbard Creek Dam spillway conducted for Freese & Nichols of Fort Worth, TX

Apr 1993: Physical model study of the Buchanan Dam 7-gate spillway conducted for Freese & Nichols of Fort Worth, TX

Oct 1991: Physical model study of the reservoir water pumps at Gerald Gentleman Station conducted for Nebraska Public Power District of Columbus, NE

May 1991: Physical model study of transducer signal performance in gasoline tanks for Campbell Scientific, Logan, Utah.

Jan 1991: Physical model study of the Nova Scotia Power circulating water pump intake conducted for Ingersoll-Rand of Phillipsburg, NJ

Jun 1990: Physical model study of the Taiwan Power Nuclear Power Station-Maanshan intake structure conducted for Ingersoll-Rand of Phillipsburg, NJ

Mar 1989: Physical model study of the Applewhite Dam Service Spillway conducted for Freese & Nichols of Fort Worth, TX

May 1988: Physical model study of the Youghiogheny Dam outlet works conducted for D/R Hydro Company of Monroeville, PA

Aug 1988: Physical model study of the Morris-Sheppard Dam conducted for Freese & Nichols of Fort Worth, TX

### **Flow Measurement and Calibration**

- Personally responsible for over 1100 large-sized flow meter calibrations since 1987, which culminated in the authorship of over 500 flow meter test reports. These calibrations included: ultrasonic, venturi, nozzle, turbine, orifice, insert probe, magnetic, v-cone, coriolis, pressure differential, open channel and velocity probe type flow meters.
- Performed extensive research on small residential flow meter accuracy and durability
- Consultant for flow meter applications, installation, design and field problems.
- Consultant for field flow rate, velocity profile and loss coefficient measurements.

An extremely small sample of flow meter calibration experience is shown below

Aug 2014: Calibration of a 12-inch and 16-inch V-cone flow meter for Fisher Controls of Marshalltown, IA

Jun 2014: Calibration of a 54-inch and a 60-inch magnetic flow meter for Badger Meter of Milwaukee, WI

Oct 2013: Calibration of two 36-inch Endress and Hauser magnetic flow meters for Xylem Inc. of Pewaukee, WI

Aug 2013: Calibration of two 8-inch ultrasonic flow meters tested on simulated pipe for Siemens Energy Inc. of Houston, TX

May 2012: Calibration of an ultrasonic clamp-on meter tested on 18-inch and 48-inch pipe for Racine Federated Inc. of Racine WI

Mar 2012: Calibration of eight 4-inch ultrasonic flow meters for GE Sensing of Billerica, MA

Nov 2011: Calibration of a three 24-inch flow nozzle meters for Daniel of Calgary, Alberta Canada

Apr 2011: Calibration of a 10-inch magnetic flow meter for Seametrics of Kent, WA

Mar 2010: Calibration of a 66-inch ultrasonic flow meter for Accurate Measurement of San Juan Capistrano, CA

Feb 2010: Calibration of a 24-inch V-cone flow meter in simulated piping for for McCrometer of Hemet, CA

Mar 2009: Calibration of a 72-inch ultrasonic flow meter for Energy Northwest of Richland, WA

Jan 2009: Calibration of a 36-inch V-cone flow meter for Wyatt Engineering of Lincoln, RI

Mar 2008: Calibration of a simple irrigation flow measurement device conducted for Millville Irrigation Company of Millville, UT

Feb 2008: Calibration of a 30-inch ABB magnetic flow meter conducted for Curtiss-Wright of Phillipsburg, NJ

Apr 2007: Evaluation of flow measurement accuracies at Piute Dam conducted for Sevier River Water Users Association of Delta, UT

Nov 2006: Calibration of four 42-inch Rittmeyer ultrasonic flow meters conducted for Accurate Measurement Systems of Laguna Hills, CA

Apr 2006: Calibration of two 48-inch ultrasonic meter spools conducted for Accusonic Technologies of Wareham, MA

Jan 2006: Calibration of an insertion turbine flow meter in 18-inch pipe conducted for Onicon Incorporated of Clearwater, FL

Dec 2005: Report on venturi specifications conducted for San Diego County Water Authority of San Diego, CA

Jul 2005: Fuji, Panametrics and Polysonics ultrasonic flow meter calibrations conducted for Energy Northwest of Richland, WA

Aug 2004: Calibration of two 1-inch coriolis flow meters conducted for Energy Northwest Standards Laboratory of Richland, WA

Jul 2004: Field calibration of a 72-inch PENN meter company venturi tube conducted for EA Fairbairn Water Treatment Plant of Sacramento CA

Apr 2004: Calibration of two 20-inch, one 24-inch, and one 60 inch v-cone flow meter conducted for McCrometer of Hemet, CA

Sep 2003: 8-Inch ASME Flow Nozzle Calibration conducted for PRC Flow Measurement and Control, Inc of Tulsa, OK

May 2003: Palmer-Bowlus Flume calibration conducted for TRACOM, Inc of Alpharetta, GA

Sep 2002: Calibration of a 10-inch insert venturi conducted for Wyatt Engineering of Lincoln, RI

Jun 2002: Calibration of two Rittmeyer 42-inch ultrasonic meters conducted for Accurate Measurement Systems of Laguna Hills, CA

Oct 2001: Calibration of two 8-inch orifice tube assemblies for Triad Measurement and Equipment Company of Humble, TX

Dec 2000: Preliminary design of a new flow meter in pumped dirty water conducted for Campbell Scientific of Logan, UT

Oct 2000: Calibration of a 3-inch electromagnetic flow meter conducted for Toshiba of Houston, TX

Sep 2000: Performance test on a 48-inch ultrasonic flow meter installed in both field & straight piping conducted for Accurate Measurement Systems of Laguna, CA

Jul 2000: Water well survey and flow measurement for "Proof of Beneficial Use of Water" conducted for Rallin Anderson of Logan, UT

Mar 2000: Design of an automated pressure differential measurement system on venturi flow meters conducted for BIF of Chagrin Falls, OH

Jan 2000: Calibration of 32 venturi meters for Primary Flow Signal of Warwick, RI

Jul 1999: Field velocity profile measurement at screenhouse #2 at the Dunkirk Power Station conducted for Niagra Mohawk Power of Syracuse, NY

Dec 1999: Physical model tests of a Southern Nevada Water Authority 180-inch venturi flow meter conducted for Primary Flow Signal of Warwick, RI

Mar 1999: Calibration of a 24-inch and a 20-inch venturi flow meter conducted for BIF of Chagrin Falls, OH

Apr 1997: Lab calibration of an American Sigma 950 area velocity meter conducted for American Sigma of Medina, NY

Aug 1996: Calibration of eighteen Paco Pump orifice plates conducted for Flow Technologies, Inc. of Brookshire, TX

Apr 1996: Sewer flow tube calibration in 36-inch pipe conducted for Yellowstone Environmental Science of Bozeman, MT

Jun 1995: Calibration of Wafer and Balvalve Venturis conducted for Gerand of Minneapolis, MN

Nov 1994: Calibration of an ISCO Model 4150 acoustic doppler velocity & level meter conducted for Marsh-McBirney of Frederick, MD

May 1994: Laboratory calibration of a 12-inch pitot static probe conducted for NASA Ames/Calspan of Moffett Field, CA

Mar 1994: Design, installation and field calibration of flow measurement device at a small hydropower facility conducted for Hydro West of Bellevue, WA

May 1993: Calibration of a 12-inch turbine flow meter conducted for J.C. Carter Company of Costa Mesa, CA

Nov 1991: Small hydropower flow meter calibration, installation and field tests at Logan River 3rd dam conducted for Current Power of Springville, UT

Oct 1991: Calibration of a 48-inch Annubar flow meter conducted for the Metropolitan Water District of Southern California, Los Angeles, CA

Sep 1991: Calibration of two 6-inch turbine meters conducted for Water Specialties Corporation of Porterville, CA

Jul 1991: 36-inch venturi coefficient verification and installation of new differential measurement device at Dewitt Springs conducted for Logan City of Logan, UT

Nov 1989: Laboratory Calibration of a 10-inch flow nozzle conducted for Ogden Martin Systems of Grand Rapids, MI

Jun 1989: Calibration of 16 orifice assemblies conducted for Westinghouse Electric Corporation, Bettis Atomic Power Laboratory of Pittsburg, PA

Nov 1987: Calibration of a 2-inch positive displacement flow meter conducted for Mountain States Energy Division of Butte, MT

### **Valve Performance and Analysis**

- Performance test experience on most types of control valves and check valves including: detection and quantification of cavitation, determination of size and pressure scale effects, cavitation suppression, torque measurements, leakage tests, cycle tests, wear tests, and discharge and loss coefficient tests.
- Valve cavitation computer programs.
- Witness of on-site valve testing.

### **A small sample of valve experience is shown below**

Nov 2014: Flow test on a 4-inch x 10-inch steam supply valve conducted for Leslie Controls of Tampa, FL

Feb 2014: Flow test on a 2-inch globe valve conducted for Leslie Controls of Tampa, FL

Aug 2013: Flow test on a 6-inch, 12-inch and 24-inch plug valve conducted for J&S Valve, Inc. of Huffman, TX

Mar 2013: Flow test on a 10-inch butterfly valve conducted for Leslie Controls of Tampa, FL

Feb 2012: Flow test on a 4-inch globe valve conducted for Leslie Controls of Tampa, FL

Jan 2012: Performance test on a 2-inch , a 4-inch and a 10-inch tank vent check valve conducted for Pro-Mar of Shelby, NC

Sep 2011: Performance testing of three 10-inch pressure relief valves conducted for Ross Valve of Troy, NY

Jun 2011: Flow performance test on a 12-inch and 14-inch double offset butterfly valve conducted for Leslie Controls of Tampa, FL

Dec 2010: Flow test on an 8-inch double offset butterfly valve conducted for Leslie Controls of Tampa, FL

Apr 2010: Flow test on a 2.5-inch and a 6-inch triple offset butterfly valve conducted for Leslie Controls of Tampa, FL

Feb 2009: Flow test on a 6-inch and 12-inch gate valve for Mueller Company of Chattanooga, TN

Aug 2008: Performance flow test on a 3-inch butterfly valve conducted for Precision Fluid Control of Auburn, CA

Feb 2007: Evaluation of cone valve failures at Southern Nevada Water System pumping plants conducted for Southern Nevada Water Authority of Las Vegas, NV

Feb 2007: Swing check valve performance tests conducted for Milliken Valve Company of Bethlehem, PA

Sep 2005: Ball valve performance tests conducted for Henry Pratt Company of Aurora, IL

Dec 2004: 250,000 cycle test of an 8-inch slanting disc check valve conducted for APCO Valve and Primer Corporation of Schaumburg, IL

Dec 2002: A 16-inch knife gate valve test conducted for Tyco Valves and Controls of Reno, NV

Nov 1999: Flow testing of eccentric plug valves conducted for Milliken Valve Company of Bethlehem, PA

1999-2000: Valve sizing and cavitation computer programs written for Cla-Val of New Port Beach, CA

Sep 1997: 24-inch tilting disc check valve performance test installed in field piping simulation conducted for BW/IP International of Williamsport, PA

Aug 1997: Valve cost analysis computer program written for APCO of San Clemente, CA

Jul 1997: Performance testing on the Star Pac System for Valtek of Springville, UT

Jul 1997: Flow and torque testing of a 24-inch butterfly valve conducted for Enertech of Brea, CA

Oct 1996: Witness of a Townley 24-inch butterfly valve test in Candler, Florida for San Luis Obispo County, CA

Aug 1995: Flow coefficient and cavitation limit tests on a 6-inch Class 900 Stop Check lift check valve conducted for Edward Valve of Raleigh, NC

May 1995: Flow calibration of a 24-inch globe valve conducted for Cla-Val Valve Company of Newport Beach, CA

Feb 1995: Valve sizing and cavitation computer program for APCO Valve of San Clemente, CA

Jan 1995: Performance flow test on a 14-inch Mark 10 angle valve conducted for Valtek of Springville, UT

1995-1997: Valve sizing and cavitation computer programs written for APCO of San Clemente, CA

Mar 1994: Flow and torque tests on 8-inch and 30-inch C&S metal seated butterfly valves conducted for Duke Power, Oconee Nuclear Station of Seneca, SC

Mar 1993: Performance tests on 10-inch and 42-inch Fisher (Posi-Seal) butterfly valves conducted for Duke Power, Catawba Nuclear Station of York, SC

Jan 1993: Calibration of a Valtek 16-inch 2-stage channelstream valve conducted for Valtek of Springville, UT

Feb 1992: Hydraulic testing of a 12-inch swing check valve conducted for Atwood and Morrill Company, Inc. of Salem, MA

Sep 1990: Hydraulic testing of a 14-inch Y-Pattern lift check valve conducted for Anchor Darling of Williamsport, PA

Feb 1989: Hydraulic testing of a 6-inch (Howell-Bunger type) free discharge valve conducted for Hartman Valve Company of St. Louis, MO

Nov 1987: Flow calibration, cavitation and sound tests on a 1.0-inch 1878# globe valve conducted for Anchor Darling of Williamsport, PA

**Municipal hydraulic system component testing, design and analysis**

- Laboratory friction loss and minor loss measurements in high density polyethylene drainage, PVC, concrete, corrugated steel, carbon steel, and cast iron pipe and fittings.
- PVC pipe and fitting pressure, cycle and burst testing and witness testing.
- Analysis of system design, pipe transients and failures.
- Hydraulic system design.

A small sample of hydraulic system component experience is shown below

May 2013: Head-Loss test on a Siemens cooler at Rofin in Clark Mills, NY conducted for Siemens Energy, Inc. of Orlando, FL

2002 to 2011: Deflection measurements and inspection of storm water retention systems under Salt Lake City, Utah parking lots conducted for Advanced Drainage Systems, Inc. of Hilliard, OH

Mar 2011: Friction tests on 36, 24 and 12-inch polypropylene pipe conducted for Advanced Drainage Systems, Inc. of Hilliard, OH

Feb 2010: Laboratory investigation of 18-inch C905 PVC pipe joint failure conducted for Western Nevada Supply Company, of Sparks, NV

June 2009: Failure analysis of a 12-inch HDPE pipe conducted for Sunny Ridge LLC Development of Spanish Fork, UT

Oct 2008: Canned pump system physical model for Dee Jasper and Associates, of Bakersfield, CA

July 2008: Source water flow rate certification for Mr. Roger Crummit of Riverdale, ID

June 2007: 8-Inch PVC pipe joint pressure tests conducted for Pride Contractors of Mesquite, NV

May 2007: Friction tests on 48-inch polyurethane-lined steel pipe conducted for the Northwest Pipe Company of Washington, WV

Aug 2006: Source water flow rate certification for Mr. Roger Crummit of Riverdale, ID

May 2006: Changes in the hydraulic roughness coefficients for circumferentially strained 24-inch HDPE pipe conducted for the Plastic Pipe Institute, Inc. of Washington D.C.

Aug 2005: Contaminant removal efficiency evaluation of a Storm PURE filter system conducted for ADS-Nyloplast of Buford, GA

Aug 2005: Changes in the hydraulic roughness coefficients for circumferentially strained M294 pipe conducted for Advanced Drainage Systems, Inc. of Hilliard, OH

Mar 2005: Hydraulic analysis of dynamic storm grates conducted for ADS-Nyloplast of Buford, GA

Jul 2004: Hydraulic analysis of static storm grates conducted for ADS-Nyloplast of Buford, GA

Sep 2003: Hydraulic Loss Coefficients for Culverts Phase I Report conducted for the Transportation Research Board NAS-NRC of Washington, D.C.

Jun 2002: Hydraulic analysis and design of the Weston Creek Irrigation system conducted for Weston Creek Irrigation Company of Weston, ID

Apr 2001: Friction test on 48-inch mortar-lined steel pipe conducted for Northwest Pipe Company of Washington, WV and the Du Page Water Commission of Elmhurst, IL

Mar 2001: Failure analysis of a 12-inch ductile iron pipe conducted for KATSPAN, INC. of Kirkland, WA

Feb 2001: Hydraulic design of an irrigation diversion structure conducted for Spring Creek Water Company of Providence, UT

Apr 2000: Failure analysis of a 36 x 36 x 36-inch PVC Tee conducted for Nyloplast of Preston, ID

Oct 1999: Hydraulic flow tests storm grates conducted for D&L Supply and Foundry of Lindon, UT

Sep 1999: Failure analysis of a 30 x 30-inch PVC elbow conducted for Nyloplast of Preston, ID

May 1999: Failure analysis of a 16-inch coupling gasket conducted for Nyloplast of Preston, ID

May 1999: Hydraulic analysis of an automated irrigation project conducted for Frank Haws, consulting engineer of Logan, UT

Mar 1999: Preliminary design and cost analysis of a hydraulic testing laboratory conducted for Texas A&M University of College Station, TX

Nov 1998: Design of a pumped pressure cycle fixture for 1,000,000 cycle tests on PVC fittings conducted for Nyloplast of Preston, ID

Sep 1998: Failure analysis of a 30 x 30 x 30-inch PVC Tee conducted for Nyloplast of Preston, ID

Oct 1997: Failure analysis of a 24-inch 45 degree gasket x gasket 160IPS fitting conducted for Nyloplast of Preston, ID

Sep 1997: Design of hydraulic testing laboratory conducted for American Sigma of Medina, NY

Jul 1997: Witness testing of 16-inch, 18-inch and 24-inch coupler gasket x gasket 100lb IPS fittings conducted for Nyloplast of Preston, ID

Jan 1997: Testing of 12-inch, 24-inch and 36-inch HDPE N-12 Pipe conducted for Advanced Drainage Systems, Inc. of Columbus, OH

Aug 1996: Failure analysis of a 30-inch, 45 degree gasket x gasket elbow conducted for Head Manufacturing of Preston, ID

Aug 1996: Witness of a 30-inch, 45 degree gasket x gasket elbow test conducted for Head Manufacturing of Preston, ID

Jun 1996: Witness of a 12-inch and 10-inch, gasket x gasket coupling test conducted for Head Manufacturing of Preston, ID

May 1996: Witness of a 10-inch, gasket x gasket coupling test for conducted for Head Manufacturing of Preston, ID

May 1996: Evaluation of friction coefficients in small diameter tubing conducted for IPEX of Edmonton, Calgary, Canada

Jun 1995: Design of fire sprinkler system conducted for Autocare Body Shop of Logan, UT

Jan 1995: Failure analysis of C900 PVC wyes and tees conducted for Head Manufacturing of Preston, ID

May 1994: Hydraulic tests of 1-inch, 3/4-inch and 1/2-inch fittings conducted for IPEX of Edmonton, Calgary, Canada

Jan 1994: Analysis of hydraulic transients conducted for Bingham Engineering of SLC, UT

Oct 1993: Manning's-n test on Hi-Flow storm sewer pipe conducted for Atlantic Industries Limited of Dorchester, New Brunswick, Canada

Mar 1993: Hydraulic design of irrigation pond and piping conducted for local farmer of Logan, UT

Jun 1989: Determination of head loss for two 8-inch 45-degree elbows conducted for Nappco, Inc.

Feb 1989: Friction factor tests on high density polyethylene pipe conducted for Big-O of Exeter, Ontario, Canada

Oct 1988: Friction factor tests on high density polyethylene pipe conducted for Hancor of Findley, OH



- Oct 1988: Friction factor tests on high density polyethylene pipe conducted for Prinsco of Prinsburg, MN
- Feb 1992: Laboratory calibration of 6 mixers conducted for Komax Systems, Inc. of Wilmington, CA
- Feb 1989: Performance and mixing tests of 10-inch static mixers with annular and 4-inch centerline injectors conducted for Koch Engineering
- Jun 1988: Efficiency tests of twin low-head hydraulic turbines conducted for Current Power of Provo, UT

### **Journal Papers and Noteworthy Publications (\* indicates authorship)**

- Feb 2015 (accepted): ***Effects of Pipe Wall Offsets on Differential Pressure Meter Accuracy.*** Journal of American Water Works Association (AWWA), Volume ??, Number ??, pp. ??-??, (Jesse M. Pope, \*, Michael C. Johnson, Zachary B. Sharp)
- April 2014: ***Low-Head Dam Reverse Roller Remediation Options.*** Journal of Hydraulic Engineering, Volume 140, Number 4 (April 2014), HY.1943-7900.0000848 (Riley J. Olsen, Michael C. Johnson, \*)
- Jan 2014: ***Generic Unified Rating for Cutthroat Flumes.*** Journal of Irrigation Science, Volume 32, Number 1 (Jan 2014), pp. 29-40, (Sathaporn Temeepattanapongsa, Gary P. Merkley, \*, Barton L. Smith)
- Nov 2013: ***Meter Testing Methods Matter.*** Journal of American Water Works Association (AWWA), Volume 105, Number 11, <http://dx.doi.org/10.5942/jawwa.2013.105.0130>, Expanded Summary pp. 67-68, (Devan Shields, \*, Michael C. Johnson, Craig C. Hannah)
- Sep 2013: ***Hydraulic Jump Air Entrainment Scale Effects in Closed Conduits.*** 35<sup>th</sup> International Association of Hydraulic Research World Congress (IAHR), Chengdu, China, (\*, Joshua D. Mortenson, Michael C. Johnson)
- July 2013: ***Using Numerical Modeling to Correct Flow Rates for Submerged Montana Flumes.*** Journal of Irrigation and Drainage Engineering, Volume 139, Number 7 (July 2013), pp. 586-592, (Ryan Willeitner, \*, Michael C. Johnson)
- Jul 2013: ***Generic Free-Flow Rating for Cutthroat Flumes.*** Journal of Hydraulic Engineering, Volume 139, Number 7 (July 2013), pp. 727-735, (Sathaporn Temeepattanapongsa, Gary P. Merkley, \*, Barton L. Smith)
- June 2013: ***Risk of Entrapment at Low-Head Dams.*** Journal of Hydraulic Engineering, Volume 139, Number 6 (June 2013), pp. 675-678, (Riley J. Olsen, Michael C. Johnson, \*)
- May 2013: ***Parshall Flume Discharge Correction Coefficients Through Modelling.*** Journal of Water Management, Institute of Civil Engineering (ICE), DOI: 10.1680/wama.12.00112, (Bruce Savage, Bryan Heiner, \*)
- Dec 2012: ***Flow Measurement Accuracies of In-Service Residential Flow Meters Over Time.*** Journal of American Water Works Association (AWWA), Volume 104, Number 12, (December 2012), pp. E637-E642, (Devin Stoker, \*, Michael C. Johnson)

- Dec 2012: ***Canal Wave Oscillations from Expansion of I-84 Bridge in Boise, Idaho.*** Journal of the Transportation Research Board (TRB), No. 2039, (December 2012), pp. 200-205, (William J. Rahmeyer, Jonathan M. Clegg, \*)
- Nov 2012: ***Ultrasonic Flow Measurement for Pipe Installations with Non-Ideal Conditions.*** Journal of Irrigation and Drainage Engineering (ASCE), (Devin Stoker, \* Michael C. Johnson) Volume 138, No. 11 (2012), pp. 993-998
- Jul 2012: ***The effects of Hydraulic Jump Location on Air Entrainment in Closed Conduits.*** Journal of Hydraulic Research (Josh D. Mortenson, \* Blake P. Tullis) Volume 50, No. 3 (2012), pp. 298-303
- Jul 2012: ***Montana Flume Flow Corrections Under Submerged Flow.*** Journal of Irrigation and Drainage Engineering (ASCE), (Ryan Willeitner, \*, Michael C. Johnson) Volume 138, Issue 7 (July 2012), pp. 685-689
- Jul 2012: ***Evaluation and Development of Unmanned Aircraft (UAV) for UDOT Needs.*** Utah Department of Transportation Research Division (UDOT), 40 Pages, Final Report (\*, Austin Jensen, Shannon Clemens)
- Apr 2012: ***Effects of Particulates on Water Meter Accuracy through Expected Life.*** Journal of American Water Works Association (AWWA), Volume 104, Number 4 (April 2012), pp. 231-242, (Skyler Buck, Michael C. Johnson, \*)
- Apr 2012: ***Revenue recovery through meter replacement.*** Journal of American Water Works Association (AWWA), Volume 104, Number 4 (April 2012), pp. 252-259, (Devan Shields, \* Michael C. Johnson)
- Dec 2011: ***Parshall Flume Discharge Corrections: Wall Staff Gauge and Centerline Measurements.*** Journal of Irrigation and Drainage Engineering (ASCE), IRENG-5868R2, (Bryan Heiner, \*)
- Sep 2011: ***Off-The-Shelf Accuracies of Residential Water Meters.*** Journal of American Water Works Association (AWWA), Volume 103, Number 9 (2011), pp. 48-55, (Martilyn Neilson, \*, Michael C. Johnson)
- Sep 2011: ***Revenue Recovery Through Meter Replacement.*** AWWA Distribution Systems Symposium, Nashville, TN, (\*, Devan Shields, Michael C. Johnson)
- Sep 2011: ***Composite Modeling of Hydraulic Structures.*** Association of State Dam Safety Officials (ASDSO), National Harbor, Maryland, (William Rahmeyer, \*, Bruce Savage)
- Aug 2011: ***Accuracy of In-Service Water Meters at Low and High Flow Rates.*** Water Research Foundation (EPA) 303 pages final report, (\*, Michael C. Johnson, Martilyn A. Neilson)
- Aug 2011: ***Discharge Coefficient Performance of Venturi, Standard Concentric Orifice Plate, V-Cone and Wedge Flow Meters At Low Reynolds Numbers.*** Journal of Petroleum Science and Engineering, 78, (2011), pp. 559-566, (Colter Hollingshead, Michael C. Johnson, \*, Robert Spall)
- Jun 2011: ***Composite Modelling: Combining Physical and Numerical Models.*** 34th World Congress of the International Association for Hydro-Environment Engineering and Research (IAHR), Brisbane, Australia, (James Sutherland, \*)

- Jun 2011: ***Conditional Assessment of Flow Measurement Accuracy.*** Journal of Irrigation and Drainage engineering (Bryan J. Heiner, \*, Michael C. Johnson) Volume 137, No. 6 (2011), pp. 367-374
- Feb 2011: ***Scale Effects of Air Entrained by Hydraulic Jumps Within Closed Conduits.*** Journal of Hydraulic Research (Josh D. Mortenson, \* Michael C. Johnson) Volume 49, No. 1 (2011), pp. 90-95
- Feb 2011: ***Flow Rate Sensitivity Due to Parshall Flume Staff Gauge Location and Entrance Wingwall Configuration.*** Journal of Irrigation and Drainage engineering (Bryan J. Heiner, \*, Michael C. Johnson) Volume 137, No. 2 (2011), pp. 94-101
- Jan 2011: ***Experimental Determination of the Hydraulic Properties of Low Pressure, Lay-Flat Drip Irrigation Systems.*** Journal of Hydraulic Engineering ASCE; (Evan J. Thompson, Gary P. Merkley, Andy A. Keller, and \*) Vol. 137, No. 1, pp. 37-48 (2011)
- Jan 2011: ***Application of Three RANS Turbulence Models to Aged Water Transmission Pipes.*** Journal of Hydraulic Engineering ASCE; (Ryan Christensen, Robert Spall, \*) Vol. 137, No. 1, pp. 135-139 (2011)
- Sep 2010: ***Eliminating Vortices at the Proposed Folsom Dam Auxiliary Spillway.*** International Symposium on Hydraulic Physical Modeling and Field Investigation, Nanjing, China (\*, William J. Rahmeyer and Nathan Cox)
- Sep 2010: ***Composite Modeling of the Success Dam Spillway; Lessons Learned.*** Association of State Dam Safety Officials, 2010 Annual Conference, Seattle, WA (Bruce Savage, William J. Rahmeyer and \*)
- Sep 2010: ***Application of Large Eddy Simulation to Aged Water Transmission Pipes.*** Journal of Engineering Applications of Computational Fluid Mechanics; (Ryan Christensen, \*, Robert Spall) Vol. 4, No. 3, pp. 450-458 (2010)
- Jul 2010: ***Metering and Water Consumption.*** Drinking Water Research, (\*, Michael C. Johnson, Donald L. Schlenger, R.W. Beck, David M. Hughes and Jian Zhang) Jul-Sep, pp. 30-35
- May 2010: ***Apparent Losses Caused by Water Meter Inaccuracies at Ultralow Flows.*** Journal of American Water Works Association (Gregory L. Richards, Michael C. Johnson, and \*) Volume 102, Issue 5, ISSN 1551-8833.
- May 2010: ***Modeling Roughness in Physical Scale Models.*** Journal of Hydraulic Research (Christopher Webb, \*, Michael C. Johnson) Vol. 48, No. 2 (2010), pp. 260-264.
- Jan 2010: ***Energy Losses in Cross Junctions.*** ASCE Journal of Hydraulics (Zachary B. Sharp, Michael C. Johnson, \*, William J. Rahmeyer) Volume 136, Issue 1, pp. 50-55 (January 2010)
- Oct 2009: ***Eliminating Vortices at the Proposed Folsom Dam Auxiliary Spillway.*** Association of State Dam Safety Officials, 2009 Annual Conference, Hollywood, FL (\*, William J. Rahmeyer and Nathan Cox)
- Oct 2009: ***Conservation through Calibration and Communication.*** River Basin Management 2009, Malta (Blake P. Tullis and \*)

- Oct 2009: ***Physical Modeling and Numerical Modeling - None, One, or Both.*** WEFTEC 2009 Annual Water Environment Federation Technical Exhibition and Conference, Orlando, FL (Jim Devlin, \*, Justin Bartels, Ben Emerson, Angela MacKinnon, and Tom Rowlett)
- Aug 2009: ***Flow Measurement Accuracies of New Residential Flow Meters.*** The 2009 Distribution Systems Symposium and Exposition, Reno, NV (Martilyn Neilsen, \* and Michael C. Johnson)
- Aug 2009: ***Improving Open Canned Systems.*** World Pumps (David Sanders, \*, and Michael C. Johnson) No. 515.
- July 2009: ***Design Challenges for Rock Channel Spillway Widening.*** Waterpower XVI, Spokane, WA (Vic Iso-Ahola, Jim Lindell, John Haapala and \*)
- July 2009: ***Aggieair – A Low Cost Autonomous Multispectral Remote Sensing Platform: New Developments and Applications.*** IEEE Geoscience and Remote Sensing Society (IGARSS 2009), Cape Town, South Africa (Austin Jensen, YangQuan Chen, Mac McKee, Thomas Hardy and \*)
- June 2009: ***Flow Measurement Accuracies of New Residential Flow Meters.*** The American Water Works Association (AWWA) 2009, San Diego, CA (Martilyn Neilsen, \*, and Michael C. Johnson)
- June 2009: ***Improving Water Quality Modeling in Systems Containing Tuberculated Pipes.*** The American Water Works Association (AWWA) 2009, San Diego, CA (Ryan Christensen and \*)
- June 2009: ***The System Conveyance and Operations Program (CSOP) Boulder Islands Outfall Project: Physical and Numerical Modeling as Design Tools.*** 33rd International Association of Hydraulic Engineering & Research (IAHR) Biennial Congress, Vancouver, Canada (Tom Rowlett, \*, Jim Devlin, Michael C. Johnson and Justin Bartels)
- June 2009: ***Metering Secondary Irrigation Water: Technological Approaches and Cost Estimation.*** Journal of American Water Works Association (Greg Richards, Michael C. Johnson and \*) 101(6):52-63.
- May 2009: ***Managing Reservoir Discharges through Accurate Flow Measurement.*** World Environmental & Water Resources Conference 2009, Kansas City, MO (Bryan Heiner and \*)
- May 2009: ***Improving Flow Measurement Accuracies in Water Systems.*** The American Water Resources Association (AWRA) 2009, Anchorage, AK (Bryan Heiner and \*)
- Dec 2008: ***Vapor Cavity Collapse Downstream from Orifice Plates.*** Journal of Hydraulic Research (Nathan Q. Smith, Michael C. Johnson and \*) Vol. 46, No. 6 (2008), pp. 830-834.
- Nov 2008: ***Development of a Fish Passage Culvert Inventory in the State of Utah.*** Utah Department of Transportation, (\*, Devin Stoker)
- June 2008: ***Metering Secondary Water in Residential Irrigation Systems.*** Journal of American Water Works Association (Greg Richards, Michael C. Johnson and \*) 100(6):112-121.
- Nov 2007: ***Improving Safety and Hydraulic Efficiency of Dams with Physical Model Studies.*** NZSOLD/ANCOLD 2007 Annual Conference, Queenstown, New Zealand (\*, Blake P. Tullis)

- Sep 2007: ***The Realities of Aged Pipe Friction.*** 2007 Annual AWWA Intermountain Section Conference, Sun Valley, Idaho (\*, William J. Rahmeyer, Ryan T. Christensen)
- Sep 2007: ***Assessing Inaccuracies in the Flow Measurement of Reservoir Releases.*** Association of State Dam Safety Officials, 2007 Annual Conference, Austin, Texas (\*, Blake P. Tullis, Jeremy D. Jensen)
- Jun 2007: ***The Realities of Aged Pipe Friction.*** 2007 AWWA Annual Conference, Toronto, Ontario, Canada (\*, William J. Rahmeyer, Ryan T. Christensen)
- Jun 2007: ***Teaching Hydraulic Structure Design: Some Key Elements to a Successful Design-Based Course.*** American Society for Engineering Education 2007 Annual Conference, Honolulu, Hawaii (Blake P. Tullis, \*)
- Jan 2007: ***Hydraulic Characteristics of Circumferential Strained M294 Pipe.*** Published in TRR (Transportation Research Record) #1976 (Blake P. Tullis, \*, and Ryan T. Christensen)
- Jan 2006: ***Changes in Hydraulic Roughness Coefficients for Circumferentially Strained M294 Pipe.*** 2006 Transportation Research Board Conference (Blake P. Tullis, \*, and Ryan T. Christensen)
- Sep 2003: ***Hydraulic Loss Coefficients for Culverts Phase I Report.*** Transportation Research Board NAC-NRC (Blake P. Tullis, \*, Corwin M. Willmore, Dale J. Lentz, S. Collin Robinson)
- Sep 2002: ***Gate Vibration Concerns at Starcke Dam.*** Approved for the Association of State Dam Safety Officials conference, but not presented due to legal issues, 2002 Annual Conference, Tampa, Florida. (\*, Michael C. Johnson, Gregor A. Forbes)
- Sep 2000: ***Starcke Dam, Gate Replacement and Spillway Modifications.*** Association of State Dam Safety Officials, 2000 Annual Conference, Providence, Rhode Island. (\*, Richard Frithiof, Michael F. Dumont)
- Sep 1997: ***Hydraulic Model Testing for Dam Safety.*** Association of State Dam Safety Officials, 1997 Annual Conference, Pittsburgh, Pennsylvania. (\*, J. Paul Tullis, John R. King)
- Sep 1996: ***Hydraulic Model Testing for Wirtz Dam Overtopping Protection.*** Association of State Dam Safety Officials, 1996 Annual Conference, Seattle, Washington. (John R. King, Richard K. Frithiof, J. Paul Tullis, \*)
- Aug 1994: ***Unsteady Spillway Inlet Conditions at the Weatherford Water Supply Reservoir.*** Presented at the 1994 National Conference on Hydraulic Engineering, Buffalo, New York. (\*, J. Paul Tullis, Stuart R. Wilson)
- Feb 1991: ***Evaluation of Nonintrusive Diagnostic Technologies for Check Valves (NIC-01).*** Volume 1, Summary, EPRI Publication NP-7235 ( J. Paul Tullis, William J. Rahmeyer, Muin S. Baasiri, \*)
- Mar 1990: ***Innovative New Drainage Pipe.*** Presented at the 1990 International Conference on Pipeline Design and Installation, Las Vegas, Nevada. (J. Paul Tullis, Reynold K. Watkins, and \*)

Aug 1988: ***Scour Hole Pre-excavation Below Hydraulic Structures.*** Presented at the 1988 National Conference on Hydraulic Engineering and International Symposium on Model-Prototype Correlations, Colorado Springs, Colorado, August. (\* and J. Paul Tullis)

## **Other Presentations and Workshops**

- Sep 2012: ***Design and Physical Modeling of the Utah Lake Pump Station Replacement Project.*** Intermountain Section of American Water Works Association Annual Conference, Logan, UT, (Jason Luettinger, W. Winsor, and \*)
- Aug 2012: ***Webinar: Introduction to Physical Modeling of Spillways for Dams.*** Association of State Dam Safety Officials (ASDSO) August 2012 National 2-hr webinar presentation (\*)
- Apr 2012: ***All Day Workshop: Approaches to Meet Spillway Design Requirements.*** United States Society of Dams (USSD) 2012 Annual Conference, New Orleans, LA (\*, Greg Paxson, Blake Tullis, Nicholas Agnoli and Paul Schweiger)
- Apr 2012: ***Comparing Solid State Water Meters to Positive Displacement Meters in Residential Services.*** Texas American Water Works Association Sectional Conference, San Antonio, TX, (Craig Hannah, and \*)
- Jan 2012: ***Canal Wave Oscillations from I-84 Bridge Expansion in Boise, Idaho.*** Transportation Research Board 91<sup>st</sup> Annual Meeting, Washington DC, (William J. Rahmeyer, Jonathan M. Clegg, \*)
- Jun 2011: ***Presenting the Business Case for Solid State Water Meters.*** American Water Works Association (AWWA) 2011 Annual Convention, Washington DC, (Craig Hannah, \* and Devan Shields)
- May 2011: ***Flow Meter Accuracy.*** ACEEE Hot Water Forum 2011, Berkeley, CA (\*)
- Mar: 2011: ***Improvement of Potable Water and Irrigation System.*** Engineers Without Borders 2011 International Conference (Poster), Louisville, KY (Scout Mendenhall, Laurie McNeill, Blake Tullis, \*)
- Sep 2010: ***The Effects of Age and Wear on Residential Flow Meters.*** 2010 AWWA Distribution Systems Symposium and Exposition, National Harbor, MD (Michael C. Johnson and \*)
- Sep 2010: ***Manning's n Uncertainty for Culverts.*** National Hydraulic Engineering Conference, Park City, UT (Blake Tullis and \*)
- Sep 2010: ***Flow Measurement Accuracies of New Residential Flow Meters.*** 2010 AWWA Distribution Systems Symposium and Exposition, National Harbor, MD (\* and Michael C. Johnson)
- Jun 2010: ***The Effects of Age and Wear on Residential Flow Meters.*** American Water Works Association (AWWA) 2010 Annual Convention, Chicago, IL (Michael C. Johnson and \*)
- Jun 2010: ***Sunday All Day Workshop – Meter: Traditional and Novel Roles in Water Systems.*** American Water Works Association (AWWA) 2010 Annual Convention, Chicago, IL

- Mar 2010: ***EWB-USU-Peru: Irrigation Canal and Potable Water System.*** Engineers Without Borders 2010 International Conference (Poster), Denver, CO
- May 2008: ***The Folsom Dam Auxiliary Spillway Physical Model Study as a Design Tool.*** 2008 ASCE / EWRI Hydraulic Conference, Honolulu, HI
- Jul 2005: ***Stormwater Catch Basin Insert Performance Evaluation,*** Stormwater Management For Highways, Transportation Research Board AFB60 Hydrology, Hydraulics and Water Quality Committee, Bonita Springs, Florida.
- Oct 1999: ***Laboratory Protocol for the verification of flow meters for stormwater and CSO applications,*** US EPA and NSF International wet weather flow technologies vendor meeting, WEFTEC 1999, New Orleans, Louisiana.
- Aug 1998: ***Hydraulic Model Testing for Dam Safety.*** Poster Session for the Annual United States Committee on Large Dams (USCOLD) Annual Meeting, Buffalo, New York. (\*, J. Paul Tullis, John R. King)
- Feb 1992: ***Solving Cavitation Problems for Control Valves,*** Motor Operated Valve User's Group, San Diego, California.
- Nov 1989: ***Hydraulics of Storm Sewer Conduits,*** Big "O" Drainage Workshop, Calgary, Alberta, Canada.
- Nov 1989: ***Hydraulics of Storm Sewer Conduits,*** Big "O" Drainage Workshop, Edmonton, Alberta, Canada.
- Jun 1989: ***Hydraulics of Storm Sewer Conduits,*** Big "O" Drainage Workshop, Burnaby, British Columbia, Canada.

## **Court and Expert Witness Experience**

- 2005 to 2006: ***Tremonton citizens versus Tremonton City.*** Tremonton citizens alleged that raw sewage that entered their basements in the spring of 2005 was caused because of inadequacies in the city's sewer system. Services were retained by Hillyard Anderson & Olsen, P.C. of Logan, Utah, to analyze the Tremonton City sanitary sewer system and to provide expert opinions.
- Dec 2004: ***Anderson Lumber versus Castle Homes.*** In 1998, the residence at 793 Vahe St., Draper, Utah, showed signs of settling and soon thereafter a leaking bronze pipe tee was discovered near the outside foundation. Services were retained by Strong & Hanni, Law Firm, of Salt Lake City, Utah to analyze the cracked 1-inch bronze pipe tee.
- Sep 2001: ***Salt Lake City citizen versus Salt Lake City.*** Failure analysis of a 16-inch cast iron pipe that failed on October 16, 1997 near 1865 South on Wasatch Drive in Salt Lake City, Utah. Several homes were damaged significantly as a result of the pipe failure. Services were retained for Garrett and Garrett, Attorney at law, SLC, Utah.
- Aug 2000: ***Seneca Foods versus Head Manufacturing.*** Failure analysis of a 4-inch PVC Tee that failed in 1996-1997 at the Seneca Foods Plant in Montgomery, Minnesota. Seneca Foods alleged that the failure of the pipe caused corn silage to be released into Sand Creek in Minnesota, killing several thousand fish. Services were retained for Travelers Property Casualty, Denver, Colorado and Kitchen Kelley Gaynes P.C., Atlanta, Georgia.

Jan 1995: *Marsh-McBirney, Inc. versus Isco, Inc.* Work included laboratory analysis of flow measurement equipment, deposition and court appearance in United States District Court for the District of Maryland. Services were retained by Williams & Connolly of Washington, D.C.

## **Professional Training**

FEMA - National Dam Safety Technical workshop at the national Emergency training center in Emmitsburg, Maryland, February 2001

ASCE Course - Hydrologic and Hydraulic Design of Culverts, Boston, MA, September 2002

AWWA – Risk Assessment Methodology for Water Utilities (RAM-W), Kansas City, Kansas, October 2003

FLOW-3D Training Course – Santa Fe, NM – December 2003

## **Patents**

Oct 2001: Fish friendly collection basket for traveling water screens. Canadian patent application No. 2,314,762, US Patent 6,187,184, 2001

## **Committees and Professional Societies**

Member, United States Society on Dams (USSD)  
USSD Hydraulics of Dams; Spillways Subcommittee Chair; 2010 to present

Member, American Society of Mechanical Engineers (ASME)  
ASME Main Fluids Committee Member

Member, American Water Works Association (AWWA)  
AWWA Water Loss Committee Member  
AWWA Customer Metering Practices Committee Member

Member, International Association of Hydro-Environment Engineering and Research (IAHR)  
IAHR Composite Structures Committee Member, Secretary; 2010 to present

Member, American Society of Civil Engineers (ASCE)

Member, Association of State Dam Safety Officials (ASDSO)

Member, ASTM International Standards Worldwide (ASTM)  
ASTM International E44.25 Heat Metering Standards Committee

Past Member, Engineers Without Borders (EWB)