



## CONTENTS:

---

Food .....	1
Chemicals, Petroleum and Natural Gas .....	2
Materials Fabrication.....	3
Materials Production.....	4
Municipal Water & Wastewater .....	4
Healthcare .....	5
Agriculture.....	5
New Communications Products Listing.....	6
Calendar of Events .....	7

---



October 1999

## FOOD

### PROJECT UPDATES

#### Membrane Test and Demonstration Unit

Dr. Jatal D. Mannapperuma, UC-Davis, reports the following project update. Water has become a costly commodity and disposal of effluents a serious environmental concern for industries nationwide. California food industry identified membrane filtration as a possible solution to these concerns. A membrane test and demonstration unit (MTDU) was constructed in 1992 to demonstrate the potential of this technology. The Electric Power Research Institute (EPRI) became the primary sponsor of this unit and its activities were extended nationwide and to support all industries. The unit was supplemented with prefiltration, ozonation and flotation equipment to enhance its versatility.

The MTDU has conducted test and demonstration work with over 100 industries in eighteen states and demonstrated the applications of membrane technology to reduce water, energy and chemical use; reduce effluent discharge and recover byproducts. The work done by the unit includes the study of present water use practices, identification of potential membrane applications, conducting membrane treatment trials with selected streams, selecting suitable membranes for each application, and evaluating technical and economic feasibility.

Several industries have successfully commissioned installations based on the work done by this unit. Zero discharge in black ripe olive process, sugar recovery from raisin wash water and starch recovery in potato processing are some of these applications. Recent work by the unit has demonstrated attractive membrane applications in textile, electroplating, pulp and paper and many other non-food industries.

The present trends of increasing fresh water and disposal costs coupled with more stringent quality criteria for fresh water supply and effluent discharge should make application of membrane technology more attractive. The wealth of experience gathered by the Membrane Test and Demonstration unit is expected to play a key role in the widespread use of this technology.

#### Postharvest Pathogens of Fresh Produce with Ozonated Water

Updating the Food Technology Alliance (FTA) project on the Control of Postharvest Pathogens of Fresh Produce with Ozonated Water, Dr. J. L. Smilanick, USDA-ARS, Horticultural Research Laboratory, reports the following:

Ozone (O<sub>3</sub>) has been used as an alternative to hypochlorite as a disinfectant or sanitizer for a variety of food products and it may perform other tasks that currently require pest-control chemicals such as fungicides or fumigants. Its primary advantages are that O<sub>3</sub> in water decomposes quickly to oxygen, leaving no residues and has more potency against bacteria, cysts of protozoa, viruses and fungal spores than hypochlorite. In 1997, an expert panel reviewed the safety and potential for O<sub>3</sub> use in food processing and declared ozone to be Generally Recognized As Safe (GRAS) for food contact applications (U.S. FDA 1997). Their declaration of GRAS status for O<sub>3</sub> and its use on food products in the United States were submitted to the Food and Drug Administration. Since that time, interest in developing O<sub>3</sub> applications in the food industry has increased. In the mid-1990s, O<sub>3</sub> was approved for food processing in Japan, France and Australia.

In 1998, the USDA-ARS (United States Department of Agriculture- Agricultural Research Service) Horticultural Crops Research Laboratory in Fresno began research to evaluate some possible uses of O<sub>3</sub>. In preliminary tests, O<sub>3</sub> doses in water that kill spores of the most important postharvest fungal pathogens that destroy fresh produce were determined, and the influence

FOR ADDITIONAL INFORMATION CALL U.S. & CANADA 800-313-3774 (EXT. 4) • INTERNATIONAL 650-855-2121 (EXT. 4)



of pH and  $O_3$  level on  $O_3$  potency was examined. Later, the evaluation of the control of these pathogens inoculated artificially or naturally on several fresh fruits (citrus fruit, table grapes, and stone fruit) was started and more practical tests to extend product shelf-life were planned for the future.

$O_3$  was made from  $O_2$  with corona discharge unit.  $O_3$  dissolved in water in contactor tank attached to a 1000-L tank.  $O_3$  content was monitored with an  $O_3$  electrode and did not change during tests.  $O_3$  also was measured by oxidation of indigo blue to verify the  $O_3$  rate periodically and calibrate the  $O_3$  electrode. Ozonated water pH was 6.4 in spore mortality tests, except when intentionally adjusted to pH 5 or 8 with  $H_2SO_4$  or KOH in water buffered with 2 mM  $Na_2HPO_4$ . Fungi (*Penicillium digitatum*, *Penicillium italicum*, *Monilinia fructicola*, *Rhizopus stolonifer*, *Botrytis cinerea*, and *Geotrichum citri-aurantii*) were cultured on potato dextrose agar (PDA) for 2 wk, then spores were rubbed from colonies with a glass rod in 2 ml water, centrifuged, and suspended in water at 106 spores/ml. A 0.2 ml aliquot was placed on a 3- $\mu$  pore size filter, low-pressure vacuum dried it, then 1 - 4  $\mu$ g/ml  $O_3$  flowed through the spores at 1.6 ml/sec. To end exposure, 3 ml of 1000  $\mu$ g/ml calcium thiosulfate was added, then 5 ml water. The filter was dried, removed, inverted and placed on and removed from PDA, where the spores were deposited. After 14 - 24 hr at 20°C, germination was recorded. Whole fruit (lemons, oranges, table grapes, and peaches) were inoculated artificially or treated without inoculation by immersion of the fruit in metal inside a 1000-L tank containing  $O_3$  up to 10  $\mu$ g/ml.

Two min in 1.5  $\mu$ g/ml  $O_3$  killed 95-100% of spores, and none of the seven fungi tested survived 3 min treatment. Spores died similarly at pH 5 and 8. LD50 times of *P. digitatum* spores in 1, 2 and 4  $\mu$ g/ml  $O_3$  were 21.6, 10.4, and 6.4 sec, respectively. LD50 CTs were 21.6, 20.8, and 25.6  $\mu$ g/ml x sec, respectively. When citrus fruit inoculated with *Penicillium digitatum* or *Geotrichum citri-aurantii*, causes of green mold and sour rot, respectively, incidence of these diseases was reduced only slightly, even after very prolonged  $O_3$  treatment. However, the addition of 3% sodium bicarbonate to the  $O_3$  affected a reduction of more than 95% in the incidence of green mold. When table grapes inoculated with *Botrytis cinerea*, causes of gray mold, the incidence of rotten berries was reduced about 50% by 5  $\mu$ g/ml  $O_3$  for several minutes in repeated tests. When peaches were artificially inoculated with *Monilinia fructicola* or *Rhizopus stolonifer*, causes of brown rot and rhizopus rot, respectively, the incidence of rotten fruit was not reduced. However, the incidence of brown rot among naturally inoculated fruit that were treated with  $O_3$  was reduced markedly, as much as 85%, although small pits were caused on peaches by treatments that reduced brown rot. Future testing will include  $O_3$  at cooler temperatures (all of the work reported is a room temperature) and in combination with compatible sanitizers or other oxidants.

For more information on the above projects, contact Chuck Sopher at the Agricultural Technology Alliance through EPRI CAC.

## UPCOMING MEETING

### Midwest Food Processors Association 95th Annual Convention & Midwest EXPO "99"

Mark your calendars to attend the Midwest Food Processors Association, Inc., 95th Annual Convention & Midwest EXPO "99", December 1-2, 1999 at the Midwest Express Center, Milwaukee, Wisconsin. The EPRI Food Technology Alliance-sponsored exhibit booth will feature food technologies. The Midwest Food Processors Association is a results-oriented trade association providing its member companies with information on government regulations, technical affairs and industry matters.

For more information on the above projects, contact Chuck Sopher at the Agricultural Technology Alliance through EPRI CAC.

## CHEMICALS, PETROLEUM AND NATURAL GAS

### PROJECT UPDATES

#### Direct Osmosis Concentration of BioSludge

This technology was first applied for applications such as concentration of tomato paste and wine. In mid 1998, the technology was commercially applied for landfill leachate concentration at 5 Tons/hr (0.5 MW). The technology is ideal for biosludge concentration due to its high tolerance for free solids.

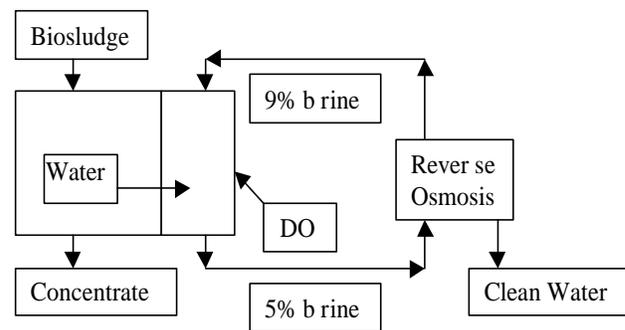


Figure 1: Direct Osmosis System

For more information on this project, please contact Sam Woinsky at 281-419-1122, fax 281-419-0811, e-mail [epripcpl@ix.netcom.com](mailto:epripcpl@ix.netcom.com).

#### Advanced Distillation

The Advanced Distillation technology is making inroads in Europe. The technology has the potential for doubling capacity at half the



cost of conventional means in many revamp situations, while halving the energy required per pound of product. The technology also has the potential for increasing electric load in separation of liquids from gases (propylene recovery from cat cracker off-gas, natural gas liquids recovery, etc.).

For more information on this project, please contact Sam Woinsky at 281-419-1122, fax 281-419-0811, e-mail [epripcpl@ix.netcom.com](mailto:epripcpl@ix.netcom.com).

## UPCOMING MEETINGS

### **CWRT/EPRI Water Management Workshop and Chemicals, Petroleum & Natural Gas Target Electric Utility Steering Committee Meeting**

CWRT (Center For Waste Reduction Technologies)/EPRI Water Management Workshop and the CPNG (Chemicals, Petroleum & Natural Gas) Target Electric Utility Steering Committee Meeting are being held on November 10-11, 1999 in St. Louis, Missouri. On Wednesday, November 10th the Workshop will be held from 8:00 am to 5:00 pm at a Monsanto facility near the hotel, and an EPRI sponsored reception will be held from 5:30 pm to 7:30 pm at the hotel. On Thursday, November 11th the Chemicals, Petroleum & Natural Gas Steering Committee Meeting will be held at the hotel from 8:00 am to 4:30 pm, including a Lunch and Speaker from 12:00 noon to 1:30 pm.

Please book your hotel reservations and airline tickets early. Contact the Hilton St. Louis Frontenac Hotel at 314-993-1100. Ask for the AIChE (American Institute of Chemical Engineers) \$85 rate for single/double occupancy, which was guaranteed through October 11th (on as available basis after the 11th). The hotel is located at 1335 South Lindbergh Blvd., St. Louis, MO 63131.

The Workshop on the 10th is at Monsanto, Creve Coeur Campus, 800 North Lindbergh Blvd. The hotel provides a van service to Monsanto. If you will be driving, directions from the hotel: north on Lindbergh and turn right on Monsanto Drive, then follow Monsanto Drive and veer to the left to park in the first lot on the left. The workshop will be held in the "D" Building.

The workshop is open to the public for a nominal charge of \$55 in the form of a check payable to AIChE-CWRT, and mailed to the EPRI Chemical, Petroleum & Natural Gas Center, Attn: Sam Woinsky, 47 Quiet Oak Circle, The Woodlands TX 77381. Please provide full contact information (name, company name, company address, phone, fax and e-mail address).

The Steering Committee Meeting is only open to employees of members of the CPNG Target. If you are signing up for just the Steering Committee Meeting, please e-mail the above information to Sam Woinsky at [epripcpl@ix.netcom.com](mailto:epripcpl@ix.netcom.com) and copy Lynn Stone at [lstone@epri.com](mailto:lstone@epri.com). If you are signing up for the Water Management Workshop, please e-mail your sign

up information to the above in addition to mailing it. If you prefer to fax, please fax to 281-419-0811. Sign up forms are available upon request by contacting Sam Woinsky.

## MATERIALS FABRICATION

### PROJECT UPDATES

#### **Vacuum Furnaces for Heat Treating, Brazing and Sintering**

A wide variety of electric and fuel-fired furnace types are being used for materials processing, each with its advantages and disadvantages. One furnace type that is enjoying an increase in usage is the electric vacuum furnace. Electrically heated vacuum furnace technology provides more precise control, improved reliability and repeatability; thus meeting the need for more demanding quality requirements. The connected electric load for this type of furnace is typically in the range of 40kW to 300 kW. The high temperature electric vacuum furnace is an excellent replacement for salt bath heat treating, brazing and sintering applications. Additional information on this subject is available in the Center for Materials Fabrication (CMF) TechCommentary, "[Vacuum Furnaces for heat Treating, Brazing, and Sintering" \(TC-113555\)](#)". (Click on the blue link to download this publication).

#### **IR Curing of Coatings on Steel Strapping**

CMF, working with Commonwealth Edison (ComEd) and Gerrard & Company, was able to identify equipment that would meet Gerrard's goals in retrofitting their curing ovens to meet increased sales demands. Gerrard, a manufacturer of packaging supplies and equipment, including steel strapping used to secure products on pallets during shipment, was running at maximum capacity of their existing ovens and needed new ovens that would meet their current and future goals. When looking for new ovens, Gerrard wanted to install state-of-the-art curing ovens that would enable them to meet increased production needs, reduce emissions, provide a safer workplace for their employees, and improve the quality of their products. CMF conducted a thorough study of the Gerrard Facility, conferred with several coatings and equipment suppliers, and investigated drying and curing methods within the strapping industry. CMF consultants identified best practices within the industry and recommended new technology short-wave electric IR ovens for drying and curing the protective finish coatings. Gerrard installed the short-wave ovens, which run at a minimum of 300 FPM (feet per minute) and provide a thorough cure in 4 seconds. By meeting their goals in replacing the curing ovens, Gerrard has improved overall profitability of the company.

For more information on the above projects, contact the Center for Materials Fabrication through EPRI CAC.

FOR ADDITIONAL INFORMATION CALL U.S. & CANADA 800-313-3774 (EXT. 4) • INTERNATIONAL 650-855-2121 (EXT. 4)



## Effects of IR on Curing of Powder Coatings

CMF is working with the University of Southern Mississippi Polymer Science Center to determine the effects of IR on Curing of Powder Coatings. Test protocols have shown that IR (at least short-wave IR) has a detrimental effect on polyurethane coatings that contain isocyanates blocked with epsilon caprolactam. The e-cap tends to settle on the surface of the coating and cause cloudiness and discoloration. It also appears to inhibit cure and reduce the properties of the coating. USM is now going to test a coating containing a self-blocked isocyanate to see if it eliminates the problem. Preliminary results with other types of coatings (polyesters, epoxies, acrylics, hybrids) have not disclosed any detrimental effects. The next step is to test different fillers and extenders to determine if IR absorption can be increased, and properties of the cured film can be enhanced with certain additives. For additional information contact Sal Lovano, CMF, 216-226-3470.

## IR/UV Curable Powder Coatings for Temperature Sensitive Substrates

The IR/UV (infrared/ultraviolet) Curable Powder Coatings Traveling Demonstration Unit (TDU) made its first stops in Birmingham, Alabama and Atlanta, Georgia the week of August 23rd. Both stops were highly successful with more than 80 people attending the seminars and demonstrations. The TDU was also at Coatings '99 in Dallas the week of September 20th and is fully booked for the month of October. The TDU consists of powder coatings application and recovery equipment, conveyors, and a combination electric IR/UV curing oven. CMF, in collaboration with suppliers of coating application systems, IR/UV equipment and UV curable powder coatings, has launched this project to promote IR/UV curable powder coatings as a VOC compliant alternative for metal, plastic and wood substrates. The equipment will continue to be available for demonstrations until the end of March 2000. For further information contact Sal Lovano, CMF, 216-226-3470.



*More than 80 participants took advantage of the live demonstrations of IR/UV curable powder coatings during the Travelling Demonstration Unit's (TDU) stops in Atlanta, Georgia and Birmingham, Alabama.*

## MATERIALS PRODUCTION

### PROJECT UPDATE

#### Nonferrous Metal Melting Model

In 1994, EPRI published a spreadsheet-based economic modeling tool for nonferrous metal melting. That model, released as a Center for Materials Production (CMP) Report ([CR-104172](#)), allows comparison of the operating costs of gas reverberatory, electric reverberatory, and induction melting furnaces. A project to update the nonferrous melting model, both in terms of melting technologies and user interface has been initiated by EPRI CMP. The new technologies to be included in the model are direct current (DC) plasma, Jet-fire<sup>®</sup> burner, regenerative burner, oxy-fuel and channel induction. Other technologies identified in the research will also be included if sufficient operating data is available from commercial installations. For future updates, the flexibility for adding new technologies will be incorporated in the model. The economic analysis model will allow the user to create various scenarios based on values for: labor rates, fuel costs, charge makeup, refractory type, environmental costs and capital costs. The model will then calculate operating costs for the melting methods selected.

Please click on the blue link to order the above report, or for more information on this project, contact the Center for Materials Production through EPRI CAC.

## MUNICIPAL WATER & WASTEWATER

### PROJECT UPDATE

#### Demonstration of Membranes for Reclamation of Wastewater Effluent in Texas

The Municipal Water and Wastewater (MWW) Program, along with Central & South West Corp., is sponsoring an assessment of a membrane process to reclaim wastewater in the City of McAllen, Texas. The City obtains its water from a reservoir that is fed by the Lower Rio Grande River. The river, at this point, is highly polluted with industrial and municipal waste as several large cities on the Mexican side of the river have inadequate wastewater treatment capabilities. McAllen currently discharges treated wastewater from the City's Wastewater Treatment Plant No. 2 directly into the river. This water is of higher quality than raw river water. Given the scarcity of water in the region, the City seeks to reclaim this water for indirect potable reuse by using microfiltration and reverse osmosis (RO). The City has done bench-scale testing

FOR ADDITIONAL INFORMATION CALL U.S. & CANADA 800-313-3774 (EXT. 4) • INTERNATIONAL 650-855-2121 (EXT. 4)



on the ZenoGem microfiltration system and would like to pursue a pilot investigation. The MWW Program and their electric supplier, Central & South West, worked with the City to develop and finance a project which will pilot test the technology at approximately 6 gallons per minute flow. Results from the pilot study will be used to determine full-scale operation and design of a reclamation plant at the City. In addition, results of this study can be used by other MWW Program members to promote its use in other water-short regions of the country, such as California, Florida and the Northeast.

For additional information on this project, please contact the MWW Center through the EPRI Customer Assistance Center.

## HEALTHCARE

### PROJECT UPDATES

#### Mercy Regional Medical Center

Mercy Regional Medical Center of Laredo, Texas is a collaborative partnership with Central and Southwest Services (CSW) and its subsidiary Central Power and Light (CP&L) and EPRI Healthcare Initiative (HCI). This partnership has provided a unique opportunity to develop an ongoing working relationship between a healthcare customer and a utility which will serve as a model for other healthcare and utility collaborations.

Several objectives were set at the beginning of this project, the most salient of which was to design a hospital that demonstrates an integrated approach to deploying electrotechnologies and thus serve as a demonstration site. The integrated technologies installed in the Mercy Regional Medical Center are as follows: Pneumatic Systems High Efficiency and Ultra Violet Germicidal Lighting Systems, Ozonated Water Treatment Systems/Cooling Water Towers and Laundry Side by Side Kitchens with an Energy Wall.

Mercy Regional Medical Center opened this past August and the data on the technologies being used is currently being collected. The TechApplications and Reports based on that data are expected to be delivered by the end of the first quarter of 2000. Over the next few months, however, we will feature one of the above technologies used in this project, and provide project updates on each. The feature technology for October is the Pneumatic Systems.

In order to meet or exceed all codes and requirements for electrical service, to ensure that appropriate back-up generation was provided, and to ensure that patient care is uninterrupted, the following service requirements were set by Mercy, CSW and CP&L:

- Four 2500 kVA 277/180v distribution transformers
- Two primary feeds with and automatic transfer switch
- Two radially fed separate transformers in a substation

*Pneumatic Systems* - Mercy Regional Medical Center has four pneumatic systems, which have been installed to take materials from the point of origin: patient care areas, storage areas, pharmacy, and management information systems; and transporting them to the point of disposition: patient care areas, laundry, and routine waste disposal. The pneumatic system carries the following materials from the point of origin to the patient care areas or to the point of disposition:

- Soiled laundry excluding red-bag infectious medical waste
- Routine household waste
- Pharmaceuticals
- Patient records

This integrated pneumatic system is unprecedented and a salient feature of the Hospital of the Future project. The demand for hospitals to begin integrating various systems will increase in years to come and the pneumatic system in use at Mercy Regional Medical is a pioneer in how the integration of these types of systems can be successfully used in the healthcare industry. The critical areas of pharmaceutical and patient records hinged on error free and reliable electrical system support. With the active up-front involvement of CSW and CP&L, the requirements necessary to assure the integrity of this system were addressed early and potential problems circumvented.

This project has demonstrated the successful results that can be realized with partnering the end-user and utility to accomplish a common goal.

For more information on this project contact the HCI through EPRI CAC.

## AGRICULTURE

### COMMUNICATIONS PRODUCTS

#### The Effects of High Purity Water on Poultry Enteritis and Mortality Syndrome in Turkeys

*Technical Report* - ["The Effects of High Purity Water on Poultry Enteritis and Mortality Syndrome \(PEMS\) in Turkeys" \(TR-113587\)](#) describes one of the most severe diseases afflicting commercial turkeys in North and South Carolina and Georgia. This report presents the findings of studies conducted at two sites in the Carolinas to determine the effects of purified drinking water in turkey brooder and grow-out barns. In addition, the studies measured the influence of high purity



drinking water on the development and severity of PEMS and were conducted to determine if microorganism-free water would improve livability and performance of market turkeys.

Results of the research indicate that potential benefits can be attained with the use of purified water. Further studies are needed to compare performance of other water purification systems. Potential savings are indicated with the use of purified water.

Please click on the blue link above to download this report, or for further information, contact Chuck Sopher at the Agricultural Technology Alliance through EPRI CAC.

### EPRI's Agricultural and Food Technology Alliances Joint Meeting, Spring 1999

Technical Report - "[EPRI's Agricultural and Food Technology Alliances Joint Meeting, Spring 1999](#)" (TR-113380) is a compilation of the current agricultural and food research project summaries reviewed and presented at the Spring Meeting held in Ithaca, New York, May 10-12, 1999. This report contains field trip reports and the actions and recommendations of the Agricultural and Food Technology Alliances Steering Committees as recorded during their business sessions.

Please click on the blue link above to download this report, or for further information, contact Chuck Sopher at the Agricultural Technology Alliance through EPRI CAC.

## NEW COMMUNICATIONS PRODUCTS

### INSTRUCTIONS FOR VIEWING ALL HYPERLINKED COMMUNICATIONS PRODUCTS

The communications products listed below are available on-line. Just click your mouse on any of the products listed to access the publications on EPRI.com. Follow EPRI.com instructions for printing, ordering and downloading the products of your choice.

NEW COMMUNICATIONS PRODUCTS		
OI#	TITLE	DIST. DATE
<b>Materials Fabrication</b>		
TC-113555	<a href="#">Vacuum Furnaces for Heat Treating, Brazing &amp; Centering</a>	Sep-99
TA-113350	<a href="#">Electric IR Oven Improves Drying and Curing Silk Screen Inks</a>	Jun-99
<b>Materials Production</b>		
TR-113539	<a href="#">Mining Conveyer Systems Marketing Kit</a>	Aug-99
<b>Healthcare</b>		
TR-107833-RI	<a href="#">Background, Trends, Issues, and Opportunities In Healthcare</a>	Sep-99
<b>Municipal Water and Wastewater</b>		
NL-113710	<a href="#">Clear Solutions Newsletter: October 1999</a>	Oct-99
TB-113727	<a href="#">Technologies for Improving Water Desalination</a>	Sep-99
TB-113728	<a href="#">Pulsed UV Light for Drinking Water Disinfection and Membrane Fouling Control</a>	Oct-99
TB-113729	<a href="#">Membrane Pre-treatment of reclaimed wastewater for RO desalination</a>	Oct-99
TE-113657	<a href="#">VARI-RO Desalting Pilot Plant Testing and Evaluation</a>	Sep-99
TR-113528	<a href="#">A Total Energy and Water Quality Management System</a>	Sep-99
<b>Agriculture and Food</b>		
NL-113886	<a href="#">Food Industry Currents - October 1999, Volume 3, Number 5</a>	Oct-99
TR-113587	<a href="#">The Effects of High Purity Water on Poulter Enteritis and Morality Syndrome (PEMS) in Turkeys</a>	Sep-99
TR-113751	<a href="#">Ozone Gas as a Soil Fumigant</a>	Oct-99
<b>Pulp, Paper and Forest Products</b>		
TR-113791	<a href="#">Development of an Online BOD Sensor</a>	Sep-99
TR-113811-V2	<a href="#">Optimal Siting and Control of Aerators in Secondary Treatment Systems Volume 2</a>	Sep-99
<b>Electronics</b>		
TR-113491	<a href="#">Evaluation of Praxair's Perfluorocompound (PFC) Capture/Recovery System</a>	Sep-99
TR-113492	<a href="#">Tool Exhaust Optimization: Good Practices</a>	Sep-99

FOR ADDITIONAL INFORMATION CALL U.S. & CANADA 800-313-3774 (EXT. 4) • INTERNATIONAL 650-855-2121 (EXT. 4)



## EPRI INDUSTRIAL AND AGRICULTURAL TECHNOLOGIES & SERVICES

### BUSINESS SUMMARY:

Responding to the needs of EPRI members and their customers, activities focus on being the Business Partner of our members by delivering products and services that provide competitive advantages in the marketplace:

- ▶ Supporting Customer Retention and Competitiveness
- ▶ Growing Electricity Market Share
- ▶ Offering New Business Opportunities
- ▶ Increasing Customer Value of Electricity
- ▶ Providing Customers with Energy Solutions

**EPRI Customer Assistance Center**  
**771 Dearborn Park Lane, Suite P**  
**Worthington, Ohio 43085-5720**  
**800-313-3774 (ext. 4) & fax: 800-832-9267**  
**International 650-855-2121 (ext. 4) & fax: 614-846-7306**  
**Email: [askepri@epri.com](mailto:askepri@epri.com)**

## EPRI INDUSTRIAL CALENDAR OF EVENTS

### 1999

Oct 20-21	Research Advisory Committee (RAC)	La Jolla, CA
Oct 20	Water & Energy Conference	Nashville, TN
Oct 21-22	Municipal Water & Wastewater Program Meeting	Nashville, TN
Oct 26-27	Chemicals & Petroleum Gas / Electric Partnership Workshop	Houston, TX
Oct 25-26	Materials Fabrication Advisory Council Meeting	Philadelphia, PA
Oct 27-28	Materials Production Advisory Council Meeting	Philadelphia, PA
Oct 28-31	Worldwide Food Expo '99	Chicago, IL
Nov 7-11	International Forum on Electrolysis in the Chemical Industry	Clearwater Beach, FL
Nov 10	CWRT/EPRI Water Mgmt. Workshop: Issues, Technologies & Solutions	St. Louis, MO
Nov 11	Chemicals & Petroleum Steering Committee Meeting	St. Louis, MO
Nov 16-17	Board of Directors Meeting	San Antonio, TX
<b>Dec 1-2</b>	<b>Midwest Food Processors Assn. 95th Annual Convention &amp; Midwest EXPO '99</b>	<b>Milwaukee, WI</b>

### 2000

<b>Feb 7-8</b>	<b>Municipal Water &amp; Wastewater Program Meeting</b>	<b>Long Beach, CA</b>
<b>Feb 9</b>	<b>Water &amp; Energy Conference</b>	<b>Long Beach, CA</b>
<b>Apr 2-6</b>	<b>Second World Congress on Microwave &amp; Radio Frequency Processing</b>	<b>Orlando, FL</b>
<b>Apr 12-13</b>	<b>Board of Directors Annual Meeting</b>	<b>Washington, DC</b>
<b>May 1-3</b>	<b>AFTA (Agricultural &amp; Food Technology Alliance) Spring Meeting</b>	<b>Denver, CO</b>
<b>May 22-26</b>	<b>CEM Users Group Meeting 2000</b>	<b>San Antonio, TX</b>
<b>Jun 21</b>	<b>Water &amp; Energy Conference</b>	<b>Minneapolis, MN</b>
<b>Jun 22-23</b>	<b>Municipal Water &amp; Wastewater Program Meeting</b>	<b>Minneapolis, MN</b>
<b>Oct (TBA)</b>	<b>Municipal Water &amp; Wastewater Program Meeting</b>	<b>Dallas, TX</b>
<b>Oct (TBA)</b>	<b>Water &amp; Energy Conference</b>	<b>Dallas, TX</b>
<b>Nov 2-4</b>	<b>Second EPRI European Conference</b>	<b>Vienna, Austria</b>

**\*Calendar items in bold have been revised or added since last month's Calendar of Events\***

EPRI 3412 Hillview Avenue, Palo Alto, California 94304 USA PO Box 10412, Palo Alto, California 94303 USA  
 800.313.3774 fax 650.855.2121 [askepri@epri.com](mailto:askepri@epri.com) [www.epri.com](http://www.epri.com)

FOR ADDITIONAL INFORMATION CALL U.S. & CANADA 800-313-3774 (EXT. 4) • INTERNATIONAL 650-855-2121 (EXT. 4)