

# PAPERS AND LECTURES

Delivered by

**PETER S. CARTWRIGHT, P.E.**

(In Reverse Chronological order)

## 2020

WQA “Commercial/Industrial RO Sizing Workshop” (Virtual Sessions)  
Presented November 5, 12, 19; December 3, 10, 17, 2020

“Groundwater Remediation Technologies” (Virtual Session) - 2020 NGWA Groundwater  
Week  
December 8, 2020

“Webinar 21: Ceramic Membranes” – AWC Water Solutions  
December 3, 2020

“Membrane Separation Technologies for Biological Wastewater Treatment” – AFS On-  
Line Course Series  
November 18, 2020

“Membrane Separation Technologies for Non-Biological Wastewater Treatment” – AFS  
On-Line Course Series  
November 10, 2020

“Reverse Osmosis Membrane Technology – Theory, Properties & Technical Insights” –  
AFS Virtual Course Series  
October 27, 2020

“Water Issues in the 21<sup>st</sup> Century” (Virtual) – AFS North Central Chapter  
October 6, 2020

“Industrial Wastewater Recovery & Reuse: A Case History” (Virtual) – Environmental  
Technology for Impact 2020  
June 4, 2020

“Chloride Contamination of Minnesota Waters – What Can We Do About It?” –  
Minnesota ASPE Chapter  
May 20, 2020

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“Groundwater Contaminants and Treatment Options” – MN Department of Health  
Drinking Water Protection Non-Community Public Water Supply Unit  
April 16, 2020 and October 22, 2020

“Chloride Contamination of Drinking Water Supplies” – WQA Virtual Education  
Webinar  
April 1, 2020

“A Primer on Microplastics” – WQA Virtual Education Webinar  
April 1, 2020

## 2019

“The Contrarian Use of Chlorine to Control Biofouling in RO Membranes” - 2019  
International Water Conference, with R. Franks, A. Rubin, C. Bartels (Hydранautics)  
November 12, 2019

“How Contaminated is our Drinking Water?” - Hellenbrand 2019 National Dealer  
Meeting  
October 10, 2019

“Chloride Pollution in Minnesota – Issues and Answers” - 2019 MN Water Quality  
Association Annual Convention  
October 1, 2019

“Chloramine Issues as a Disinfectant” - Minnesota ASPE  
September 18, 2019

“A Primer on Microplastics” (with Richard Cook) “Commercial/Industrial RO Sizing  
Workshop” - WQA Convention & Exposition  
April 22-26, 2019

“The Ins and Outs of Membrane Separation Technology” “New Membrane Technologies  
for Water Treatment” - AFS FiltCon2019  
April 1-3, 2019

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## 2018

“Are We Contaminating Our Drinking Water?” - Minnesota Water Quality Association Annual Convention  
October 24, 2018

“POE Treatment with Membranes” - Minnesota Water Quality Association Annual Convention  
October 24, 2018

“Crossflow Technologies for Wastewater Treatment” - AFS FiltCon 2018 Conference & Expo  
April 24, 2018

“Water Chemistry Issues: Corrosion & Scaling” - ASPE Spring Seminar  
April 18, 2018

“Membrane Technologies for Wastewater Treatment & Reuse” - Maris Water Conference  
April 17, 2018

“Hollow Fiber Membranes for Bacteria and Legionella Removal” - WQA Convention & Expo  
March 28, 2018

“Chloramines: Occurrence, Benefits, Consequences, and Treatment” - WQA Convention & Expo  
March 26, 2018

## 2017

“Doing Business in The Dutch Way” - Water Technology Roundtable  
December 12, 2017

“Groundwater Contaminants – What Does the Future Hold?” - NGWA 2017 Groundwater Summit  
December 6, 2017

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“Membrane Technologies for Wastewater Reuse” - MWQA Conference  
October 11, 2017

“RO Membrane Pretreatment with Membranes” - AFS Fall Conference 2017  
September 20 , 2017

“Technologies For Trace Contaminant Removal From Drinking Water Supplies” - AFS  
Fall Conference 2017  
September 19, 2017

“Membrane Technologies in Residential POE Applications” - 44<sup>th</sup> Annual TWAQ  
Convention & Expo  
July 28, 2017

“Advances in Membrane Technologies” - TX A&M Water and Wastewater Short Course  
May 17, 2017

“The Role of Membranes in Wastewater Recovery & Reuse Applications” - 2017 AFS  
Spring Conference  
April 10-13, 2017

“Membrane Technologies in Residential POE Applications” - 2017 WQA Convention &  
Expo  
March 28, 2017

“Opportunities in Water Reuse” - Water Technology Export Roundtable Dow Water and  
Process Solutions  
February 9, 2017

## **2016**

“Contaminants of Emerging Concern in Drinking Water” - MN ASPE December  
Chapter Meeting  
December 21, 2016

“Groundwater Contaminants and Treatment Options” - NGWA Groundwater Week  
December 7, 2016

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“High Pressure Pumps for Membrane Technologies” - AFS Clean Air & Water Solutions Conference 2016  
October 26, 2016

“New Treatment Technologies – What’s Happening?” - AFS Clean Air & Water Solutions Conference 2016  
October 26, 2016

“Wastewater Recovery & Reuse Workshop” - 2016 AWT Annual Convention & Expo  
September 7, 2016

“Membrane Treatment Technologies for Wastewater Treatment” - AFS Spring Conference 2016  
May 10, 2016

“Basic Principles of Membrane Filtration Separations, Membrane Filtration Modules and Systems” - Semiannual Water & Wastewater: Issues, Challenges, Solutions and New Technologies, Texas A&M  
April 19, 2016

“Pretreatment Technologies Overview” - Semiannual Water & Wastewater: Issues, Challenges, Solutions and New Technologies, Texas A&M  
April 19, 2016

“RO System Design Workshop” – WQA Convention & Expo  
March 14, 2016

## **2015**

“Compromised Water Quality – Challenges and Solutions” - NGWA Groundwater Expo  
December 15, 2015

“Industrial Wastewater Treatment for Recovery & Reuse” - 2015 Chem Show  
November 18, 2015

“Membranes to Pretreat Membranes” - AFS Fall Conference 2015  
October 6, 2015

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“Fundamentals of Membrane Technology” - Texas A&M Webinar Series  
July 22, 2015

“Advanced Technologies for Mine Water Treatment” - Water Technology Listening  
Session  
May 13, 2015

“RO System Design Workshop” - WQA Aquatech USA  
April 24, 2015

“Membrane Systems – Sampling, Monitoring & Fouling Mitigation” - WQA Aquatech  
USA  
April 21, 2015

“Membrane Technologies for Reuse in the Power Industry” - 2015 AFS Spring  
Conference  
April 29, 2015

“RO System Design Workshop” - 2015 AFS Spring Conference  
April 27, 2015

“Pretreatment Technologies Overview” - Semiannual Water & Wastewater: Issues,  
Challenges, Solutions and New Technologies, Texas A&M  
April 8, 2015

“Basic Principles of Membrane Filtration Separations, Membrane Filtration Modules and  
Systems” - Semiannual Water & Wastewater: Issues, Challenges, Solutions and New  
Technologies, Texas A&M  
April 8, 2015

“Membranes to Pretreat Membranes” - Water Technology Export Roundtable  
March 3, 2015

“Hydraulic Fracturing – What’s it All About” – ASME MN Section  
January 14, 2015

“Membrane Technologies for Unconventional Oil & Gas Applications” – 25<sup>th</sup> Annual  
Produced Water Society Seminar  
January 13, 2015

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## 2014

“Cooling Tower Blowdown Recovery and Reuse Utilizing Membrane Technologies” –  
WaterWorld Middle East  
October 14, 2014

“Pretreatment Technologies to Minimize Fouling” – Membrane Technology Forum  
June 4, 2014

“Reverse Osmosis & Nanofiltration: Principles and Practice” – Membrane Technology  
Forum  
June 4, 2014

“Basic Principles of Membrane Filtration Separations, Membrane Filtration Modules and  
Systems” – Water/Wastewater Short Course, Texas A&M University  
April 15, 2014

“Pretreatment Technologies Overview” – Water/Wastewater Short Course, Texas A&M  
University  
April 15, 2014

“Hydraulic Fracturing – Trying to Get at the Truth” CDANA Convention  
April 4, 2014

“Membrane Fouling – Meeting the Challenges” – AFS Oil & Gas and Chemical  
Processing Filtration and Separations Conference”  
March 26, 2014

“RO Design Workshop” – WQA Aquatech USA  
March 21, 2014

“Advances in Membrane Technologies” – WQA Aquatech USA  
March 20, 2014

“Influence of System Design on Microbiological Contamination Control in Food  
Applications” – WQA Aquatech USA  
March 18, 2014

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## 2013

“Water for Everyone – What Does the Future Hold?” – ASPE Minnesota Chapter  
December 18, 2013

WQA Webinars – visit [www.wqa.org](http://www.wqa.org)

“High Purity Water Applications”

“Introduction to High Purity Water Treatment”

“Treatment Technologies for High Purity Water – Size Exclusion Filtration”

“Treatment Technologies for High Purity Water – Surface Active and Crossflow  
Filtration”

“Treatment Technologies for High Purity Water – Reverse Osmosis”

“Sampling, Monitoring & Logs”

“Food Processing Wastewater Treatment & Reuse – A Case History” – International  
Water Week Amsterdam Conference  
November 5, 2013

“Zero Liquid Discharge – The Marriage of Chemistry with Membrane Technologies” –  
AWT 2013 Annual Convention & Exposition  
October 31, 2013

“Graywater Recovery & Reuse” – ASPE Webinar / ABC’s of Graywater Reuse &  
Recovery  
October 23, 2013

“Removal of Problem Contaminants in Water Treatment Applications” – 2013 AFS Fall  
Conference  
October 16, 2013

“Water for Everyone – What Does the Future Hold?” – 2013 AFS Fall Conference  
October 16, 2013

“Zero Liquid Discharge of Bakery Wastewater – A Case History” – 2013 AFS Fall  
Conference  
October 15, 2013

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“RO Design Workshop” – 2013 AFS Fall Conference  
October 14, 2013

“Graywater Recovery & Reuse” – 2013 ASPE Technical Symposium  
September 20, 2013

“An Introduction to Membrane Bioreactor (MBR) Technology” – 25<sup>th</sup> Annual Practical  
Membrane Technology Short Course  
June 6, 2013

“Reverse Osmosis & Nanofiltration: Principles & Practice” – 25<sup>th</sup> Annual Practical  
Membrane Technology Short Course  
June 5, 2013

“Strategies to Minimize Fouling of RO & NF Membranes” – 25<sup>th</sup> Annual Practical  
Membrane Technology Short Course  
June 5, 2013

“How to Perform a Pilot Plant Study” – 25<sup>th</sup> Annual Practical Membrane Technology  
Short Course  
June 5, 2013

“Advanced Treatment Technologies for Food Processing Wastewater Treatment – A  
Case History” – 2013 AFS Spring Conference  
May 9, 2013

“Spiral Wound & Pleated Membrane Construction Secrets” – 2013 AFS Spring  
Conference  
May 7, 2013

“RO Design Workshop” – 2013 AFS Spring Conference  
May 6, 2013

“The Effects of Hydraulic Fracturing on Groundwater – Quantity & Quality” – 2013  
NGWA Summit  
May 1, 2013

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“High Purity Water Production System” – ASPE Chapter Education Seminar 2013  
April 24, 2013

“The Mitigation of PCPP and EDC Contamination” – ASPE Chapter Education Seminar  
2013  
April 24, 2013

“Contaminant Removal from Water Supplies” – ASPE Chapter Education Seminar 2013  
April 24, 2013

“Waterborne Pathogens: What Can We Do About Them?” – ASPE Chapter Education  
Seminar 2013  
April 24, 2013

“Basic Principles of Membrane Separation Filtration” – Water/Wastewater Short Course  
– Texas A&M University  
April 15, 2013

“Testing Processes – Applications Pilot” – Water/Wastewater Short Course – Texas  
A&M University  
April 15, 2013

“RO Design Workshop” – WQA Aquatech USA  
April 5, 2013

“Waterborne Pathogens: The Case for Proactive Plumbing Design” – WQA Aquatech  
USA  
April 4, 2013

“Membrane Fouling – Issues & Actions” – 23<sup>rd</sup> Annual Produced Water Seminar –  
January 15, 2013

“Pretreatment for Membrane Technology” – 23<sup>rd</sup> Annual Produced Water Seminar –  
January 15, 2013

“Membrane Fouling – Issues & Actions” – 23<sup>rd</sup> Annual Produced Water Seminar –  
January 15, 2013

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## 2012

“Waterborne Pathogens: The Case for Proactive Plumbing Design” – ASPE 2012  
October 30, 2012

“Power Plant Water Reclamation & Reuse” – AFS 2012 Fall Conference  
October 17, 2012

“Produced Water Pretreatment Technologies” – AFS 2012 Fall Conference  
October 17, 2012

“An Introduction to Membrane Bioreactor (MBR) Technology” – Practical Membrane  
Technology Short Course  
June 6, 2012

“How to Perform a Pilot Plant Study” – Practical Membrane Technology Short Course  
June 6, 2012

“An Introduction to Membrane Bioreactor (MBR) Technology” – AFS 2012 Annual  
Conference  
June 5, 2012

“A Unique Zero Liquid Discharge System Utilizing Microfiltration Technology” – AFS  
2012 Annual Conference  
June 5, 2012

“Technologies for Industrial/Municipal Water Reuse” – IAPMO International Emerging  
Technology Symposium  
May 2, 2012

“How to Run a Pilot Plant Experimental/Test & Applications Testing” – Texas A&M –  
22<sup>nd</sup> Annual Practical Short Course: Membrane/Filtration & Other Separation  
Technologies  
April 23, 2012

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“Pre & Post Treatment of Process Liquids in Membrane Filtration Applications” – Texas A&M – 22<sup>nd</sup> Annual Practical Short Course: Membrane/Filtration & Other Separation Technologies  
April 23, 2012

“RO Design Workshop” – WQA Aquatech USA  
March 9, 2012

“Hydraulic Fracturing – What’s it All About?” – WQA Aquatech USA  
March 8, 2012

“Innovation Trends in Membrane Technologies” – WQA Aquatech USA  
March 7, 2012

“Training Workshop – Membrane Bioreactor (MBR) Technology” – Everything About Water Expo 2012  
February 11, 2012

“Training Workshop – Water Reuse & Recycle” – Everything About Water Expo 2012  
February 9, 2012

“An Introduction to Membrane Bioreactor (MBR) Technology” – MOWA 2012  
Minnesota Onsite Wastewater Convention  
January 30, 2012

## 2011

“Ethanol Plant Thin Stillage Treatment – A Case History” – AFS Fall Conference  
October 18, 2011

“Membrane Technologies for Water Reclamation” – WaterSmart Innovations 2011  
October 5, 2011

“Whole-House Ultrafiltration – The Low Energy, Chemical-Free Disinfection Option” – WQA Webinar  
September 28, 2011

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“Filtration Technologies for Water/Wastewater Treatment” – AWT 2011 Annual Convention & Exposition  
September 15, 2011

“Membrane Technologies for Produced Water Treatment” – 26<sup>th</sup> Annual WaterReuse Symposium  
September 13, 2011

“Water Reuse: Technologies for Industrial & Municipal Applications” – 7<sup>th</sup> Annual Practical Short Course on Water Issues & Technologies: Process Water, Wastewater, and Desalination, Texas A&M University  
August 8, 2011

“Membrane Technologies for Potable Water Production” – Puradom, SRL, Dominican Republic  
September 6, 2011

“RO System Design” – Puradom, SRL, Dominican Republic  
September 6, 2011

“Ultrafiltration Training” – Hellenbrand Water, Waunakee, WI  
June 29, 2011

“Rainwater Harvesting Systems – Design, Operation & Maintenance” – ASPE 2011 Rainwater Harvesting Webinar  
June 22, 2011

“How to Perform a Pilot Plant Study” – Practical Membrane Technology Short Course  
June 9, 2011

“How to Run a Pilot Plant Experimental/Test & Applications Testing” – Texas A&M - 21<sup>st</sup> Annual Practical Short Course: Membrane/Filtration & Other Separation Technologies  
April 11, 2011

“Pre & Post-Treatment of Process Liquids in Membrane Filtration Applications” – Texas A&M - 21<sup>st</sup> Annual Practical Short Course: Membrane/Filtration & Other Separation Technologies  
April 11, 2011

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“Water Issues – What are they all about?” | “Water – What you’ve been reluctant to ask” | “Membrane Technologies for Wastewater Treatment & Reuse” | “Membrane Technologies for Water Reuse” - US Embassy, Ottawa, Canada  
March 27-29, 2011

“Reverse Osmosis in Residential Applications” – WQA Aquatech USA Conference  
March 11, 2011

“Factors Relating to the Design & Operation of Membrane Separation Technologies in Produced Water Treatment” – 9<sup>th</sup> Produced Water Workshop  
May 19, 2011

“RO Wastewater Treatment System Design and Operation” – WQA Aquatech USA Conference  
March 10, 2011

“RO Wastewater Treatment System Design and Operation” – WQA Aquatech USA Conference  
March 10, 2011

“Membrane Bioreactor (MBR) Technology” Training Workshop – EA Water Expo  
January 28, 2011

## 2010

“Graywater System Design, Parts 1 & 2” – ASPE 2010 Convention and Engineered Plumbing Exposition  
November 3, 2010

“Membrane System Design” – AWT 2010 Annual Convention & Expo  
October 23, 2010

“Membrane Treatment Technologies for Water Reuse” – AWT 2010 Annual Convention & Expo  
October 22, 2010

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“Membrane System Operation & Troubleshooting” – Part 3 of 3: 5 Day Seminar in Kuala Lumpur, Malaysia  
October 11, 2010

“Membrane Water Treatment Design” – Part 2 of 3: 5 Day Seminar in Kuala Lumpur, Malaysia  
October 12-13, 2010

“Membrane Water Treatment Fundamentals” – Part 1 of 3: 5 Day Seminar in Kuala Lumpur, Malaysia  
October 11, 2010

“Testing Protocol for Membrane Separation Applications” – 2010 AFS Water Filtration & Filter Testing Topical Conference  
October 5, 2010

“Graywater Reuse Technologies” – 2010 AFS Water Filtration & Filter Testing Topical Conference  
October 5, 2010

“Water Reuse/Technologies for Industrial & Municipal Applications” – 6<sup>th</sup> Annual Practical Short Course on Water Issues & Technologies: Process Water, Wastewater, and Desalination – Texas A&M University  
August 9, 2010

“Membrane Technology Treatment of Produced Water” – 8<sup>th</sup> Produced Water Workshop  
June 24, 2010

“How to Perform Pilot & Applications Testing” – 22<sup>nd</sup> Annual Industrial Workshop on Membrane Filtration Technology – Basics, Process Design and Applications – Bloomington, MN  
June 9, 2010

“Water Reuse Technologies: - IAPMO Second International Emerging Technologies Symposium – Ontario, Canada  
May 11-12, 2010

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“Water Reuse & Recycle” – AFS Annual 2010 Conference  
March 23, 2010

## 2009

“Lessons Learned in Industrial Membrane Applications” – Industrial WaterWorld  
Webcast – December 15, 2009

“Water Reuse and Recycle” – Chem Show  
November 19, 2009

“Design & Layout of Rainwater Harvesting Systems” – ASPE 2009 Plumbing  
Engineering & Contracting Technical Symposium – October 23, 2009

“Membrane Treatment Technologies for Water Reuse” – AWT 2009 Annual Convention  
& Expo – August 27, 2009

“Conservation, Collection & Conversion – Critical Water Issues” – 5<sup>th</sup> Annual Water  
Issues & Technologies Short Course – Texas A&M – August 4, 2009

“How to Perform Applications and Pilot Testing” – Practical Membrane Technology  
Short Course – June 10, 2009

“Pre & Post-Treatment of Process Liquids in Membrane Filtration Applications” – 19<sup>th</sup>  
Annual Practical Short Course – Texas A&M – April 20, 2009

“RO Design Workshop – Optimizing Recovery” – WQA Aquatech –  
March 19, 2009

## 2008

“Water Purification versus Wastewater Reuse” – AWT 2008 Annual Convention & Expo  
– November 7, 2008

“Water Reuse – Needs, Challenges and Opportunities” – ASPE 2008 Convention –  
October 28, 2008

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“What’s Water Reuse All About?” – AFS 2008 Fall Conference –  
September 24, 2008

“What’s Happening to Our Water Quality and What Can We Do About It?” – AFS 2008  
Fall Conference – September 23, 2008

“Water Reuse / Recycle in an Electroplating Facility – A Case History” – Texas A&M –  
August 4, 2008

“How to Perform Applications and Pilot Testing” – Practical Membrane Technology  
Short Course – June 11, 2008

“Wastewater Reuse in the Meat Processing Industry” – Southeastern Meat Association  
2008 Annual Convention – June 7, 2008

“Basics of Water Chemistry” – given in conjunction with CWQA -  
January 15, 2008

## 2007

“Industrial Wastewater Reuse with Membranes” – Association of Water Technologies  
2007 Annual Convention and Exposition – November 8, 2007

“Water Reuse: “Technologies, Testing and Trepidation” - Chem Show 2007 –  
October 30, 2007

“A New Electrolytic Ozonation Technology” – 2007 World Congress, International  
Ozone Association – August 28, 2007

“Applications and Pilot Testing”  
Practical Membrane Technology Short Course – May 24, 2007

“Choosing Between Different POU Water Treatment Technologies” – AVEX – The  
Cooler Show – April 26, 2007

“Applications and Pilot Testing Revisited” – Texas A&M 2007 Membrane & Separations  
Technology Conference – April 3, 2007

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“Membrane Technology Fundamentals” - WQA Aquatech USA –  
March 28, 2007

“An Emerging Innovative Disinfection Technology” – AFS Annual Conference  
Emerging Technology Session – March 27, 2007

“Hollow Fiber Membrane Technology” - WQA Aquatech USA –  
March 27, 2007

## **2006**

“An Innovative Ozone Technology”, Aquatech – Amsterdam –  
September 29, 2006

“The Latest in Water Treatment Instrumentation”, Aquatech – Amsterdam –  
September 28, 2006

“Water Reuse Technologies – The Wave of the Future”, Aquatech – Amsterdam –  
September 27, 2006

“POU/POE Treatment in North America – Market and Technology Trends”, Aquatech –  
Amsterdam – September 26, 2006

“Applications and Pilot Testing” - Practical Membrane Technology Short Course –  
May 19, 2006.

## **2005**

“Water Reuse: Needs, Opportunities, Technologies” 51<sup>st</sup> Chem. Show Educational  
Conference, Nov 1, 2005.

“Membrane System Design Workshop,” 66<sup>th</sup> Annual International Water Conference, Oct  
13, 2005.

“Membrane Technologies for Water Reuse Applications”, 66<sup>th</sup> Annual International  
Water Conference, Oct. 12, 2005.

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“Membrane System Design Workshop”, WQA Aquatech USA 2005, The International Exhibition & Conference on Water Technology, April 1, 2005.

“Applications and Pilot Testing” Membrane & Separations Technology 2005 (Texas A&M) March 31, 2005.

Ongoing Lecturer: “Process Piping Systems” workshop presented annually by the University of Wisconsin-Madison.

## 2004

“Membrane Troubleshooting,” 64<sup>th</sup> Annual International Water Conference, October 23, 2004

“Membrane System Design Workshop,” 64<sup>th</sup> Annual International Water Conference, October 22, 2004

“Membrane Separation Technologies for Industrial Water Reuse,” 64<sup>th</sup> Annual International Water Conference, October 20, 2004

“A Review of Membrane Technologies for Water Reuse Applications,” Ultrapure Water Europe, September 28, 2004.

“Membrane Technologies for Wastewater Treatment: Design & Testing Challenges,” Membrane & Separations Technology 2004 (Texas A&M) April 14, 2004

“Industrial Membrane Technology,” 30<sup>th</sup> Annual Water Quality Association Convention, March 17, 2004

## 2003

“Selective Removal of Toxic Antimony from Drinking Water using Reverse Osmosis Technology”, Journal – ARS Separatoria Aeta, 2 (2003), with Z. Pawlak, G. Robiega, L. Scanlan

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“Waste Treatment with Tubular Membranes – A Case History,” The 2003 Twentieth Annual Membrane/Separations Technology Planning Conference, December 1, 2003

“Membranes for Industrial Water Reuse,” 50<sup>th</sup> Edition Chem. Show, November 19, 2003

“Membrane System Design,” ASPE 2003 Technical Symposium, October 31, 2003

“Membrane System Design, Operation and Maintenance Issues,” Water Quality Association of Wisconsin Annual Convention and Trade Show, September 27, 2003

“Water Treatment & Recycling Technologies for Dairies,” Virginia Cooperative Extension Dairy Technology and Conservation Tour, June 19, 2003

“POU and Commercial RO Basics and System Design Issues,” WQA Water Quality Technology Seminar, May 9, 2003

“Commercial and Industrial Membrane Technology Workshop,” 29<sup>th</sup> Annual Water Quality Assn. Convention, March 19, 2003

## 2002

“The Latest in Membrane Separation Technologies for Wastewater Recycling,” Industrial Water Conference, December 11, 2002

“The Latest in Membrane Technologies for Wastewater and Chemical Processing,” The 2002 20<sup>th</sup> Annual Membrane/Separations Technology Planning Conference, November 18, 2002

“Membrane Technologies – A Primer,” AquaTech 2002, October 2, 2002

“Membrane Technology Basics and System Design Issues,” WQA Water Quality Seminar, July 18, 2002

“Water Treatment Technologies,” CM Expo 2002, June 24, 2002

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“Ozone Treatment of Groundwater,” (with Phil Olsen), MWQA Dealer Meeting, April 19, 2002

C & I Membrane Separations Seminar, WQA 28<sup>th</sup> Annual Convention and Exhibition, March 6, 2002

## 2001

“Membranes for Wastewater Treatment – Polymer and Device Configuration Choices,” the 2001 Nineteenth Annual Membrane/Separations Technology Planning Conference, December 4, 2001

“Reverse Osmosis Membrane System Design” (Workshop), ASPE 2001 Technical Symposium, November 2, 2001.

“Considerations in RO Membrane Cleaning and Maintenance,” Water Quality Technology Seminar, October 26, 2001

“Membrane Technologies for Drinking Water and Wastewater Treatment Applications” (Workshop), Third NSF International Symposium and Technology Expo, April 22, 2001.

Membrane Separations Seminar, WQA 27<sup>th</sup> Annual Convention and Exhibition, March 30, 2001

## 2000

“Membrane Technologies – A Primer,” WQA WAD Seminar at AquaTech 2000, September 27, 2000

“Advancements in Membrane Technologies for Pollution Control,” Chemical Engineering Expo, June 8, 2000

“Ozone Treatment of Groundwater Contaminants,” Water Quality Association 26<sup>th</sup> Annual Convention and Exhibition, March 22, 2000

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“Membrane Separation Technologies for Industrial Waste Minimization and Wastewater Recycling,” AFS Thirteenth Annual Technical Conference and Exposition, March 15, 2000

## 1977-1999

“Membrane Technologies for Cheese Plant Total Effluent Treatment,” The 1999 Seventeenth Annual Membrane Technology/Separations Planning Conference, December 7, 1999

“The Role of the USEPA Environmental Technology Verification (ETV) Initiative in Verifying Performances of POU-POE Technologies,” AWWA Water Quality Technology Conference and Exhibition, November 3, 1999.

“Reverse Osmosis Membrane System Design Workshop,” ASPE 1999 Technical Symposium, October 30, 1999

“An Overview of Sanitization Concerns in the Semiconductor Industry,” Ultrapure Water Expo '99, April 8, 1999

“Wastewater Treatment,” 1999 Annual Technical Conference of The AFS Society: April 6, 1999

“Membrane Separation Technologies – Opportunities in Small Systems Applications,” Association of State Drinking Water Administrators Thirteenth Annual Conference, October 7, 1998

“Residential RO Workshop,” WQA Midstates Education Conference, July 16, 1998

“Membrane Separation Technologies for Cleaning Process Wastewater Treatment,” CleanTech '98, May 19, 1998

“Membrane Separation Technologies – Practical Applications,” Safe Drinking Water in Small Systems, May 12, 1998

“Commercial/Industrial RO Workshop,” 24th Annual Water Quality Association Convention & Exposition, March 21, 1998

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(In Reverse Chronological order)

“Membrane Technologies for Water Reuse,” The 1997 Fifteenth Annual Membrane Technology/Separation Planning Conference, October 29, 1997

“High Purity Water Production – Technologies & System Design Workshop,” 1997 ASPE Technical Symposium, September 28-29, 1997

“Municipal Wastewater Reuse for Industrial Applications: An Indian Experience” (Poster), TAPPI 1997 International Environmental Conference & Exhibit, May 5, 1997

“The Role of Membrane Technology in Water Purification Applications”/“Crossflow Filtration for Environmental Compliance,” (2 papers), AFS Annual Technical Conference and Expo, April 30, 1997

“The Role of Membrane Separation Technologies in Water Purification and Wastewater Treatment” (Tutorial), Precision Cleaning '97, April 15, 1997

“Reverse Osmosis System Workshop” – 23rd Annual Water Quality Association Convention, March 19, 1997

“Membrane Separation Technologies for Environmental Compliance,” U.S. EPA Region 5 Waste Minimization/P2 Conference, February 26, 1997

“Municipal Wastewater Reuse in India – A Case History,” The 1996 Fourteenth Annual Membrane Technology/Separations Planning Conference, October 30, 1996

“Microorganism Contamination of Residential Drinking Water – A Global Problem,” World Plumbing Conference – IV, October 6, 1996

“Membrane Separation and Other Advanced Technologies for In-Process and Water/Wastewater Reuse Applications,” Three week training module presented at The National Productivity Council, Madras, India, November 1995

“Predicting the Filterability of Ground Water for Small Systems” (with Lawrence R. Henke), AWWA Annual Conference, June 20, 1995

“Advanced Technologies for Aqueous Cleaner Wastewater Treatment,” Precision Cleaning 1995, May 15, 1995

# **PAPERS AND LECTURES**

Delivered by

**PETER S. CARTWRIGHT, P.E.**

(In Reverse Chronological order)

“Worldwide Microbiological Concerns and Treatments” (with Charles P. Gerba, Ph.D.), WQA Convention, March 17, 1995.

“Latest Trends in Liquid Waste Processing with Membranes,” Twelfth Annual Membrane Technology/Separations Planning Conference, October 18, 1994

“The Application of Membrane Technologies to Industrial Pollution Control,” AICHE 1994 Summer National Meeting, August 15, 1994

“Membrane Technologies for Industrial Pollution Control,” Hazmacon '94 Conference, March 30, 1994

“Membrane Processes: Relationships and Applications,” WQA Convention, March 18, 1994

Lecturer for “Pharmaceutical Water, PHA-1,” and lecturer for “Pharmaceutical Filtration, PHA-2,” Annual Meeting of the Fine Particle Society Short Courses and Particulate/Powder and Pharmaceutical Technology Exhibition

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**PETER S. CARTWRIGHT, P.E.**

(In Reverse Chronological order)

“High Purity Water System Design,” 1994 TWQA Annual Meeting, June 24, 1994

“The Changing Climate – Opportunities For Membrane Technologies in Industrial Pollution Control,” AIChE 1993 Summer National Meeting, Hybrid Membrane Processes for Material Recovery & Pollution Control, August 24, 1993

“Pharmaceutical Waters and Pharmaceutical Filtration,” First International Conference on Pharmaceutical and Food Sciences and Technology, August 23-29, 1993

“Membrane Technologies for Industrial Applications,” Midwest WQA Convention, July 15-17, 1993

Panel, “Ask The Experts,” WQA Convention – Aquafest '93, March 16-21, 1993

Lecturer for “Beyond The Basics In Membrane Technology” workshop presented semi-annually by Ultrapure Water Journal, 1988-1992

Discussion paper on “Makeup Water Treatment Incorporating Electrodeionization along with Triple Membrane Treatment at Grand Gulf Nuclear Station,” International Water Conference, October 20, 1992

“Waste Treatment With Membranes – Trends and Opportunities,” Tenth Annual Membrane Technology/Separations Planning Conference, October 15, 1992

“Pollution Control Applications for Membrane Technologies,” European Congress and Exhibition of Membranes and Membrane Technologies, October 7, 1992

“Membrane Separation Technologies for Hazardous Waste Management”, Ecoworld '92, June 14, 1992

Tutorial – “Membranes for Pollution Control,” American Filtration Society Exposition and Annual Meeting, May 13, 1992

“Emerging Pollution Prevention Opportunities for Membrane Separation Technologies,” The Environmental Technology Exposition and Conference, April 7, 1992

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(In Reverse Chronological order)

“Industrial Wastewater Treatment with Membranes – A United States Perspective,” IAWPRC Specialized Conference on Membrane Technology in Wastewater Management, March 2, 1992

“Case Histories – Membranes for Pollution Control,” AICHE Annual Meeting, Third Topical Conference on Emerging Technologies in Materials, November 20, 1991

“Waste Reduction/Recovery – The Rush Is On,” Ninth Annual Membrane Technology/Planning Conference, November 5, 1991

“Microorganisms & Membranes – The Challenges and Opportunities,” American Society 1991 National Meeting, October 23, 1991

“Membrane Technologies for Pollution Control – A System Design Primer,” Filtech Europa 91, October 15-17, 1991

“Membrane Processing System Design – HMC-Northeast 191 Conference & Exhibition, July 10-12, 1991

“Ultrapure Water System Design – Issues, Decisions and Compromise,” American Filtration Society Annual Meeting (Fine Particle Filtration & Separation), April 22-24, 1991

“Zero Discharge/Water Reuse – The Opportunities for Membrane Technologies in Pollution Control,” 5th World Congress/12th European Symposium – Desalination & Water Reuse, April 15-18, 1991

“The Application of Membrane Separation Technology to Industrial Wastewater Treatment,” The Environmental Technology Expo, April 8-11, 1991

“Waste Reduction/Recovery Is Good Business,” National Association of Metal Finishers, March 4, 1991

“Operating Membrane Systems for Different Applications,” International Specialized Conference on Industrial Wastewater Treatment and Disposal, November 20-21, 1990

“Effluent Treatment With Membranes,” The 1990 Eight Annual Membrane Technology/Planning Conference, October 16, 1990

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**PETER S. CARTWRIGHT, P.E.**

(In Reverse Chronological order)

“Membrane for Industrial Wastewater Treatment – A Technical/Application Perspective,” The 1990 International Congress on Membranes and Membrane Processes, August 21, 1990

“Membrane Separation Technologies in Pollution Control Case Histories,” The 1989 Battelle International Symposium on Solid/Liquid Separations, December 5-7, 1989

“Past, Present and Future of Membrane Technology,” International Water Conference, October 23-25, 1989

“Operating Membrane Systems for Different Applications,” The 1989 Seventh Annual Membrane Technology/Planning Conference, October 17-19, 1989

“From Pilot to Production – Challenges of System Design & Scale-up,” International Technical Conference on Membrane Separation Processes, May 24, 1989

“The Opportunities for Membrane Separation Technologies in Pollution Control Applications,” 44th Annual Purdue Industrial Waste Conference, May 11, 1989

“The Point-of-Use Drinking Water Market – Opportunities and Challenges,” Profiting from Water Conference, May 10, 1989

“Pure Water System Design,” ASPE 1988 Convention and Exposition, November 14, 1988

“Opportunities for Membrane Technologies in Pollution Control,” The 1988 Sixth Annual Membrane Technology/Planning Conference, November 2, 1988

“Application of Membrane Separation Technologies to Metal Finishing Effluent,” 12th Annual World Congress on Metal Finishing, October 4-7, 1988.

“Membrane Separation Processes for Industrial Effluent Treatment,” 3rd International Gothenburg Symposium on Chemical Treatment, June 2, 1988

“The Application of Membrane Separation Technologies to Industrial Processes,” 43rd Annual Purdue Industrial Waste Conference, May 10, 1988

“Application of Membrane Processing Technologies for Heavy Metals Removal,” HazMat 88 Central, March 15, 1988

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**PETER S. CARTWRIGHT, P.E.**

(In Reverse Chronological order)

“Membrane Systems Engineering: Where It’s At and Where It’s Going,” The 1987 Fifth Annual Membrane Technology/Planning Conference, October 23, 1987

“Membrane Processing Technologies for Toxic Effluent Treatment,” Elmia Water ’87, Seventh International Trade Fair on Water Management and Supply, October 13, 1987

“Effluent Contamination Control by Membrane Separation Processes,” Filtech Conference, September 25, 1987

“Ultrapure Water System Design Considerations,” 3rd World Congress on Desalination and Water Reuse, September 15, 1987

“Economics and Design Factors in the Application of Reverse Osmosis to Metal Finishing Solute Recovery,” Sur/Fin ’87, July 15, 1987

“The Application of Point-of-Use Devices to Potable Water Treatment,” AWRA Conference and Symposium, Water and Human Health, November 11, 1986

“The Application of Membrane Separation Technologies for Contaminated Groundwater Treatment,” September 23, 1986

“Latest Applications of Membrane Technologies for Industrial Effluent Treatment,” The Fifth International Symposium on Synthetic Membranes in Science and Industry, September 5, 1986

“Membrane Technologies for Treatment of Industrial Discharges,” American Institute of Chemical Engineers 1986 Summer National Meeting, August 25, 1986

“The Latest Applications of Membrane Separation Technologies to Industrial Effluent Treatment,” First Biennial Conference National Water Supply Improvement Association, June 10, 1986

“Industrial Effluent Applications of Membrane Separation Technologies,” First International Conference of Separation Science and Technology, April 15-17, 1986

“Membrane Separations Technology for Industrial Effluent Treatment – A Review,” Second World Congress on Desalination and Water Reuse, November 1985

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**PETER S. CARTWRIGHT, P.E.**

(In Reverse Chronological order)

“The Application of Membrane Separations Technology for Water Effluent Treatment,”  
First Asian Water Technology Conference, November 6, 1985

“New Advances in the Use of Membranes for Wastewater Treatment,” 1985 Third  
Annual Membrane Technology/Planning Conference, October 30, 1985

“The Application of Membrane Technology to Industrial Effluent Treatment,” 58th  
Annual Conference of the Water Pollution Control Federation, Industrial Waste  
Symposia, October 7, 1985

“The Application of Membrane Technology for Removal of Toxic Contaminants from  
Industrial Effluent Streams,” 5th International Conference of Heavy Metals in the  
Environment, September 11, 1985

“The Status of Ultrafiltration & Microfiltration Applications for the Metal Finishing  
Industry,” American Exhibit of Surface Finishing, July 17, 1985

“Membrane Separations Opportunities in the Biotechnology Industry,” Achema '85  
International Meeting on Chemical Engineering, June 11, 1985

“Membrane Processing for Removal of Toxic Metal from Metal Finishing Printed Circuit  
& Semi-Conductor Effluent Streams,” Membrane Technology 1985, Poster Presentation,  
May 28-30, 1985

“Membrane Fouling – Causes and Remedial Action,” 16th Annual Meeting of the Fine  
Particle Society, April 24, 1985

“Reverse Osmosis for Toxic Rinse Water Treatments,” The Institute of Metal Finishing  
Technical Conference, April 18, 1985

“Monitoring Point-of-Use Devices,” Water Quality Association Annual Convention and  
Exposition, March 7, 1985

“An Overview of Membrane Separation Applications for the Metal Finishing Industry,”  
6th AES/EPA Conference & Exhibit of Pollution Control for the Metal Finishing  
Industry, January 29, 1985

“Application of Innovative Technologies to Reclaim High Quality Semi-Conductor Rinse  
Waters,” The International Water Conference, October 24, 1984

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**PETER S. CARTWRIGHT, P.E.**

(In Reverse Chronological order)

“Total Waste Treatment in a Printed Circuit Manufacturing Facility,” Water Pollution Control Federation Industrial Wastes Symposia, October 3, 1984

“Total Effluent Treatment & Rinse Water Reclamation in a Semi-Conductor Device Manufacturing Facility,” 12th Biennial International Conference on Water Pollution Control, September 20, 1984

“Innovative Technology to Treat Toxic Wastes from a Thin Film Head Manufacturing Facility – A Case History,” Water Reuse Symposium III, August 27, 1984

“High Purity Water Reclamation in an Electronic Device Manufacturing Facility,” Water Supply Improvement Association 12th Annual Conference, May 14, 1984

“Total Effluent Treatment & Rinse Water Reclamation in a Manufacturing Facility Producing Integrated Devices,” AES/EPA Fifth Conference on Pollution Control for the Metal Finishing Industry, January 31, 1984.

“What’s New with Reverse Osmosis in Metal Finishing Waste Treatment,” American Electroplaters’ Society, Sur/Fin ’83, June 28, 1983

“Latest Advances in Reverse Osmosis Electroplating Rinse Water Reclamation,” American Electroplaters’ Society Federal/State/Municipal, Industrial Waste Management & Control Conference for the Surface Finishing Industry, January 11, 1983

“The Status of Reverse Osmosis and Ultrafiltration in Metal Finishing Recovery and Reuse,” Water Pollution Control Federation Conference, October 5, 1982

“Reverse Osmosis and Ultrafiltration for Metal Finishing Waste Treatment – A Status Report,” Water Supply Improvement Association Conference, July 29, 1982

“Reverse Osmosis Treatment of Electroplating Rinse Water – A Review,” AICHE Symposium, November 15, 1978

“Ultrafiltration Utilizing Spiral Wound Separators”, 15th Annual Liberty Bell Corrosion Course, September 14, 1977