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DECEMBER 1997

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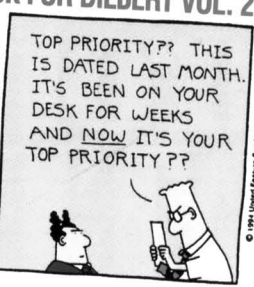
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Environmental PROTECTION

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12/97 BUYING PLANS SURVEY - TRAINING PRODUCTS & MISCELLANEOUS SERVICES

1. Which of the following TRAINING PRODUCTS AND MISCELLANEOUS SERVICES do you plan to purchase in the next 12 months? (select all that apply)

- 800 ISO 9000/14000 Certification
- 801 Training Videos
- 802 Training CD-ROM Products
- 803 Training Manuals
- 804 HAZWOPER Training
- 805 UST Installation/Removal Training
- 806 Software, Compliance Documentation
- 807 Software, Environmental Management

- 808 Software, Regulatory Compliance
- 809 Software, EPA/OSHA Compliance
- 810 OSHA Training
- 811 Radiation Training
- 812 Legal Services
- 813 Insurance, Environmental Liability
- 814 Pollution Prevention Consulting Services

- 817 \$50,001-\$100,000
- 818 \$10,001-\$50,000
- 819 \$5,000-\$10,000
- 820 under \$5,000

2. What is your projected budget for the product(s)/service(s)?

- 815 over \$200,000
- 816 \$100,001-\$200,000

3. How immediate is your need for the selected products/services? (select one)

- 821 3-6 months
- 822 7-9 months
- 823 10-12 months
- 824 over 12 months

SUBSCRIPTION INFORMATION

YES, I would like to receive/continue to receive *Environmental Protection*.

NO, I'm not interested at this time.

Signature _____ Date _____

Title _____

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COMPANY _____

ADDRESS _____ Home Bus.

CITY _____ STATE _____ ZIP _____ ZIP+4 _____

A. Function which best describes your activity in Pollution Control (check only one):

- A Corporate responsibility for Pollution Control
- B Manage all Pollution Control Operations at this location
- C Supervise sub-group in Pollution Control Operations
- D Provide professional consulting service on Pollution Control
- E Provide staff environmental service on Pollution Control
- Z Other _____

- (29) Petrol. & Coal
- (30) Rubber/Plastic
- (38) Instr./meas./analyze/controlling

- C Chemicals
- D Parts & equipment for maintenance operation & control
- E Services/Consulting
- F None of the above _____

- B Mining
- D Engineering & Contracting
- E Utilities, public, private & cooperative
- F Govt. including municipal or district sanitary water or wastewater treatment sys. or plants
- Type of Govt.: _____
- G City H County I State J Federal

- E. What types of Pollution Control are you responsible for? (check all that apply)
- A Air
 - C Noise
 - E Industrial Hygiene
 - F Toxic & Hazardous Material
 - G Energy Control/Energy Conservation
 - H None of the above _____

- K Transportation
- O Training
- Z Misc. Services _____

B. Type of Business (check only one):

- A Manufacturing. If manufacturing, please check the appropriate SIC (check only one):
- (20) Food
- (21) Tobacco
- (22) Textile
- (23) Apparel
- (24) Lumber & Wood
- (25) Furniture
- (26) Paper
- (27) Print/Publish
- (28) Chemicals
- (31) Leather
- (32) Stone/Clay/Glass
- (33) Primary Metal
- (34) Fab. Metal
- (35) Mach., except Elect.
- (36) Elect. & Electron Mach.
- (37) Trans. Equip.
- (39) Miscellaneous Mfg.

- C. Number employed at this location:
- A 1-19
 - D 100-249
 - G 1000-1499
 - B 20-49
 - E 250-499
 - H 1500-2499
 - C 50-99
 - F 500-999
 - I 2500 and up

- D. In your job function do you recommend, specify or purchase? (check all that apply)
- A Pollution Control Equipment
 - B Instrumentation

- F. Which of the following publications do you receive personally addressed to you? (check all that apply)
- A Pollution Engineering
 - B Environmental Today
 - C Environmental Solutions
 - D Pollution Equipment News
 - E The National Environmental Journal
 - F Water Environment & Technology
 - G None of the above _____



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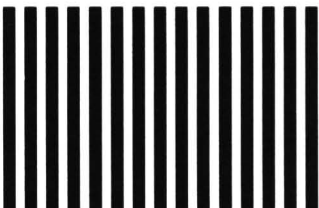
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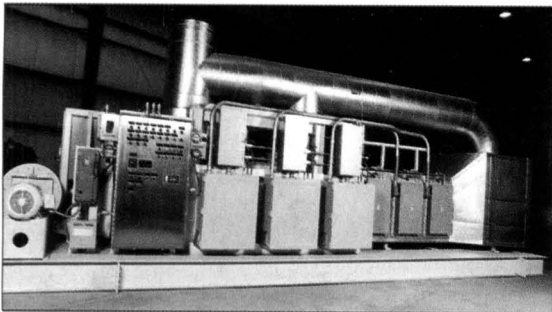
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Regenerative Thermal/Catalytic Oxidizers

- ▼ Capable of $\geq 99.9\%$ destruction efficiency
- ▼ Up to 70% preheat efficiency
- ▼ Used for control of VOC's, HAP's from a wide range of industrial process

Circle 255 on card.



Control of Chlorinated Volatile Organic Compounds (CVOC's)

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- ▼ Skid mounted or trailer mounted
- ▼ Purchase, lease or rent

Circle 256 on card.



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- ▼ Patented mechanical valve drive
- ▼ Turn key systems

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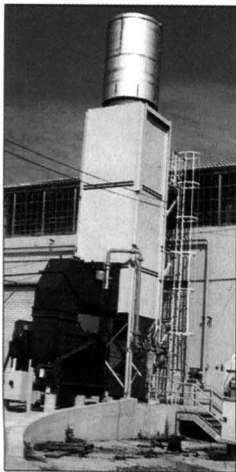


One shoe doesn't fit every foot . . . and one oxidizer technology is not right for every process.

That is why at Advanced Environmental Systems, Inc we evaluate your process and project objectives first. Then we work with you to select the technology that best fits your specific project needs.

Give us a call!

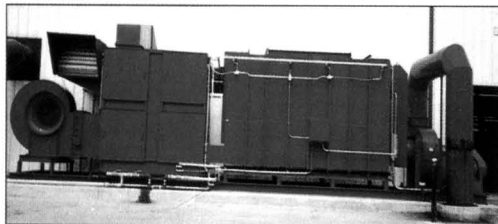
We look forward to helping you make sure your project gets off on the right foot!



Enclosed Oxidizing Flares (EOF)

- ▼ No visible flame
- ▼ Burners provide low NOx, high turndown
- ▼ Used on landfill gas, waste treatment facilities and fuel unloading stations

Circle 258 on card.



Air-Clear™ Fiberbed Mist Collectors

- ▼ In addition to our oxidizers, AES offers fiberbed mist collectors
- ▼ Preferred technology for submicron (visible smoke and haze) mist and fume collection
- ▼ > 99% efficiency, inherently low maintenance requirement
- ▼ Ideal for controlling emissions from metalworking, asphalt and textile operations

Circle 259 on card.

EXPERIENCE

Whether it is pill coating or fabric coating, tank vents or tank cleaning, silicone chips or potato chips, our experience with controlling a wide variety of industrial air pollutants ensures a high level of success on your project.

PERFORMANCE

Advanced Environmental Systems, Inc.'s oxidizers have been tested to show destruction efficiencies of greater than 99.99%! Our Regenerative Oxidizer has a heat transfer efficiency of > 96%. When it comes down to it, there is no room for compromise with performance.

FLEXIBILITY

Advanced Environmental Systems, Inc. offers an extensive range of services. Remote diagnostics, long term maintenance agreements, rental or lease purchase options, in addition, a variety of other services and options are available to help you meet your project objectives.

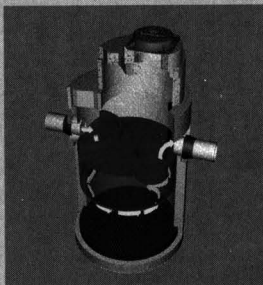


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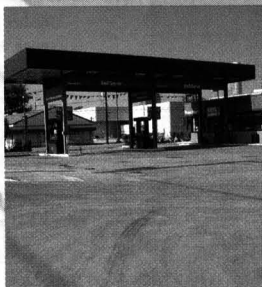
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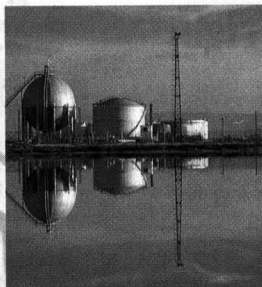
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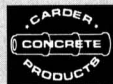
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About the cover:

Companies in the United States are increasingly promoting their technology and services to meet the needs of foreign nations that are moving forward with wastewater treatment, air quality and hazardous waste projects. Beginning on page 12, we profile trends around the world that are creating lucrative business opportunities for U.S. environmental professionals.

Cover design by Kathleen Logan.

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Kyoto Meeting Stokes Global Warming Debate

Many U.S. industrial groups dismiss the dire predictions about pending world-wide climate change as just a lot of hot air. Yet, even though these groups are skeptical about the real effect of global warming on the planet, they're certain about the impact that the proposed standards to reduce greenhouse gases will have on their bottom lines—disastrous.

Consequently, it's no surprise that the international meeting on climate change scheduled this month in Kyoto, Japan, is warming up the discourse on this topic. At the conference, the United States is expected to take the lead in trying to negotiate a treaty to reduce greenhouse gas emissions. The U.S. government will also work toward the equitable participation of developing countries like China, Brazil and Mexico.

The basic theory of global warming is that as increased levels of greenhouse gases, such as carbon dioxide (CO₂), methane, chlorofluorocarbons, nitrogen oxides and ozone, collect in the atmosphere, they trap heat radiating from our planet toward outer space. These gases act like the glass in a greenhouse by allowing sunlight to enter into the Earth's atmosphere, but preventing the resulting heat from escaping back into space. Numerous scientists postulate that the increased temperatures could alter the world's climate and change rainfall patterns, melt polar ice caps, cause flooding and harm air quality.

Many of the treaty's opponents argue the costs of reducing emissions, especially of CO₂, will be large and immediate, while the benefits are distant and uncertain. For example, the Global Climate Coalition, a lobbying group consisting of private companies and trade associations, claims that reducing CO₂ emissions "would eliminate millions of American jobs, reduce America's ability to compete and force Americans into second-class lifestyles." The coalition asserts that proposed reductions would cost industrial nations as much as 3.5 percent of their gross domestic product—\$245 billion per year out of today's \$7 trillion U.S. economy—and possibly greater losses in the developing world.

Environmentalists and other groups in this country, on the other hand, take the threat of global climate change seriously and advocate the immediate passage of stricter emission standards.

In preparation for the upcoming meeting, President Clinton announced in October a plan for curtailing greenhouse gases to 1990 levels that would give U.S. companies several options to meet that goal. An industrial facility could reduce its emissions by upgrading its equipment or using cleaner fuel sources. If this didn't work, the facility would have three other choices: buy the right to emit greenhouse gases from a company that had cut back its emissions below its target level; spend money to preserve forests; or pay to modernize a plant in a developing country and reduce its emissions. The administration's plan has outspoken critics both at home and abroad who fault it because it won't roll back emissions to 1990 levels until some time between 2008 and 2012.

Hopefully, the participants at the Kyoto meeting will be able to move beyond such heated debate and reach a workable solution to this growing international problem.

Angela Neville

Angela Neville, JD, REM
Editor, *Environmental Protection*

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Publisher **Craig S. Stevens**
Group Publisher **Dana Cornett**
Associate Publisher **Randy Dye**
Editor **Angela Neville, JD, REM**
Managing Editors **Ashley E. Blyth**
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Contributing Editors **Ernie Carrasco**
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Compliance isn't toll-free but it's the highway to the future. Our fleet experience helps us to recognize danger signs and suggest safe, alternate routes. Get on the road to cost-effective compliance. Talk to us!

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- Site Assessments
- Property Audits
- Compliance Audits

2 Facility operation programs

Drains, drums and other materials aren't a "hazard" if you know how to handle them.

- Sewers and Drains
- Drum Labeling and Storage
- Hazardous Waste Disposal
- Used Oil Management
- Compliance Manuals

3 Storage tank programs

What to do with tanks if you can't do without them. There are plenty of options.

✓ If your tanks are leaking

- Repair
- Replace
- Close

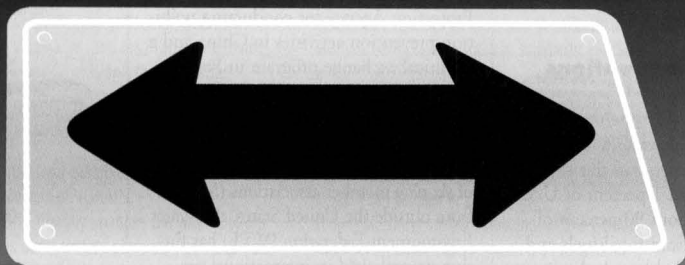
✓ If you've had a leak or spill

- Remediation Programs

✓ If your tanks are tight

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- Aboveground & Underground Tank Management Programs

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**U.S. Company to Build
Philippines Waste Plant**

WILTON, Conn.—Startech Environmental Corp. has received an agreement from the city of Caloocan, Philippines, to construct the Startech Plasma Waste Converter Resource Recovery Center.

The new center will be built in Caloocan, the third largest city in the Philippines. "The center will allow the city to continue to grow and prosper without harm to the public health and safety from incineration, landfilling or open dumping," Joseph F. Longo, of Startech, said. The center will process 500 tons per day of nonhazardous waste and hazardous industrial waste, with expansion for an additional 500 tons per day.

The center will also process, remediate and convert solid wastes into the principal commodity product of Plasma Converted Gas (PCG). PCG is the Startech name for clean, hydrogen-rich synthesis gas produced by the Plasma Waste Converter (PWC) that can be used to make electricity, and also used as an alternative fuel source for nearby manufacturing operations.

Plasma converters can remediate and process hazardous and nonhazardous wastes, organics and inorganics, solids, aqueous and nonaqueous liquids, sludge and gases by its method of molecular dissociation. The Startech process, called "loop elemental recycling," safely and economically converts wastes into useful commodity products.

**U.S. Energy Innovations
Sent Abroad**

MARION, Ohio—Despite the early promise of renewable energy in the 1970s, renewable energy in the 1990s contributes less than 1 percent of U.S. energy capacity. About 90 percent of our power comes from fossil fuels and nuclear power. And although the United States is continually the leader in renewable technology innovations, the majority of those innovations are being sent to foreign countries in Europe, Asia, Latin America and Africa.

In the remote village of El Higueral, El Salvador, a school gets its electricity from two 48-watt solar panels on its roof. Outside Gaviotas, Columbia, a series of compact windmills stirs the air and a seesaw on the school playground doubles as a pump to provide the village clean

water. In the Northern Province of Costa Rica, where logging has made firewood expensive and scarce, the Women's Solar Oven Group has produced hundreds of highly efficient fuel-free cookers at a cost of only \$5 each. Reykjavik, Iceland, whose skies were once blackened by chimney smoke, now gets most of its heat from geothermal energy and is touted as one of the cleanest cities in the world.

More than 2 billion people globally live without electricity. In Asia, the energy market is growing 10 percent annually, while the U.S. demand increases by less than 2 percent. In addition, U.S. carbon emissions rose in 1996 for the fifth straight year to 3.3 percent, which is well above the level targeted by President Clinton. Despite its innovative technology, the United States is well behind the rest of the global community in its energy efficiency efforts.

**A&WMA Expands
Global Network**

PITTSBURGH—The Air and Waste Management Association (A&WMA) has become more involved in overseas projects and continues to add new sections and chapters to its family. Recently, it welcomed new sections from Saudi Arabia, Korea and the Philippines, and expects new sections from Sri Lanka, India and possibly Europe in the future.

The A&WMA also recently received grants from the U.S. Environmental Protection Agency for conducting pollution prevention activities in China and a technical exchange program in Poland.

**WEF Strengthens
Global Ties**

ALEXANDRIA, Va.—With the addition of six new member associations (MAs) from outside the United States, the Water Environment Federation (WEF) has further strengthened its international ties.

WEF's board of directors approved petitions for membership from Hungary, Malaysia, Mexico, Palestine, Singapore and Thailand during WEFTEC '97, in Chicago, Ill., America's largest technical conference and exposition on water quality and environmental issues.

The addition of the six new member associations brings the total number of MAs located outside of North America to 28. WEF has another 45 MAs located in the United States and Canada. **EP**

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the grapevine

Robert D. Goldman has been named the new president of **Lexicon Environmental Associates Inc.**, West Chester, Pa.

Fluid Controls Inc. is now an authorized stocking distributor for **McElroy Manufacturing Inc.** McElroy manufactures fusion equipment for high-density polyethylen (HDPE) piping systems.

The board of directors of **Figgie International Inc.**, Willoughby, Ohio,

announced that **Glen W. Lindemann** has been named chief executive officer and president of the company.

Highland Tank, manufacturer of protected steel storage tanks, announced the opening of a new manufacturing facility in Somersworth, N.H.

Roy F. Weston Inc. was awarded a 5-year indefinite delivery order and indefinite quantity contract valued at up to \$3.5 million to provide comprehensive

Clean Air Act compliance and engineering support for the Naval Facilities Engineering Command Atlantic Division, the Navy's East Coast contracting agency for environmental services.

International Technology Corp., Pittsburgh, Pa., was awarded a series of U.S. Department of Energy contracts and delivery orders under existing contracts valued at up to \$11 million.

U.S. Filter Recovery Services acquired Eastern Oil Co., an Alexandria, Va.-based collector and recycler of used oil and antifreeze.

Clifford L. Metcalf was named central U.S. practice leader of **Golder Associates Inc.**'s Environmental Management Service practice.

Degussa Corp. celebrated the production of a billion pounds of hydrogen peroxide at the Mobile, Ala. facility.

Knorr Associates was awarded a Microsoft Industry Solution Award for Healthcare last month. The Butler, N.J.-based engineering and software development firm was one of nine winners.

The U.S. Army Corps of Engineers Norfolk District awarded **Rust Environmental & Infrastructure** a 1-year, \$1 million indefinite quantity contract to provide environmental services at federal sites within the jurisdiction of the Norfolk, Va. District.

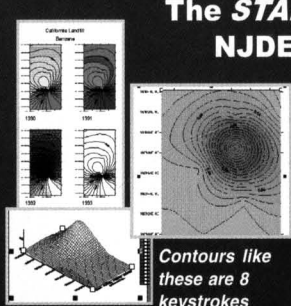
George R. Freiberg joined **Hazen and Sawyer Environmental Engineers and Scientists** as director of utility management services, based in the firm's Mid-Atlantic regional office in Raleigh, N.C.

To guarantee and expedite cleanup activities of the 1,866-acre former Lowry Air Force Base, The Lowry Redevelopment Authority in Denver, Colo., has purchased a comprehensive environmental insurance program provided by **ECS Underwriting**.

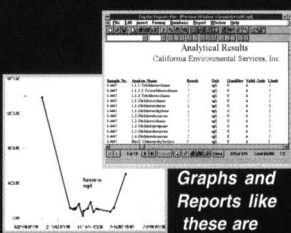
EA Engineering, Science and Technology Inc. was awarded the third in a series of contracts with the Washington Suburban Sanitary Commission headquartered in Laurel, Md. **EP**

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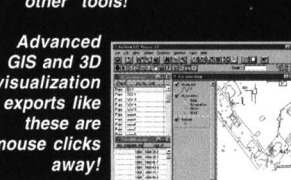
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ENVIRONMENTAL TRENDS IN THE MIDDLE EAST

U.S. companies wishing to do business in the Middle East need to do their homework before making the trip.

By Marc H. Siegel, PhD

The Middle East peace process has brought profound changes to that region and has created unprecedented opportunities for regional cooperation and improved environmental protection. Due to the arid climate, shared surface and underground water supplies, as well as shared air basins, pollution problems are amplified and are not restricted by international boundaries.

Transboundary pollution does not have far to go to have a significant impact on neighbors' health in this region of relatively small countries. There is a need for a coordinated management of waste with a harmonization of standards and approaches reflecting the unique economic and cultural realities of the region. Industrialized countries wishing to do business in the environmental arena of the Middle East should not look to simply transplant successful technologies from their countries to the region, but rather work on approaches that will be sustainable.

Unique Characteristics

The countries in the Middle East region have a unique set of environmental conditions characterized by scarce fresh water, dependence on oil for energy and intensive agricultural production on reclaimed arid lands. This is exacerbated by the problems associated with rapid urban growth and its attendant environmental consequences. As the region attempts to harmonize environmental standards, develop renewable energy resources and stimulate its economy, energy and

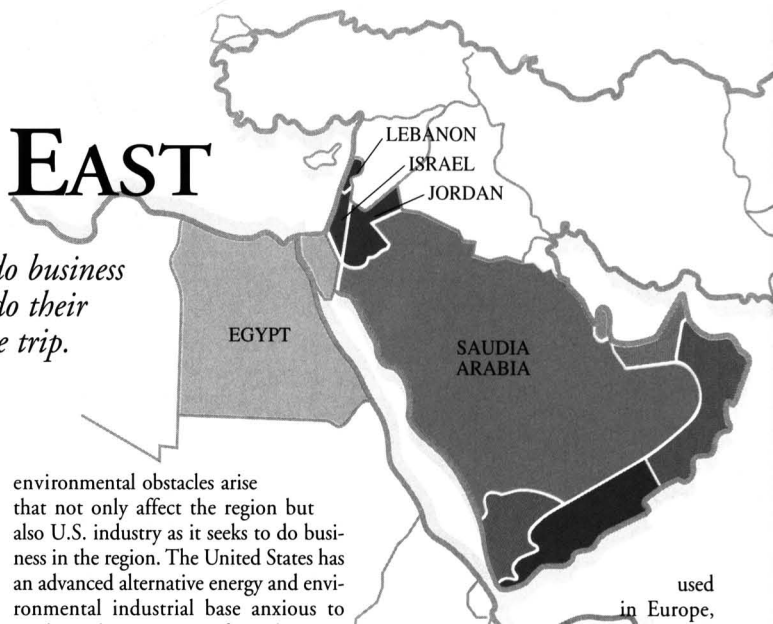
environmental obstacles arise that not only affect the region but also U.S. industry as it seeks to do business in the region. The United States has an advanced alternative energy and environmental industrial base anxious to work in the region. In fact, there are many technological problems common to both United States and Middle Eastern industry in each of these areas.

Many of the natural resources of the countries in the Middle East are jointly owned and exploited. The northern tip of the Gulf of Aqaba, for example, is heavily utilized by Egypt, Jordan and Israel for recreational as well as economic purposes; the Palestinian Authority and Israel share aquifers as joint sources of water; and, of course, air pollution in the region affects all neighbors regardless of its source. A shared perspective on environmental protection and sustainable development is one that takes account of the need for institution, infrastructure and capacity building as tools to implement national and regional strategies.

Areas of particular environmental concern include limited water resources requiring the reuse of water by safe, low-tech, low-cost methods; the need for technologies for solid waste management; harmonization of hazardous waste standards to avoid shifting the generation of pollution from one country to another; and new and innovative approaches to hazardous waste regulation, management and treatment. High-cost, high-maintenance technologies, often

used in Europe, Japan and North America, are not considered appropriate choices. There is a need for joint research and development projects among the countries in the region, and with other industrialized countries to develop and commercialize technologies appropriate to the region.

Pollution knows no political borders. There is a need to create regional frameworks for environmental cooperation to prevent pollutant release into the environment. Throughout the Middle East, countries are experiencing rapid development. Local environmental agencies have recognized the need to promote pollution avoidance technologies that safeguard the environment while promoting economic development and increase production efficiency. As in many emerging economies, economic development has taken precedence over environmental protection. Increased environmental awareness among the general population coupled with a more proactive approach by environmental agencies has started a trend toward using "clean technologies" as a form of environmental investment. As environmental regulatory enforcement improves, there will be an increasing demand for clean and waste minimization technologies.





Water shortage is a problem shared by most countries in the region, commonly resulting in over-exploitation and pollution. Many of these water resources are shared and therefore, it is extremely important that they be protected and managed in a sustainable manner. The demand for clean technologies to protect this scarce resource is increasing. Wastewater treatment and reuse is seen as a crucial method for narrowing the gap between water demand and available water resources. There is a need for both appropriate technology development and epidemiologically verified water reuse standards.

Searching for Answers

Technologies that reclaim wastewater for use in industry and agriculture are the most promising. Furthermore, efficient management of reclaimed water will require the development of seasonal storage facilities.

Increased urbanization and industrialization, rapid growth in population, and an improved standard of living in the Middle East have also increased the demand for better solid waste, hazardous waste and sewage management facilities. The private sector can play a role in improving the environmental infrastructures in various countries in the Middle East by entering the waste management market with "turnkey" and "own and operate" strategies. Throughout the region there is a demand for new domestic wastewater treatment systems. Waste management systems that are safe, low-cost, low-technology methods have the greatest promise of sustainability. Government incentives and investment guarantees for foreign investment are available in many countries in the Middle East.

Solid waste management illustrates the need for new and innovative approaches when addressing Middle Eastern technology needs. The region's hydrological sensitivity, population distribution and hot climate complicates waste management and makes the location of treatment sites more difficult. Furthermore, the composition of solid waste differs from that typically found in Western countries because it contains large amounts of organic materials

with high moisture content. This precludes the possibility of simply transplanting Western technologies to the region.

Reversing the effects of desertification is another crucial environmental priority of the region. Land management technologies, appropriate arid region agricultural practices, and increased use of solar energy systems can help stem the tide of desertification. Closed irrigation systems, cultivation of desert crops and development of aquicultural systems that exploit both the sun and saline water are technologies of particular interest to countries in the region. Joint environmental and aquiculture research and development programs with experts in the region would potentially find marketable solutions to environmental problems common to arid regions throughout the world. The Gulf of Aqaba, shared by Egypt, Israel, Jordan and Saudi Arabia, represents a unique challenge for a regional environmental protection plan due to its importance to tourism, shipping and industrial sectors of these countries' economies. Plans to prevent accidental and operational pollution in the marine environment are needed. Multinational emergency response planning and technologies to deal with emergency situations are also needed throughout the region. The need for compatible national coastal environmental management plans has been recognized as a priority for the countries in the region. There is also a need to develop and operate a multimedia (air, land, water) environmental monitoring program.

How to Begin

The first step in conducting a successful business venture in a foreign country is to learn as much as possible about that country. It is not sufficient to steamroll in with a new technology, which might be newer, safer, better and cheaper. Rather, it is also necessary to adapt your approach to doing business in another country. This means you should first understand the economic, social, cultural, political and technological framework that will define how you will conduct business in the target country.

There are numerous resources on the Internet. Two sites can get you started in your quest for more information: the U.S. Department of Commerce International Trade Administration (<http://www.ita.doc.gov/>)

site provides links to useful information, organizations and tools to assist businesses in succeeding in the export marketplace. A one-stop shop for export business assistance, The Middle East/North Africa Business Home Page (<http://www.ita.doc.gov/mena/>) is a very good starting point for finding information on doing business in the Middle East and North Africa. The Middle East/North Africa Business Home Page is maintained by the U.S. Commerce Department's Office of the Near East, in conjunction with the State Department, for use by American companies interested in business, trade and commerce in the Middle East and North Africa. The U.S. Department of Commerce, Technology and International Trade Administrations, in conjunction with the Taba Initiative (Egypt, Israel, Jordan, Palestinian Authority, United States) is currently developing the MENA-PeaceNet information system. This project will develop an interactive information exchange network designed to bring up-to-date information on conducting business in the Middle East and North Africa (MENA) region, as well as between the MENA region and the United States.

In conclusion, a key point that must be considered is that the Middle East should not become a dumping ground for North American, European and Japanese environmental technologies. High-cost, high-maintenance technologies are not appropriate choices for most applications. There is a need for new better, cheaper, safer, low-tech technologies. A one-size-fits-all approach will not work. Countries in the region, as well as outside the region, must work together to develop appropriate technological solutions to regional environmental problems. Environmental experts in the Middle East region are eager to work on a multinational level, as well as work with the public and private sectors outside the region to develop appropriate technological solutions. Joint ventures and partnering are important keys to success. **EP**

Marc H. Siegel, PhD, is the director of Engineering Process & Information Consulting and serves as the executive director for the U.S. Department of Commerce sponsored International Trade and Development Network program.

For more information, circle 80 on card.



STORMWATER MANAGEMENT IN PUERTO RICO

One Caribbean power generation facility manages its stormwater runoff with new technology.

By Ernie Carrasco and Angel De Jesus, PE

Environmental pollution often is mistakenly perceived as a problem found only in large industrialized nations. In fact, anywhere there are people, the natural surroundings must be protected from the byproducts of civilization.

The Caribbean island of Puerto Rico brings to mind images of clear, blue water and unspoiled beaches. But with a population of more than 3.5 million people, Puerto Rico is one of the most densely populated areas in the world. Each square mile of the small island holds an average of more than 1,000 people—a higher population-to-space ratio than found in any of the 50 U.S. states.

Maintaining a clean environment requires aggressive action by government and industry. As a U.S. territory, Puerto Rico must comply with all U.S. Environmental Protection Agency standards. Because of tropical storms and high amounts of rainfall each year, stormwater runoff can spread pollution from various sources to rivers, streams, lakes, the Gulf of Mexico, Atlantic Ocean and Caribbean Sea. The Puerto Rico Electric and Power Authority (PREPA) has taken action to greatly reduce stormwater pollutants at one of its primary electrical generating facilities in Mayagüez, Puerto Rico's third-largest city, located on the western tip of the island.

Three Stormceptor® units, made by CSR Hydro Conduit in Orlando, Fla., have been installed at the facility to remove contaminants from stormwater before it reaches the environment.

"The Puerto Rico Electric and Power Authority is very concerned with the quality of stormwater runoff from its power plants," said Pablo Colon, PE, PREPA project manager. "The authority installed these units because they efficiently remove pollutants from runoff and are very easy to maintain."

The Stormceptor unit removes 95 percent of petroleum-based products and 80 percent of the total sediment load, which typically contains coarse and fine sediments intermingled with heavy metals and petroleum.

The equipment will bring the plant in compliance with EPA National Pollution Discharge Elimination System regulations, Colon added. Precast Stormceptor units are made in easily-assembled reinforced concrete components. They are installed much like standard manhole structures.

Capacity of the Stormceptors at Mayagüez is 1,800 gallons. Stormwater is carried to the units through 18-inch-diameter reinforced concrete pipe. Each unit consists of two sections: a bypass chamber at the top and a treatment chamber at the bottom. Stormwater flows into the upper bypass chamber and is diverted by a u-shaped weir, through a drop inlet pipe and into the treatment chamber. Right-angle outlets direct downward flow around the circular walls of the chamber causing a horizontal flow to the outlet pipe, which is submerged similar to the drop inlet pipe. Above and below the flow, oil and sediment accumulate in relative tranquility.

Gravity causes fine and coarse sediments to settle to the bottom of the tank. Oil and

other liquids with a specific gravity less than water will rise in the treatment chamber and become trapped, because the outlet pipe is submerged. Sediment deposits and oil are removed from the units by vacuum equipment mounted on trucks. Sediment is removed at least once a year or when the accumulation reaches 15 percent of operating storage volume of the unit. Frequency of removal depends on location and site conditions.

Typical cleaning procedures by a vacuum truck includes removal of trapped hydrocarbons, followed by sediment removal. The manufacturer of the Stormceptor devices recommends de-watering of the oils and sediments, with the liquid phase being discharged into the sanitary sewer. The vacuum then transports the waste to an approved non-hazardous waste disposal site. In the event of a hazardous spill or if the pollutants are being removed from a heavy industrial site, analytical testing is recommended to determine if the pollutants are hazardous before disposal. Typically, stormwater waste is considered to be non-hazardous waste unless the results from testing indicate otherwise.

Consulting engineers Stone and Webster, Denver, Colo., selected Stormceptors for the project, because they are



Photo courtesy of CSR.

A portion of a Stormceptor® 1800 awaiting installation at the Mayagüez Power Plant facility. A part of the power plant can be seen in the background.

available with an internal bypass that does not scour or resuspend trapped pollutants. Because of the area's heavy rainfall, equipment that resuspends pollutant material would be ineffective or counterproductive.

The relatively compact size of the units used also was important, because of the limited amount of available space at the site. K. D. Contractors, S.E., Penuelas,

Continued on page 42.

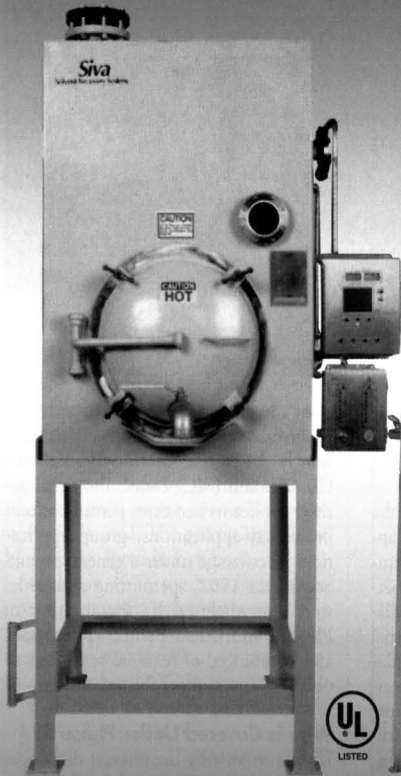
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STORMWATER REGULATIONS: FIVE YEARS LATER

Stormwater regulations have impacted industry and cities in many ways since taking effect five years ago.

By Prokopis A. Christou, PE

Photo courtesy of TNRCC.

It has been more than five years since the U.S. Environmental Protection Agency required industries and municipalities to obtain stormwater permits for the first time. How does the stormwater program affect your industrial facility now?

Background

The U.S. Congress passed the Clean Water Act to improve the water quality of streams, rivers, lakes and oceans impaired by pollution. The water pollution was the result of discharges of wastewater from industrial facilities and municipalities and contaminated stormwater and sediment from urbanized areas, industrial and agricultural activities. With the authority of the Clean Water Act, the EPA established the National Pollutant Discharge Elimination System (NPDES) program. Although this program has not eliminated discharges, it has been successful in improving the quality of the nation's waters by controlling, through permits, wastewater discharges from industrial and municipal point sources. Due to the difficulty in controlling diffuse pollution sources, little was done to

address pollution from stormwater discharges and non-point sources.

The Stormwater Program

With the Water Quality Act of 1987, the U.S. Congress established a two-phase approach to address pollution from stormwater sources. Under the first phase, permits were required for stormwater discharges from municipalities and industrial facilities. Statutory deadlines for regulations and permit applications were also established. For the second phase, the statute required the EPA to study potential additional stormwater discharges and issue regulations for the Phase 2 discharges. The Act prohibited the EPA from requiring permits for Phase 2 before October 1, 1992, later extended to October 1, 1994.

Who is Covered Under Phase 1?

On November 16, 1990, the EPA issued final regulations clarifying the scope of Phase 1 discharges and establishing application requirements and deadlines. Phase 1 discharges included stormwater discharges from municipalities with populations greater than 100,000 or designated by the EPA or the states, and discharges

from 11 categories of industrial activities. These categories were broadly defined and mostly based on Standard Industrial Classification (SIC) codes. Industrial activity applicants had three permit options: individual applications, group applications or coverage under a general permit. Starting in 1992, permitting authorities were overwhelmed by the number of Phase 1 individual permit applications and encouraged or required applicants to obtain coverage under the general permits.

Who is Covered Under Phase 2?

Unable to identify the Phase 2 discharges and then issue regulations for these discharges by the original deadlines established by the Water Quality Act of 1987, the EPA extended the deadline for permit applications for Phase 2 discharges to August 6, 2001. However, this may not be necessary, as the EPA expects to change the regulatory framework before March 1, 1999, and Congress is expected to streamline the stormwater program when the Clean Water Act is reauthorized, which possibly could occur in 1998.

Since the EPA has not defined who is a Phase 2 discharger in its regulations, a

Phase 2 discharger would by default be one who is not regulated under Phase 1. In the March 1995 Report to Congress, *Stormwater Discharges Potentially Addressed by Phase II of the NPDES Stormwater Program*, the EPA identified possible Phase 2 discharges and made several recommendations. The report recommended that stormwater permits be required for municipalities in urbanized areas only; that municipalities be authorized to regulate industrial discharges and address commercial and institutional sources, such as healthcare institutions; and that facilities that could certify no exposure to rainwater be exempt from permit requirements. Potential Phase 2 discharges include discharges from municipalities in urbanized areas not already included in Phase 1, and additional industrial, commercial and institutional activities, as listed in **Exhibit 1**.

Permit Coverage for Industrial Activities

Individual permits addressing both wastewater and stormwater are processed under the regular NPDES permit cycle. The individual permit option for stormwater only is discouraged in most cases, as is the group permit option, since application deadlines have passed and the EPA used the information submitted by group applicants to issue a general permit—now referred to as the multi-sector general permit—instead of group permits. As a result, the general permit option is now the most widely used. The permit application deadlines are listed in **Exhibit 2**.

Starting in 1992, the EPA issued three general permits for industrial activity. The first general permit, referred to as a baseline permit, was issued in 1992 and expires September 1997. In June 1997, the EPA proposed to terminate this permit. The second general permit, the multi-sector permit, was issued in September 1995 and was intended for 29 industrial categories. In July 1997 the EPA proposed to expand this permit to provide permit coverage for virtually all industrial facilities, including those previously eligible only under the baseline permit. The third general permit that was issued in 1992, expiring in September 1997, was intended for construction activity of five acres or more. In June 1997, the EPA proposed to reissue this permit with changes.

Each general permit describes eligibility requirements, means to obtain and terminate permit coverage and terms and

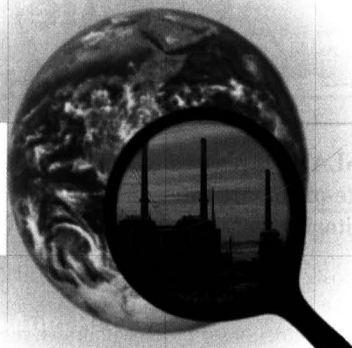
conditions. An eligible facility must submit a Notice of Intent to the EPA to obtain permit coverage. The general permits require written stormwater pollution prevention plans that incorporate best management practices for preventing exposure to stormwater and preventing and containing spills. Special requirements are specified for areas where Form R Water Priority pollutants are handled and effluent limitations for high-risk facilities. (Form R Water Priority pollutants are chemicals reported under the Toxic Chemical Release Inventory form, which

the EPA considers high-risk to contamination of stormwater). Periodic inspections, visual and analytical monitoring, and annual evaluations are also required.

How About the States?

The stormwater program is a federal program that applies to all states. The federal program is implemented by the EPA regional offices in states where the NPDES program has not been delegated to the state environmental agencies. It is implemented by state authorities in delegated states. State stormwater programs are sim-

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Stormwater Regulations: Five Years Later

ilar to the federal program, although the deadlines and the details may vary. Almost all of the delegated states have issued general permits for stormwater.

What Does This Mean for Industry?

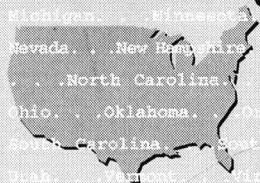
To begin with, Phase 1 of this program has been in effect and has already impacted the industry in several ways. Facilities with permit coverage under general permits issued in 1992 are required to maintain permit coverage as the EPA reissues or modifies these permits. Secondly, the EPA has proposed changes to streamline Phase 1

and has made recommendations for Phase 2 of the program that will also impact industry. Facility managers need to be aware how the stormwater program impacts their operations and act on the information to ensure cost-effective compliance. **EP**

Prokopis A. Christou, PE, is environmental engineer/project manager at Formosa Plastics Corp., in Livingston, N.J., and is responsible for environmental and transportation safety issues.

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Exhibit 1: Examples of Potential Phase 2 Dischargers

Source: The EPA's 1995 Report to Congress

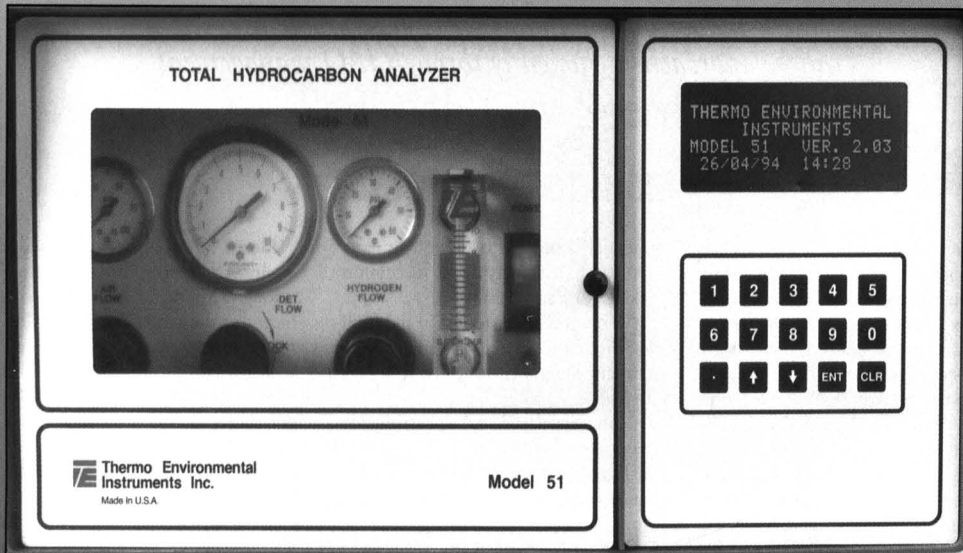
- Facilities that were not considered for inclusion in the effluent guideline formulations.
- Offsite warehouses, offsite salt storage piles, chemical distributors that conduct incidental mixing and blending of products, distributors of farm products and equipment with mixing and blending of fertilizers.
- Pipelines, petroleum product distribution.
- Hazardous waste generation/storage sites exempt from RCRA permits.
- Municipal solid waste landfills, solid waste transfer stations, land application of sewage treatment plant effluent, incinerators, temporary offsite waste storage sites.
- Interim recycling collection and satellite storage sites.
- Treatment works with design flows less than 1 million gallons per day, offsite non-domestic wastewater treatment plants and sludge drying beds, portable sanitary and septage service facilities, drinking water treatment plants.
- Construction that disturbs less than five acres of total land area.
- Facilities in Phase 1, Category xi, where there is no exposure of materials.
- Automotive service
- Nurseries, farm chemical suppliers and distributors, large lawns, golf courses.
- Livestock, feedlots
- Various utilities
- Transport, rail and other

Exhibit 2: Federal Stormwater Permit Application Deadlines

- Permit not required prior to Oct. 1, 1992.
- Deadlines for general permits are specified in the general permits.
- Individual application for Phase 1 discharges, 180 days prior to start of operation.
- Individual application for construction of five or more acres, 90 days prior to start of construction.
- Individual application for Phase 2 discharges, by Aug. 6, 2001.
- If notified by the EPA or the state, within 180 days of notification.

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COST SAVING APPROACH TO IAQ MANAGEMENT

*Indoor air quality management problems
can be approached efficiently through IAQ management.*

By Tim J. Leslie

The U.S. Environmental Protection Agency and its Science Advisory Board have ranked indoor air quality (IAQ) problems among the top five risks to public health. Though there are few specific regulations with regard to IAQ, with the exception of the Occupational Safety and Health Administration and the work place environment, the EPA has developed, sponsored and promoted "voluntary" IAQ compliance, particularly for public schools. Many will recall Asbestos Hazard Emergency Response Act (AHERA), addressing asbestos issues, was first promulgated in schools. Building managers, school administrators and employers must deal with IAQ issues on an increasing basis. IAQ problems usually do not cause a clinical or easily diagnosable disease and often have subtle health impacts. It is difficult to recognize IAQ problems, since a majority of people in a particular environment does not show health effects from the IAQ.

In many cases the perception of IAQ problems is much worse than the actual air contaminants or IAQ problems. In conjunction with the perception of IAQ problems, if carbon dioxide, temperature and relative humidity are out of recommended comfort zones, it can contribute to the assumption that IAQ problems exist in the facility.

Failure to address real or perceived IAQ issues can negatively impact the organization and personnel with regard to direct and indirect costs and/or health issues. This is true whether the IAQ problem is in an office building, school, commercial or industrial facility. Some of the

potential impacts of IAQ problems are:

- lost productivity due to discomfort, sickness or absenteeism;
- risk of areas or rooms in the facility being closed or evacuated requiring staff and equipment to relocate;
- negative publicity;
- increased costs of operating mechanical equipment;
- increased spread of disease or sustained health-related symptoms such as eye irritation and headache;
- strained tenant-management or ad-

**Failure to address real
or perceived IAQ issues can
negatively impact
the organization and
personnel with regards to
direct and indirect costs
and/or health issues.**

ministration-parent relations;

- losing or breaking leases;
- liability issues;
- decreased efficiencies due to fatigue; and
- tenants, employees, students or parents becoming captivated with the perception of IAQ problems, thus requiring time and costs from human resource personnel, administrators or management to address the concerns.

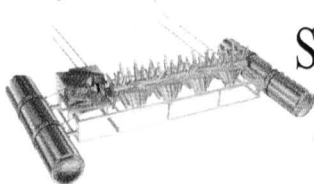
Most IAQ problems can be addressed easily, efficiently and inexpensively through IAQ management and communication, the basis of which is an IAQ management plan. Negative impacts with IAQ problems can be significantly reduced or eradicated by the implementation of such a plan. In addition, it can minimize or eliminate the costs and time involved with an IAQ investigation. The IAQ management plan is designed to 1) address any existing IAQ problems, 2) develop communications with regard to IAQ that will lead to preventative actions, and 3) resolve IAQ complaints as they occur.

An essential part of implementing an IAQ management plan is designating an IAQ coordinator. The coordinator is the person responsible for oversight of all IAQ issues within the facility. The coordinator does not have to work alone, but does have overall responsibility for IAQ issues. Different organizations use varying methods for designating the IAQ coordinator. He or she can be a member of the building management team, building principal, human resource personnel or maintenance staff, for example. Alternatively, some organizations prefer to hire independent outside consultants to fill the role of IAQ coordinator. Regardless how the coordinator is selected, there are specific steps in implementing a successful IAQ management plan. The IAQ coordinator distributes a memorandum to building occupants informing them the IAQ in the building is being actively managed and how to contact the coordinator.

After selecting the IAQ coordinator, the

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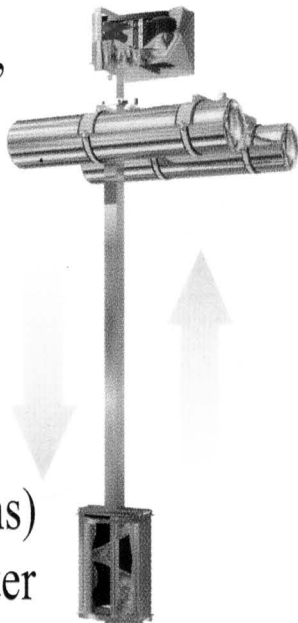
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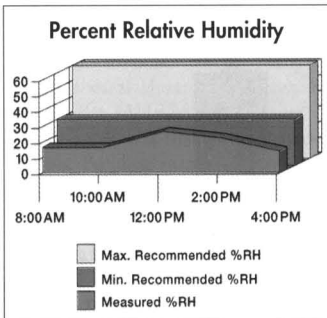
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Cost Saving Approach to IAQ Management

next is to assess current facility. This does not necessarily mean initiating an investigation that requires sampling and analyses of indoor air. Keep in mind sometimes the perception of IAQ problems is actually worse than the actual indoor air. Because of potential pre-conceived notions, it is important to determine the building occupant's perception of the IAQ.

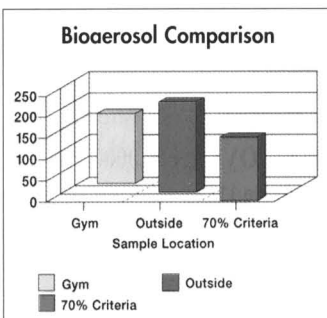
An IAQ checklist should be completed and returned by building occupants. The checklist is designed to identify potential IAQ problem areas. In general, the checklist should address the following areas: general facility cleanliness; spill areas; drain evaporation (particularly important in frequently used drains); excess moisture or water condensate; leaks in the plumbing or roof; thermal comfort; exhaust fans; chemical storage; people with health-related symptoms; ventilation equipment; maintenance supply storage and usage; pest control; food handling and storage; waste management; recently renovated or repaired areas; and areas where new furniture or fixtures have recently been installed.

Figure 1



Measured below relative humidity recommended guidelines.

Figure 2



Microbial composition for inside and outside air samples.

After the IAQ checklist has been completed by building occupants, the IAQ coordinator should review and summarize the results. The coordinator should note any areas or concerns in the building that were identified on the checklist by the building occupants. Information should also be obtained regarding radon, pest management practices, lead-based paint and lead in drinking water. This information, in addition to that obtained from the checklist and site walk-through, is the basis of the IAQ management plan.

After the initial information is acquired, implementation of the IAQ management plan is achievable. Any problems or problem areas identified from the walk-through or from the questionnaires should be corrected. The problem may be as simple as a closed vent on the heating, ventilating and air conditioning (HVAC) system or inoperable control. For example, several employees in a large office building were complaining of runny discharges from the nose and eyes, dry throat and allergy-type symptoms. Just a simple evaluation of the comfort parameters indicated the relative humidity was low.

Figure 1 shows the relative humidity in the facility during the time of monitoring. The low relative humidity was reported to building management and corrected. The next day employees were told the IAQ problem had been identified and corrected. Employee complaints regarding IAQ problems dropped to essentially zero. Significant dollars were saved by the building management because extensive testing and laboratory analyses were not initiated. The problem was simple to find and correct. Employees were reassured that management was taking an active role and addressing their concerns.

The second aspect of the IAQ management plan is to instill an awareness in employees, tenants and students within a facility that leads to the prevention and minimization of IAQ problems. Potential or known sources of IAQ problems can be addressed in the IAQ management plan. For example, if a fresh air intake is located near a loading dock, the potential exists for exhaust to enter the facility while trucks are loading or unloading. The dock foreman can be made aware of the possibility of the exhaust and instruct drivers to shut off their engines while the truck is being loaded. Another type of IAQ prevention would

be to make teachers aware that if a spill occurs in their classroom it should be cleaned up immediately. If moisture is not removed, it can serve as a source for microbial growth. Issues such as these are addressed in the IAQ management plan and when implemented, facilitate the prevention of IAQ problems.

The final goal of the IAQ manage-

IAQ Management Plan Checklist

1. Designate IAQ Coordinator.
2. Complete checklist for facility.
3. Conduct facility walk through.
4. Identify and correct any known IAQ problems.
5. Obtain information on lead, pesticide management and radon.
6. Establish checklist interval.
7. Establish emergency response plans.
8. Evaluate and establish preventive measures.
9. Develop a mechanism to resolve IAQ complaints and problems.
10. Establish communication protocols on how IAQ information is communicated to building occupants.

ment plan is to facilitate resolution of IAQ complaints and problems as they occur. If a complaint or problem is ignored or not rectified, the situation becomes needlessly more critical. Often the IAQ problem is relatively minor and can be corrected with minimal time and expense. Employees, tenants, students and parents recognize and appreciate immediate correction of these problems. However, periodically, additional evaluation and testing is required to identify the problem source before corrective actions can be implemented. Figure 2 displays IAQ data for microbial sampling in a school. Certain students and parents were complaining of symptoms related to potential IAQ problems. An investigation indicated microbial imbalances within the facility. The microbial IAQ problems were corrected. School administrators were credited by the students and parents for taking prompt action to resolve the problem. **EP**

Tim Leslie is technical director of LESLIE Environmental in Aubrey, Texas.

For more information, circle 83 on card.

New NIOSH Respirator Standard

A smooth transition requires assessment of airborne hazards, workplace applications, communications, worker training and respirator fit testing.

What is NIOSH 42 CFR Part 84?

In 1995, the National Institute for Occupational Safety and Health (NIOSH) adopted new certification performance criteria for all negative pressure particulate air-purifying respirators and filters. This new respirator testing standard, designated *42 Code of Federal Regulations (CFR) 84*, represents the first time in more than 20 years that NIOSH filter efficiency criteria have been revised. As such, *42 CFR 84* represents a watershed both for companies that manufacture respirator equipment and for those that purchase and use them for worker protection.

Under the previous NIOSH respirator standard, *30 CFR Part 11*, respirators were classified according to the contaminant type they could be used against, such as dust, mist, fume and radionuclides. Under *42 CFR 84*, those classifications have been eliminated. In their place are nine classes of filters comprised of three levels of minimum filtration efficiency and three categories of resistance to the effects of oil aerosols. An oil aerosol is any of the numerous mineral, vegetable and synthetic substances, or animal or vegetable fats that are slippery, combustible, viscous, liquid at room temperature and soluble in various organic solvents, but not in water. Oil aerosols may be present, for example, in metal lathe or machining operations, where oil is used for lubrication or heat dissipation.

The three different levels of filtration efficiency are 95 percent, 99 percent and 99.97 percent, against an average particle size of .3 micrometer (μm) (mass aerodynamic diameter). NIOSH has indicated that customers can select these new filters without regard to particle size, because they will be effective against any size aerosol (*Federal Register* 60:110, June 8) and more efficient against larger particles. The three categories of resistance to oil aerosols are:

- "N" for Not resistant to oil;
- "R" for Resistant to oil; and
- "P" for oil Proof.

How Will This New Standard Affect Me and My Employees?

Employers have the responsibility to see that appropriate respiratory protection—and training needed



to use respirators—are provided for workers in areas where respiratory hazards exist. Employers and employees both benefit from a well-managed respiratory protection program. Such a program helps reduce loss of worker productivity because of illness, increases worker comfort and helps protect healthy workers so they will be more alert. Healthy workers stay on the job longer, which reduces new worker training and productivity costs for the employer.

Employers must update written respirator programs and enforcement policies to incorporate the new filter designations. They may also need to change or update respirator training and fit testing procedures.

How Are These New Respirators Different?

Under *42 CFR 84*, the new NIOSH requirements impose greater filter efficiency requirements for respirators than did the previous standard. One way for manufacturers to meet these requirements is to add additional layers of filter material to existing respirators. But this approach could make respirators less comfortable and reduce worker acceptance to wearing them. This is especially true as the filter material starts to "load" with airborne contaminants, thereby further increasing breathing resistance. 3M believed



Alan Johnston,
*CIH, is technical
service manager
for the 3M
Occupational
Health and
Environmental
Safety Division in
St. Paul, Minn.*

Recommendations for Selecting Respirators Approved Under 42 CFR Part 84

Select air-purifying, particulate respirators when the contaminant has been identified, workplace conditions are not IDLH (Immediately Dangerous to Life and Health), and there is no oxygen deficiency in the workplace.

- Identify the aerosol contaminants (name) and form (oil or non-oil), regardless of concentration.
- Determine concentrations of air contaminants.
- Determine the hazard ratio (HR) for all substances. (The HR is the ratio of the hazard air concentration / occupational exposure limit).
- Determine filter efficiency required.
- Determine filter series needed (N for non-oils, R or P for oils).
- Identify relevant workplace or respirator characteristics to select the most appropriate respirator in the class.

that a better solution was to make significant alterations in blown microfiber technology in the filter media. New filters already on the market are made with advanced electret media (AEM). These have a permanently imbedded electrostatic charge, which requires less filter material to achieve the same filter efficiency as a purely mechanical filter. This results in easier breathing, greater

worker comfort and higher worker acceptance.

In creating the new testing standard, NIOSH decided to focus more on filter efficiency, because other aspects of implementing a respiratory protection program—primarily human variables—were difficult to measure and include in certification standards.

These human variables include:

- selecting the proper respirator;
- achieving and maintaining an effective face seal;
- fit testing; and
- wearing respirators properly.

When Must I Switch to These New Respirators?

Sale of respirators approved under *30 CFR 11* will be permitted until July 10, 1998. Respirators purchased before that date can be used until inventories are depleted. Between now and then, however, customers must plan the transition to ensure that their employees continue to have appropriate respiratory protection. For health and safety professionals, the new standard creates an impetus to reassess important elements of their respiratory protection programs: identify contaminants with respect to oil content, evaluate workplace applications and communicate changes to employees.

Why is it Necessary to Act Now?

Because the Occupational Safety and Health Administration is allowing employers to make the transition to *42 CFR 84* respirators when it makes sense for them, employers can use this time to gather information and evaluate current and future needs. For example, employers will have to determine which type of filter to use based on contaminant type, airborne concentrations and length of worker exposure. Other factors, such as worker comfort and ability to communicate while wearing respirators, are important aspects of wear time.

If respirators are uncomfortable or interfere with communications, workers may remove them briefly or refuse to wear them. These actions can increase exposure to contaminants and reduce respirator program effectiveness.

Making the transition to this new equipment requires evaluation, planning and communication. These steps include:

- evaluating the workplace where respirators are used;
- selecting appropriate respirators for intended applications;
- educating employees;
- performing respirator fit testing;
- communicating internally, as well as with safety distributors and manufacturers; and
- revising written respirator programs.

Careful advance planning and coordination well before the deadline will facilitate a smooth transition. Some respirator users estimate it will take from three to six months to complete the steps listed above. If you wait until just before the deadline to make the transition, you may not have enough time to address these steps thoroughly.

Isn't This Just a One-to-One Product Switch?

No. Because the new certification requirements change respirator classifications, users can't assume that new respirators that look the same as those approved under *30 CFR 11* will be approved for the same applications. Health and safety professionals should re-examine work environments and applications in which respirators are used to determine which of the new filters is most appropriate for their needs. They must also determine whether the work envi-

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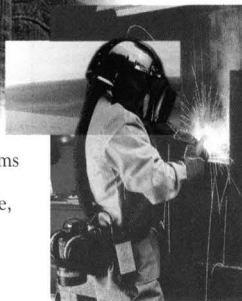
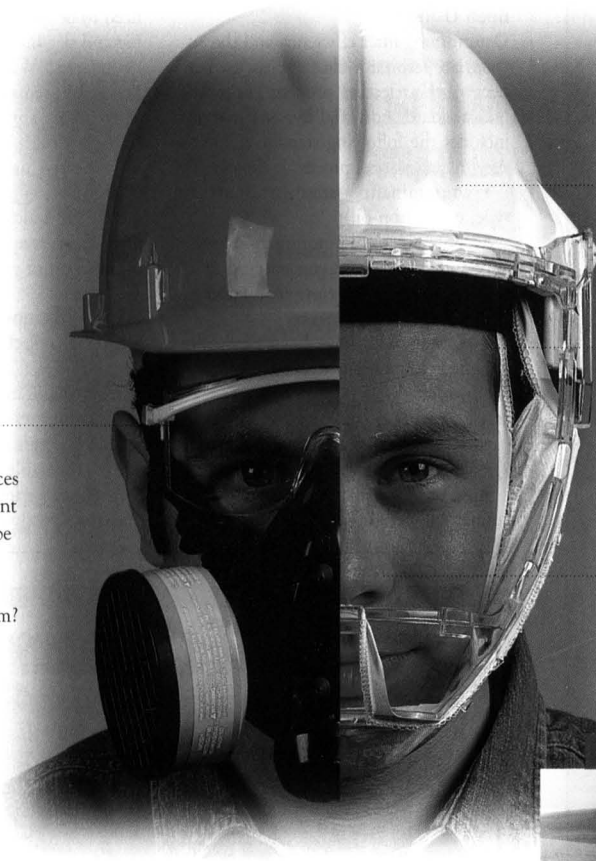
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New NIOSH Respirator Standard

ronment contains oil, match respirator features with work applications and determine acceptable respirator efficiency.

How Do I Determine Which Respirators Replace The Ones I've Been Using?

Determining filter efficiency and the appropriate respirator class are just two aspects of the selection process. For example, standard industrial hygiene practice includes the following steps to help ensure the evaluation process is thorough:

- contaminant assessment (particle type, oil vs. non-oil);
- contaminant monitoring for oil presence and contaminant concentrations;
- filter efficiency class mandated or desired;
- workers who have been medically qualified to wear new respirators;
- worker evaluation of respirators to assess comfort, acceptance;
- respirator fit testing; and
- worker training.

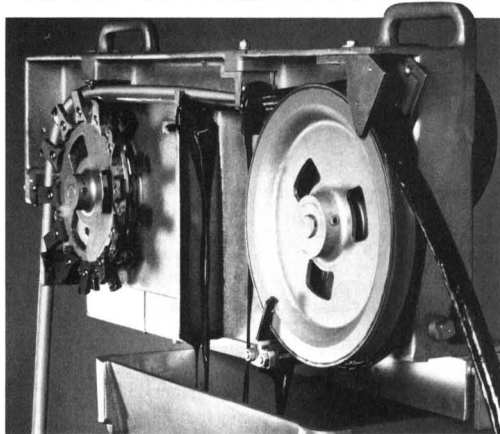
Also, be aware that respirators must be compatible with other safety equipment,

such as hard hats and eye and ear protection. And there may be other factors to consider during the selection process. For example, will your workers prefer a respirator that is designed to be comfortable in high heat or humidity? Do the filters need to be resistant to sparks from welding and slag burn-through from smelting operations? Will you need respirators that resist premature filter loading—such as in paint spray or welding applications—or ones that are durable enough to withstand use in very dusty environments? This is important, because if the filters load quickly, you may have to replace them frequently—thereby increasing the cost of your respirator program.

Which Efficiency Class Should I Select?

The NIOSH User's Guide (Publication No. 96-101, Cincinnati, Ohio, NIOSH, 1996) indicates that filter efficiency selection depends on how much filter leakage is acceptable, but it doesn't say how to define a desired filter efficiency. Selection partly depends on the work-

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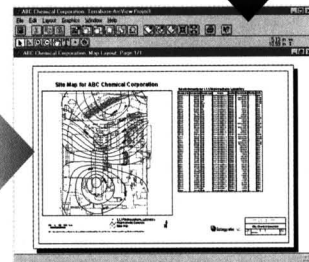
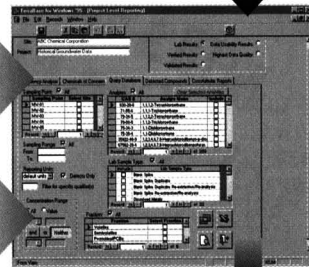
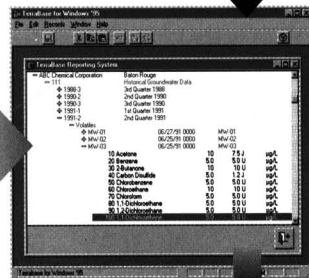
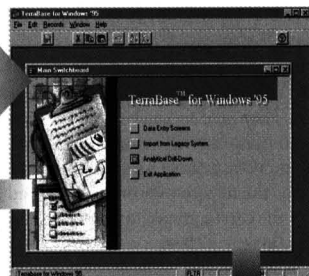
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New NIOSH Respirator Standard

place application. Health and safety professionals should consider the type of contaminant, filter efficiency and desired respirator characteristics. Worker comfort, breathing resistance, durability, filter loading and substance specific regulations should all be assessed in the decision-making process.

Will Fit Testing or Training Responsibilities Change?

Fit testing is required if the form or fit of respirator facepieces change or if the manufacturer recommends that it be done. Also, administrative documents and enforcement policies should be revised to reflect new product designations after the transition is complete. Training on the new terminology and respirator limitations may also be needed to prevent confusion.

What Should Employees Know About These New Respirators?

First of all, they need to be aware of why NIOSH has developed the new testing criteria and why you are selecting these specific respirators. They need to know that there is no substitute for a proper fit when using any respirator, and they need to know the dangers of not properly wearing a respirator in hazardous work environments.

For the new respirators, they should also be familiar with:

- the correct respirator class to be used and its appropriate applications;
- uses for and limitations of specific respirators;
- potential time-use restrictions;
- how to put the respirator on and remove it properly;
- how to check for proper fit;

- proper maintenance and inspection procedures; and
- other company prescribed policies.

Who Else Should be Aware of the Transition Process?

In addition to the employees who use the respirators and their supervisors, senior managers with responsibility for work processes where respirators are used should be informed of the change and its impact. Others who need to know include those administering the respirator program, trainers, purchasing, inventory management, and safety and health auditing personnel.

How Long Will it Take to Make the Transition to the New Respirators?

The amount of time necessary will depend on the complexity of the work environment, number of applications, number of employees, fit testing and revisions to the written program. Some respirator users estimate it will take from three to six months.

Where Can I Obtain Assistance During This Transition?

Consulting industrial hygienists, industrial safety distributors and respirator manufacturers can help with the transition. Ask the manufacturer for assistance with fit testing and other training aspects of your respirator program. The manufacturer should consider your needs and applications, be able to provide accurate information on a regular basis, and have a good relationship with your safety distributors so you will have a smooth transition. **EP**

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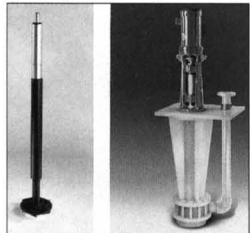
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new products

Centrifugal Pumps

The Vanton SGV Vortex pump permits clog-free han-



dling of corrosive and abrasive process and waste fluids containing stringy materials and solids of various sizes and shapes. Standard designs are suitable for sump depths to 20 feet. Vanton Pump and Equipment Corp.

Circle 133 on card.

Submersible Probe

The Troll 4000 is a fully submersible intelligent probe

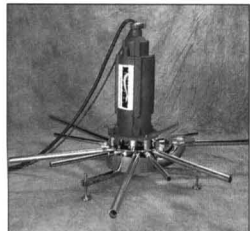


and data logger designed to simultaneously monitor water level and temperature. It accesses 2-inch wells and comes with linear, logarithmic and event test types. Includes easy-to-use Windows-based software. In-Situ Inc.

Circle 134 on card.

Submersible Aerator

The Hurricane Submersible Aspirating Aerator discharges



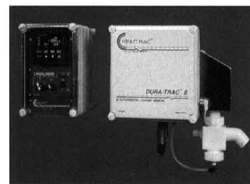
air through adjustable-length diffuser channels to circulate water at the bottom of a basin. Tripod legs are wider in diameter and adjustable feet increase stability. Special impellers are

available for SBR applications. Aeromix Systems Inc.

Circle 135 on card.

Polymer Optimization

Chemtrac's Streaming Current Monitor model 3000XRW



with Dura-Trac II sensor provides optimum polymer dosage control for centrifuges, belt filter presses, screw presses and wastewater treatment processes. The automatic sensor flushing system reduces sludge formation. Chemtrac Systems Inc.

Circle 136 on card.

Safety Eyewear

The America's Best line of patriotic red, white and blue safe-



ty eyewear is ideal for industrial, medical and consumer markets. Included in the line are adjustable click-to-fit temples, ergonomic designs, flex-radius design frames and resiliun frames. H.L. Bouton Co. Inc.

Circle 137 on card.

Heavy Duty Pumps

Pumpex heavy duty wastewater, sludge and dewatering



pumps remove hazardous or abrasive wastewater, pump solids and aggressive slurries, manage stormwater flooding

product exclusive

Infrared Gas Transmitter

The GasPLUS-IR, a new infrared combustible gas transmitter, offers advantages over catalytic bead detectors. There is no risk of sensor poisoning from silicone, halogens or other contaminants; no sensor saturation from high gas concentrations; no oxygen required for operation; continuous monitoring for sensor faults; no reductions in sensor life from exposure to gas; faster response time; and fewer effects from temperature and humidity. No span calibration is necessary and zero calibration is required once every 3 to 6 months. All adjustments are non-intrusive and are can be performed at the instrument or remotely. EIT.



Circle 142 on card.

and meet minimal space and lightweight portability requirements. Pumpex Inc.

Circle 138 on card.

HazMat Storage

Hazmat non-occupancy storage systems for IBCs store chem-



icals over a spill containment sump, which exceeds mandatory federal compliance regulations. Full-face opening doors offer easy access to all IBCs without the need to enter the structure. Lockable door styles are available. P&D Solutions Corp.

Circle 139 on card.

Soil Bioremediation

Oil Snapper™ soil remediation is the solution for non-removable leaks and spills. It mixes into the soil to improve site appearance and suppress



odor. It prevents leaching into surface water and groundwater. Serengeti Products Co. Inc.

Circle 140 on card.

Containment Berms

New Ultra-Containment Berms capture spills from



heavy equipment. Sidewalls lay down when driven through, then automatically return to an upright position. The chemical-resistant XR5 material can be rolled up for compact storage. Custom sizes available. UltraTech International Inc.

Circle 141 on card.

new products

Measurement

The HydroRanger non-contacting, ultrasonic level and



flow measurement system is designed for the wastewater industry. The ST-H transducer has an integral air temperature sensor and is sealed for demanding environments. It has an operating range of 33 feet. Milltronics Inc.

Circle 143 on card.

Datalogger

The Levelogger™ is a 3/8-inch diameter datalogger and pressure



sure transducer in one self-contained probe for recording water levels in wells. Infrared data transfer eliminates electrical cable and avoids electrical interference. Solinst Canada Ltd.

Circle 144 on card.

Shredder

The TM8540 TASKMASTER™ Shredder twin-shaft

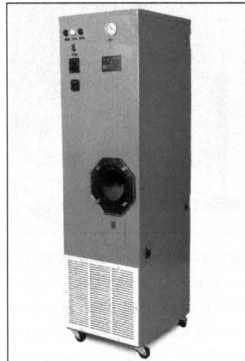


shredding mechanism features the FMI Cutter Cartridge Design. Individual cutters and spacer discs are combined into one-piece multi-tooth cartridges for strength and resistance. Ideal for sewage treatment plants, sludge lines, pumping stations and more. Franklin Miller.

Circle 145 on card.

Water Treatment System

The Zentox Clean Streams low temperature distillation



equipment provides a cost-efficient, low-maintenance water treatment system for the recovery and reuse of wastewater for industrial applications. The systems are available because of Zentox's recent acquisition of Clean Streams Inc. Zentox Corp.

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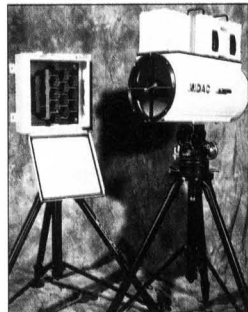
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new products

Air Monitoring System

The FTIR Air Monitoring System detects, identifies and



measures hundreds of contaminants simultaneously within seconds of startup. The hermetically sealed, 0.5-cm resolution interferometer is equipped with beamsplitter or detector. It links to an IBM-compatible data system via standard ribbon cable or long-range fiber optic link. MIDAC.

Circle 147 on card.

Stormwater Sampler

The Global SS201 Stormwater Sampler takes a "first

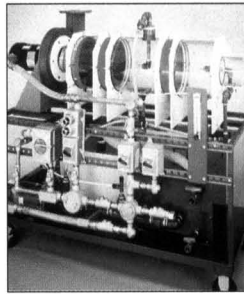


flush" sample in one bottle and a "time weighted" composite sample in the second bottle. It consists of two intake tubes, two sampling pumps and two bottles, which eliminates any possibility of cross contamination between first flush and composite samples. Global Water.

Circle 150 on card.

Scrubbing System

Misonix MYSTAIRE® WALTERWEB® Mesh maintenance-free scrubbing systems remove



particulates, acids, mists, odors, gases and soluble organic vapors. The layered, PVC-coated fiberglass mesh system provides multi-stage scrubbing for difficult-to-scrub applications. Misonix Inc.

Circle 151 on card.

Pump Series

The Stallion pump transfers slurries with heavy solids content up to 1-inch solids. The Ultra-flex™ diaphragm configuration employs a shortened



shaft stroke to allow solids to pass between the outer piston and the liquid chamber. Handles tuck away. Wilden Pump & Engineering Co.

Circle 155 on card.

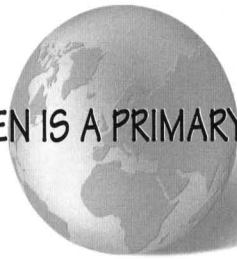
Service Valve

The Xomox Tuflin Severe Service Sleeved Plug Valve uses a triple stem sealing system. Included is the thermal shrink-seal lip, which tightens the seal as the packaging shrinks during thermal cycling. Radial shrinkage causes the packing to compress against the lip. Tuflin.

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organic vapor contaminants that are discharged from soil vapor extraction and groundwater treatment systems during site remediation. Global Technologies.

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Fireproof Plastic Pipe

The FireMaster® PlenumWrap™ is a high-temperature insulation blanket en-



capsulated with aluminum foil scrim. It is an alternative in fire-rated plenums to PVDF or metal piping and was tested to the UL910 flammability test. T49 Aluminum Foil Tape is for sealing cut edges of foil-faced blankets. George Fischer Inc.

Circle 149 on card.

Respiratory Fit Testing

Respiratory Fit Testing: A Closer Look is an instructional program that includes a



video and interactive CD-ROM. It overviews fit testing and why it's important, general fit testing protocols, a detailed look at qualitative fit-test methods, and an introduction to quantitative fit-test methods. Aearo Co.

Circle 154 on card.

VOC Analyzer

HNU introduces a series of new systems for on-line analyzing of VOCs in water. Total VOCs or individual hydrocarbons can be measured from sub-ppb to ppm levels. Total VOCs can be measured by photoionization or flame ionization. Ideal for continuous operations in industrial plant environments. HNU Systems Inc.

Circle 153 on card.

Centrifugal Pump

The CE10A60-B04045T is a new 10-inch self-priming centrifugal pump constructed of cast iron. It has a silicon carbide-faced mechanical seal and ductile-iron open-type two-vane impeller. The removable coverplate provides access to the impeller without removing hoses. Gorman-Rupp.

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new products

Drum and Pail Washer

The Versawash drum and pail washer system washes open-



top or bung-type containers from 5-gallon pails to 90-gallon drums in solvent and aqueous applications. Options include wash rack assemblies suitable to wash lids, small containers and more. SRS Industrial Engineering Inc.

Circle 156 on card.

Steel Ball Valves

Carbon steel ball valves offer reliable, economical shut-off for general industrial and hy-



draulic lines. They are available in 1/4-inch to 2-inch sizes and are pressure rated to 2,000 PSI and 1,500 PSI. Standard features include a corrosion-resistant phosphate coating. Parker Hannifin Corp.

Circle 157 on card.

Underground Piping

PISCES is an integrated underground fuel transfer and containment system composed of flexible piping, sumps and entry fittings. The flexible piping installs quickly and easily. Retractable piping offers crush-resistant access, a

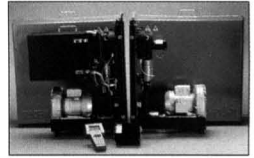


smooth bore design and fewer piping joints. OPW Fueling Components.

Circle 158 on card.

Transmitter

The OPM 2000R Opacity/Dust Density Transmitter measures dust emitted from flue gas stacks in combustion processes that burn fossil fuels. Instantaneous and average outputs can be configured to represent stack exit opacity, dust



density, optical density or extinction. Rosemount Analytical.

Circle 159 on card.

Permanent Clamp

Controlotron's System 1010 DN Permanent Clamp on-



transit multifunction flowmeter supports all industry standard data inputs and outputs.



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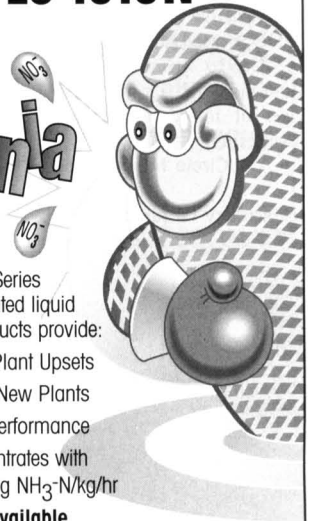
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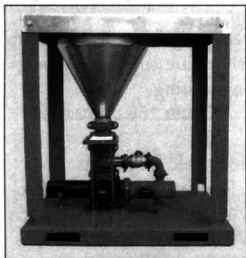
Circle 127 on card.

Options include dual channel or dual path transit time and/or Reflexor™ mode to measure all full pipe liquid applications. Controlotron.

Circle 160 on card.

Mixing Educator

The Lobestar mixing educator provides triple duties: vac-



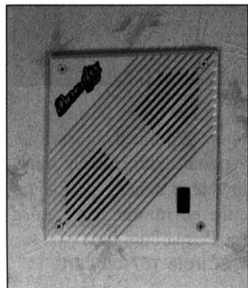
uum feed, rapid mixing and product delivery in a one-step process. The liquid/vacuum system converts dry materials to a slurry to reduce airborne dust and dust collection.

Closed circuit provides safety and eliminates spilling. Vortex Ventures.

Circle 161 on card.

Air Purification System

The Pure-Air™ Built-In System eliminates airborne conta-



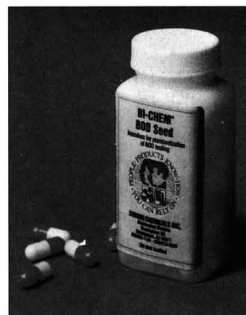
minants with ozone, ultraviolet light rays and negative ions. It is completely contained and is safe for inhabited areas. Ideal for sick buildings, offices, hotel rooms, hospitals, homes, restrooms, nursing

homes and other indoor areas. RGF O₃ Systems Inc.

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BOD Test Seed

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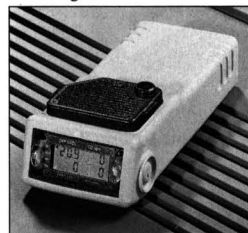
Biochemical Oxygen Demand (BOD) test. It is certified pathogen-free and manufactured under ISO 9000 standards. It contains a wide variety of microorganisms capable of degrading industrial and

municipal wastewater. Sybron Chemicals Inc.

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Gas Detector

The new Minigas-XL portable 4-gas detector features



dual alarm lights, loud alarm and internal pump. Ideal for confined space monitoring, it comes with the following standard features: field-adjustable alarm settings, peak readings, easy calibration and lifetime warranty. Neotronics of N.A.

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The Station Analyzer™ is a new sewage lift station flow-



meter ideal for inflow and infiltration studies, flow surveys and lift station performance. No manhole entry, cleaning or profiling is required. It uses Station-Ware™ software, which is compatible with Flo-Ware™ software for Flo-Totes™. Marsh-McBirney Inc.

Circle 166 on card.

Humidity Measuring

The testo 635 measures humidity and temperature and



indicates dewpoint at the touch of a button. A wide variety of probes makes it versatile in HVAC and IAQ spot-checking applications. It weighs 11 ounces and comes with an optional infrared printer. Testo Inc.

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Generator

The portable Zero-Air™ Generator supplies instrument-quality air for field applications.

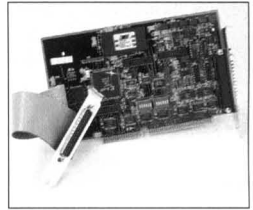


It supplies up to 20 liters per minute of purified air. It weighs 27 pounds and is easily transportable to remote applications in the environmentally sealed case. Perma Pure Inc.

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Data Acquisition Board

Omega's DAQ-1100 is an economical high-speed data acquisition board. It has a sampling rate of up to 330 KHz at a resolution of 12-bits. The analog inputs can be set



for 16 single-ended or 8 differential, and the gain is software programmable. Software drivers are supplied. Omega Engineering.

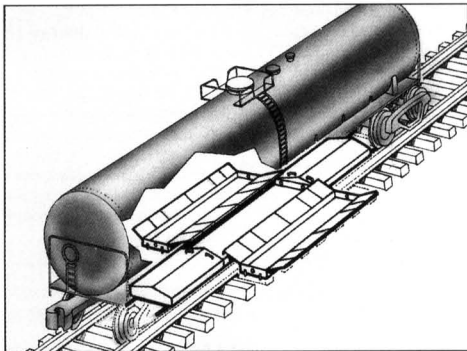
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Electronic Reg Data

RegScan Live™ is a regulatory system on the World Wide Web, offered to FastRegs' monthly update customers. Databases cover environmental, safety, transportation, food, drug and state environmental compliance information. RegScan Inc.

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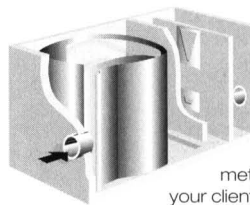
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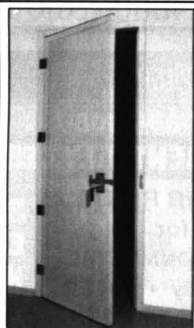
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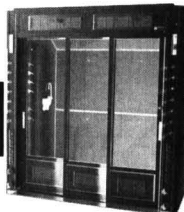
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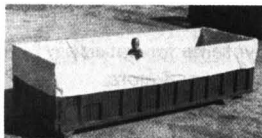
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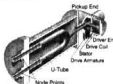
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Stormwater Management in Puerto Rico

Continued from page 14.

Puerto Rico, was the contractor responsible for installing the units. Work began in July 1997 and was completed in November.

The stormwater treatment devices were installed in insertion pits supported by standard shoring and bracing procedures. The area's high water table required water to be pumped from the pits during construction. The Mayagüez project includes several "firsts." The Stormceptor units are the first stormwater quality treatment devices to be installed in Puerto Rico. This project was the first time the Stormceptor units have been shipped outside the continental United States or installed in a power generation facility. The units range in capacity from 900 to 7,200 gallons. Sizes used vary with site conditions and volumes of water to be treated.

The Mayagüez power plant is one of the oldest in Puerto Rico. Built in the 1920s, it has been updated and redesigned to meet expanding demands. It produces 80-90 megawatt power and services more than 250,000 people during peak periods. The plant is located approximately 500 feet from the Caribbean Sea.

PREPA project manager Colon said that the authority will install at least eight more of the stormwater treatment units at other facilities. **EP**

Ernie Carrasco is senior project engineer with CSR Hydro Conduit Corp. in Houston, Texas. Angel De Jesus, PE, is a sales engineer with 19 years experience in the concrete pipe industry and 17 years as engineer and quality assurance manager in Puerto Rico.

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113	Horiba Instruments Inc.	24	145	Franklin Miller	30	141	UltraTech International Inc.	29
105	Inficon	9	149	George Fischer Inc.	33	133	Vantop Pump and Equipment	29
117	Integrate	27	148	Global Technologies	33	161	Vortex Ventures	35
126	IqUES	34	150	Global Water	32	155	Wilden Pump & Engineering Co.	32
110	Legi-Slate	18	170	Gorman-Rupp	33	146	Zentox Corp.	30
104	Lexicon Environmental	7	153	HNU Systems Inc.	33		PRODUCT LITERATURE	
131	Mapa Professional	43	134	In-Stu Inc.	29	99	CNA Schinnerer	42
125	Modern Technologies	35	166	Marsh-McBirney Inc.	36		HOT SPOTS	
116	Oil Skimmers	26	147	MIDAC	32	75	HEMCO	37
100	Omega Engineering	2	143	Milltronics Inc.	30	74	R & D Equipment	37
101	Omega Engineering	2	151	Misonix Inc.	32		CLASSIFIEDS	
124	PE Photovac	33	165	Neotronics of North America Inc.	35	71	Automation Products Inc.	37
118	Perma Pure Inc.	28	168	Omega Engineering	36	73	EnviroData Solutions Inc.	37
130	Petroleum Information	41	158	OPW Fueling Components	34	70	GNESYS Inc.	37
114	Racal Health & Safety	25	157	Parker Hannifin Corp.	34	76	Safety Services of Texas	37
112	S&N Airoflo	21	167	Perma Pure Inc.	36	72	Youngstown Barrel & Drum Co.	37
127	Sybron Chemical	34	138	Pumpex Inc.	29			
132	S.G.S.I.C.S.	44						

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Follow these simple steps:

1

Answer all questions completely, sign and date your card.

2

Circle the number(s) on the attached card which correspond to the advertisement & items mentioned in this issue that you would like FREE information on.

3

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2183a

Environmental PROTECTION

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December 1997
Card expires March 1998
Reader Service Card
N9712F

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PLEASE SEND ME FREE INFORMATION ON THE FOLLOWING ITEMS:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240
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281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300

12/97 BUYING PLANS SURVEY - TRAINING PRODUCTS & MISCELLANEOUS SERVICES

1. Which of the following TRAINING PRODUCTS AND MISCELLANEOUS SERVICES do you plan to purchase in the next 12 months? (select all that apply)

- 800 ISO 9000/14000 Certification
- 801 Training Videos
- 802 Training CD-ROM Products
- 803 Training Manuals
- 804 HAZWOPER Training
- 805 UST Installation/Removal Training
- 806 Software, Compliance Documentation
- 807 Software, Environmental Management

808 Software, Regulatory Compliance

809 Software, EPA/OSHA Compliance

810 OSHA Training

811 Radiation Training

812 Legal Services

813 Insurance, Environmental Liability

814 Pollution Prevention Consulting Services

2. What is your projected budget for the product(s)/service(s)?

815 over \$200,000

816 \$100,001-\$200,000

817 \$50,001-\$100,000

818 \$10,001-\$50,000

819 \$5,000-\$10,000

820 under \$5,000

3. How immediate is your need for the selected products/services? (select one)

821 3-6 months

822 7-9 months

823 10-12 months

824 over 12 months

SUBSCRIPTION INFORMATION

YES, I would like to receive/continue to receive *Environmental Protection*.

NO, I'm not interested at this time.

Signature _____ Date _____

Title _____

Business Phone (____) _____ FAX No. (____) _____

Please peel address label from cover and affix below. For faster service photocopy this side only and send to our FAX # (312) 922-3165.

NAME _____

COMPANY _____

ADDRESS _____ Home Bus.

CITY _____ STATE _____ ZIP _____ ZIP+4 _____

A. Function which best describes your activity in Pollution Control (check only one):

A Corporate responsibility for Pollution Control

B Manage all Pollution Control Operations at this location

C Supervise sub-group in Pollution Control Operations

D Provide professional consulting service on Pollution Control

E Provide staff environmental service on Pollution Control

Z Other _____

(29) Petrol. & Coal

(30) Rubber/Plastic

(38) Instr./meas./analyze/controlling

B Mining

D Engineering & Contracting

E Utilities, public, private & cooperative

F Govt. including municipal or district sanitary water or wastewater treatment sys. or plants

Type of Govt.: City County State Federal

K Transportation

Q Training

Z Misc. Services _____

C Chemicals

D Parts & equipment for maintenance operation & control

E Services/Consulting

F None of the above _____

E. What types of Pollution Control are you responsible for? (check all that apply)

A Air

C Noise

E Industrial Hygiene

F Toxic & Hazardous Material

G Energy Control/Energy Conservation

H None of the above _____

F. Which of the following publications do you receive personally addressed to you? (check all that apply)

A Pollution Engineering

B Environment Today

C Environmental Solutions

D Pollution Equipment News

E The National Environmental Journal

F Water Environment & Technology

G None of the above _____

C. Number employed at this location:

A 1-19

B 20-49

C 50-99

D 100-249

E 250-499

F 500-999

G 1000-1499

H 1500-2499

I 2500 and up

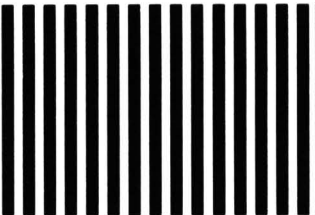
D. In your job function do you recommend, specify or purchase? (check all that apply)

A Pollution Control Equipment

B Instrumentation



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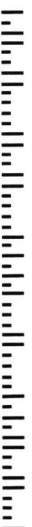
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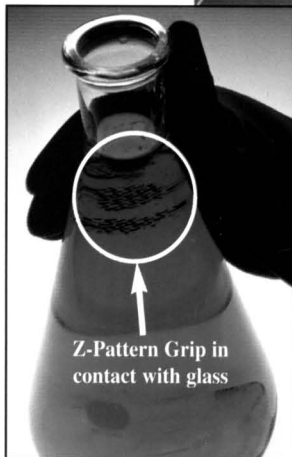


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GET A GRIP

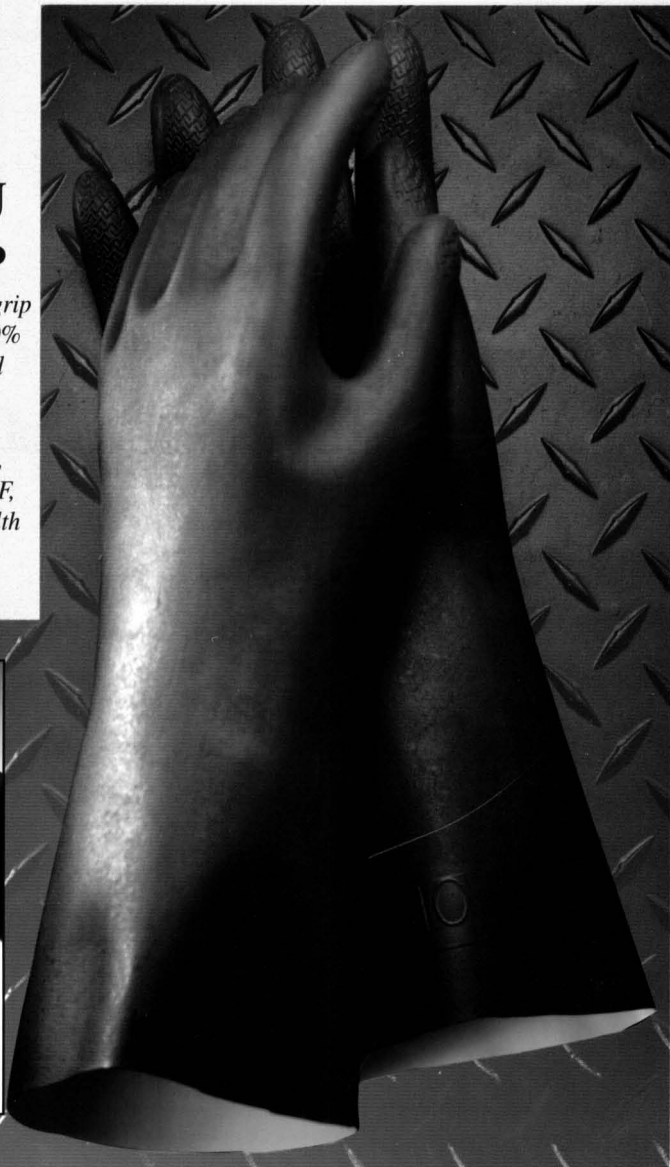
with a Z-pattern embossed-grip glove, the heavy gauge 100% Neoprene Chem-Ply, used

ON TOXIC
compounds such as MEK, methylene chloride, and HF, known severe skin and health

HAZARDS!



Z-Pattern Grip in contact with glass



Compare the new MAPA Professional Chem-Ply chemical-barrier glove to exotic-polymer gloves such as Viton and Butyl-rubber costing two to six times as much. The Chem-Ply's 100% Neoprene construction guarantees long life against toxic chemical permeation. Available in three different gauges, the Chem-Ply lets you match the glove to the job. Choose the heavy 40-mil N-540 against severe hazards such as Haz-Mat work or aggressive solvents, or the lighter 22-mil

N-360 or 30-mil N-440 when more flexibility and dexterity are required. Both the 13" and the *NEW* 18" versions, N-730 and N-740 (available fall '97), feature MAPA's exclusive Z-pattern embossed grip to channel fluids off the working surface, to insure a secure grip. 30- and 40-mil Chem-Ply gloves meet strict NFPA standards for protective clothing. If toxic chemical hazards are causing you to *lose your grip*, call **MAPA Customer Service** today!

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