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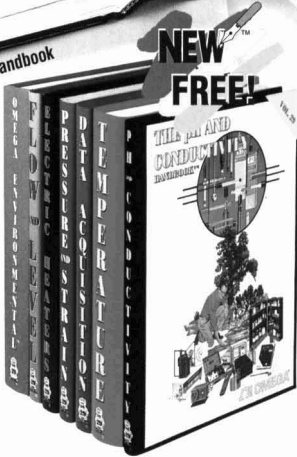
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 E Provide staff environmental service on Pollution Control
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| J <input type="checkbox"/> (23) Apparel | J <input type="checkbox"/> (33) Primary Metal |
| J <input type="checkbox"/> (24) Lumber & Wood | J <input type="checkbox"/> (34) Fab. Metal |
| J <input type="checkbox"/> (25) Furniture | J <input type="checkbox"/> (35) Mach., except Elect. |
| J <input type="checkbox"/> (26) Paper | J <input type="checkbox"/> (36) Elect. & Electron. Mach. |
| J <input type="checkbox"/> (27) Print/Publish | J <input type="checkbox"/> (37) Trans. Equip. |
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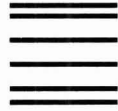
- A Pollution Control Equipment
 B Instrumentation
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 D Parts & equipment for maintenance operation and control
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 F None of the above _____
 (please specify)

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

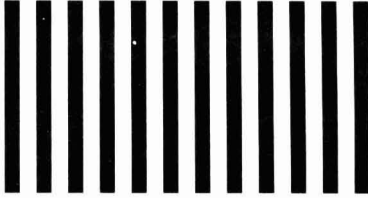
- A Air F Toxic & hazardous materials
 B Water G Energy control/energy conservation
 C Noises H None of the above _____
 D Solid waste disposal (please specify)
 E Industrial hygiene

6. 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
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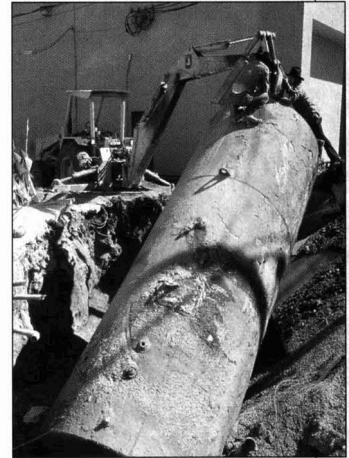
The Environmental Protection Agency named the South Tahoe Public Utility District's 7.7-million-gallon-per-day wastewater treatment plant number one in the nation in 1994. The California district must serve customers while protecting Lake Tahoe. *EP's* coverage of wastewater treatment begins on page 22.

Photo courtesy of Tahoe Public Utility District.

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Environmental Technology Takes Off

The Wright Brothers flew right through the smoke screen of impossibility.

Charles F. Kettering

As exemplified by the Wright Brothers at Kitty Hawk, N.C., in 1903, Americans have a long history of making technological advances that overcome seemingly impossible obstacles. One of the biggest challenges now facing American ingenuity is the environmental crisis created by the population explosion and its dramatic effect on the earth's ecological system.

The earth's current population is about 5.5 billion people who occupy a total land area of about 58 million square miles. More troubling, the world population is increasing by about 100 million annually. In the next 40 to 50 years, the world population is expected to reach about 10 billion people.

The extension of civilization and development has already created major environmental problems, such as declining water and air quality, wide-scale solid and hazardous waste contamination and environmentally related diseases. Continuing runaway population growth will only worsen such conditions.

In response to the problem, the Clinton administration is advocating the concept of "sustainable development," which is the integration of economic and environmental policies to produce more goods and services with less impact on the environment.

Sustainable development is the primary focus of the Clinton administration's National Environmental Technology Strategy (NETS). One of the NETS's main goals is to encourage the U.S. private sector to develop, commercialize and put into use new environmental technologies, which it defines as "hardware, software, systems or services that reduce risk, enhance cost-effectiveness, improve efficiency or create products that are environmentally beneficial."

The NETS divides environmental technologies into four categories: those that avoid environmental harm, control existing problems, remediate past damage, and monitor and assess the state of the environment. The NETS stresses the need to remediate past environmental damage while helping industry shift from waste management to pollution prevention and efficient resource use.

The NETS aims to boost the already soaring growth of the U.S. environmental technology industry. The market for environmental goods and services in the United States currently exceeds \$170 billion and is expected to grow to more than \$210 billion by the year 2000.

Of course, the United States is not alone in its increased demand for environmental technology. The global market for environmental technology is estimated to reach \$400 billion by the end of the decade and grow at rates between 7 percent and 17 percent per year in the developing Third World, creating significant export opportunities for U.S. manufacturers.

It seems impossible to think that technological advances can allow the earth to support double the current world population without significantly impacting natural resources. Yet, Americans have always embraced challenges and are already poised to meet the problem head-on.

Angela Neville
Editor-in-Chief

Environmental PROTECTION

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NEWS UPDATE

Firm to Pay Love Canal Cleanup Costs

The Occidental Chemical Corp. agreed to pay \$129 million to cover the federal government's cleanup costs at Love Canal, closing a chapter in one of the nation's most notorious toxic-dumping cases. Under the settlement, the Environmental Protection Agency's Superfund will receive \$102 million and the Federal Emergency Management Agency, which handled the relocation of Love Canal residents and initial cleanup, will receive \$27 million.

The federal government agreed to con-

tribute \$8 million toward cleanup costs to put to rest Occidental's claim that the government shared responsibility for contaminating the site near Niagara Falls, N.Y.

Dug in the 1890s for an abandoned dropower project in upstate New York, Love Canal became a dump site during World War II. Occidental's corporate predecessor, Hooker Chemicals & Plastics Corp., buried 22,000 tons of chemical waste there from 1942 to 1953. Later a housing development was built on the site.

Last year, Occidental agreed to pay New York \$98 million toward cleanup of the

site. The state had originally sought \$630 million in damages. Litigation is pending between the company and the city of Niagara Falls, as are suits brought by 90 former area residents.

Dog Chow Doubles as Sludge Chow

The city of Georgetown, Ky., bought a ton of Big Red Nuggets dog food at Christmas, not to give four-legged critters a present but to nourish its wastewater-treatment-plant bacteria over the holidays. The wastewater plant handles only waste from a nearby Toyota plant, which shuts down every year for 10 days around Christmas.

Without the industrial and human waste from Toyota, the beneficial microorganisms in the treatment plant's sludge tank could starve.

At many treatment plants in similar situations, operators ship in waste from other plants to keep the bacteria alive during holiday shutdowns. But five years ago, Georgetown found a cheaper way to do the trick and has been using it since.

The holiday kibbles cost the city \$520, which included a discounted price of \$13 a bag compared to \$14.55 retail. The plant has the dog food ground into a powder the consistency of sand so it mixes easier.

EHS Managers Up Against a 'Green Wall,' Survey Says

A "green wall" exists between environmental and business staffs of many companies, creating a roadblock to successfully managing corporate environmental issues, according to a recent survey.

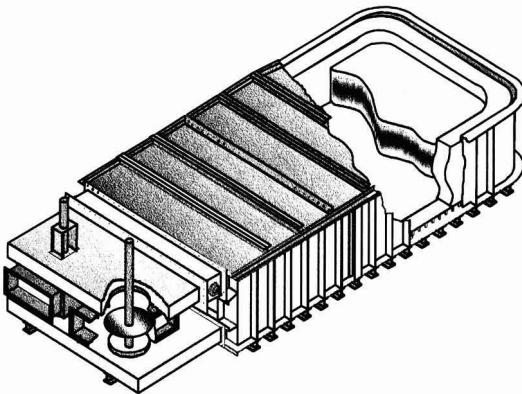
Conducted by the consulting firm, Arthur D. Little, the survey queried managers of 185 U.S. and Canadian companies. They identified two impediments to improving their company's environmental management—lack of integration between environmental and business issues in the company, and their own failure to convince management that the environment is an important issue.

Several respondents noted that despite their own belief that good environmental management provides a competitive edge, environmental health and safety managers were commonly viewed as an outside operation whose mission was to "keep the company out of trouble."

A number of EHS managers said management frequently doesn't understand or support the EHS function and its potential contribution to the company's bottom line.

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Bioremediation Continues to Grow, but at Slower Pace

Despite the current Congressional quagmire, the environmental restoration market continues to grow as emphasis shifts from studies to actual cleanup, according to a recent report by the New York, N.Y., research firm, FINDS/SVP.

Fueling the growth are new studies that show contaminants once thought to be resistant to biodegradation are now susceptible to bioremediation using new technologies.

Bioremediation is not only the most environmentally benign cleanup technology, it is often the least expensive and fastest, according to the report. Despite the advantages—and the growing number of sites requiring cleanup—the market for bioremediation services faces several formidable challenges.

One is the current mood of Congress, which has placed environmental issues on the back burner and appears bent on dismantling the Environmental Protection Agency, according to the report. Another is the complicated regulatory and technological environment in which the industry operates.

Despite the challenges, FIND/SVP projected the market for bioremediation products and services to grow at a compound annual rate of 16 percent to the year 2000. Although the market has slowed from the 42-percent compound annual growth rate of the industry between 1986 and 1992, it is still a healthy forecast, according to the research firm.

Toxic Wastes Cloud Sunshine State's Image

Florida may be the home to the world-famous mouse and his theme park, but it is also home to toxic wastes generated by paper mills, phosphate fertilizer factories and other industries.

The other side of Florida—the side not promoted on tourism brochures—is the part that environmentalists say more residents should be concerned about.

An Associated Press analysis of five years of federal Toxic Release Inventory records identified the state's top 25 polluters and the state's toxic hot spots.

Many of the state's worst toxic polluters have made progress reducing the amount of chemical waste they release into the environment. The overall amount of toxic chemicals released in Florida dropped by 61.9 million pounds, or 26 percent, over the five-year period analyzed.

Nevertheless, one-third of Florida's 67 counties saw toxic waste totals grow during that five-year period—some dramatically. Twelve of the top 15 toxic polluters in the most-recent statistics for on-site releases were phosphate fertilizer plants or pulp-paper mills.

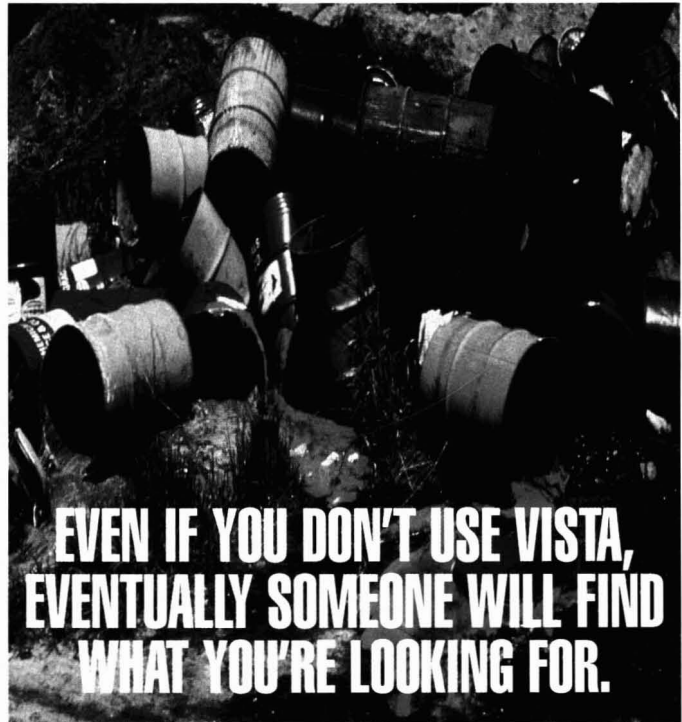
California Kills Pollution Credit Trade Expansion

Southern California's smog-fighting agency shelved expansion of a program that allows industry to buy and trade pollution credits. The RECLAIM program was

to expand from about 300 companies to more than 1,300 in the Los Angeles basin.

But industry leaders, who had initially endorsed the plan, withdrew their support because they believed the proposed limits were too stringent. The agency had considered opening up the smog credit market to a wider range of polluters, such as trucking companies.

Though environmentalists said the existing program had no teeth, they denounced any move to scale it back. The South Coast Air Quality Management District board now has to come up with a



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The retreat from the RECLAIM plan was the latest in a series of setbacks to government efforts to clean the state's air. In December 1995, the California Air Resources Board scaled back its mandate requiring car makers to sell about 200,000 electric cars between 1998 and 2003. The South Coast district also repealed its car-pool regulations, replacing it with a menu of options allowing businesses to reduce emissions caused by commuting employees.

Despite Ban, Illegal Wood Burning Goes Unchecked

Woodburning violations are widespread across the Denver, Colo., metropolitan area, but little is done to prosecute the violators, according to state records.

Instead, regulators have turned to new programs—such as replacing winter road sand with more expensive de-icing chemicals—to help the Denver area meet federal particulate air-pollution standards.

In addition to Denver and Boulder,

Colo., where burn-control programs have been in place for a decade, 16 other Colorado cities have banned wood burning when winter pollution levels rise too high.

Last winter, wood burning was banned on 101 of 151 days. Yet in Denver, 60,000 homes burned fires illegally during the burning prohibitions that the state calls "red days." Only two violators were prosecuted.

Despite the low prosecution rate, environmental officials said state anti-pollution laws and related local ordinances are successful because of voluntary compliance. Wood smoke still comprises about 10 percent, or 4.1 million tons per day, of local particulate air pollution.

Energy Savings Loses Luster; Firm Pulls Plug on Device

A Boulder, Colo.-based manufacturer of energy saving devices has pulled the plug on business because of waning interest in conservation. Green Technologies produced an energy saving device called a GreenPlug, a voltage-reduction unit plugged into large appliances, such as refrigerators and freezers to reduce the appliances' energy consumption.

Though the company distributed the product nationally through chains including Home Depot and Walmart, sales never reached the desired levels. Sales that at one time topped 50,000 units a month dwindled to less than 2,000 a month, forcing the company to close its doors.

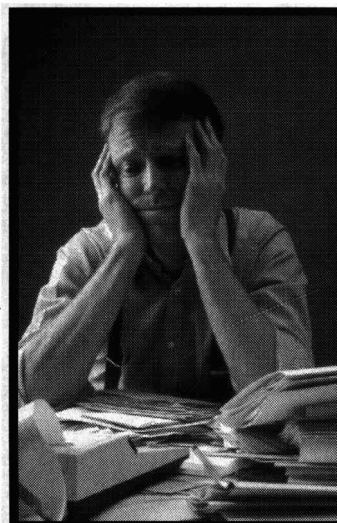
Founded by John D. Hays, who also founded the herbal tea company, Celestial Seasonings, Green Technologies met the same demise as some other environmental businesses, such as *Buzzworm Magazine*. "We started out great, but the mass market just isn't there to sustain environmental products," Hays said.

California Highway Patrol Becomes Smog Busters

The California Highway Patrol is enforcing a different type of law in San Diego County. In addition to stopping drivers violating moving-vehicle laws, officers also have begun stopping drivers whose cars are "gross polluters."

Using infrared technology that measures emissions from cars traveling over on-ramps, highway patrol officers will be able to identify vehicles emitting pollutants.

Polluters will be required to have their vehicles tested within 30 days at a state-run emissions testing station. Within 60 days of being tagged by police, the polluters must prove they have reduced the



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emissions levels within the legal limit.

The state won't take action until a vehicle has been tagged as a gross polluter more than once. Drivers who refuse to have the tests and repairs can be fined \$5 per day up to \$500, which will be charged through the annual vehicle registration.

Though official records show that 18.1 percent of the state's 24 million vehicles fail to meet the 12-year-old Smog Check program, roadside vehicle tests show about 45 percent actually fail the test.

The portable testing system, including a van and infrared detectors, costs \$100,000 to \$150,000 apiece. The state plans to have 20 of them in the field by the end of 1996.

Diminutive Mollusks Causing Colossal Wastewater Problems

Operators of the Reno-Sparks, Nev., wastewater treatment plant have a big problem on their hands—tiny snails that are causing the plant to violate nitrate discharge limits. The city councils of both towns awarded engineering and construction contracts worth \$1.8 million for new equipment to make it easier for the plant to kill the snails.

In the meantime, the plant is operating under a temporary permit allowing it to discharge 1,665 pounds of nitrogen daily. During December 1995, the plant averaged 2,084 pounds a day.

Since the snail problem arose in July 1994, the plant has not been able to meet its 500-pound-a-day nitrate discharge limit.

Millions of snails have inhabited the plant's four denitrification towers and have an appetite for the beneficial bacteria that feed off hydrogen in ammonia. Plant operators believe the snails originally came from someone's aquarium or arrived on the legs of ducks that frequently swim around the plant's pond.

California County Wants Sludge Studied Before OK'ing its Use

Monterey County, Calif., wants to find out just how safe treated sewage sludge is to use on crops, and county leaders are hoping to conduct a five-year study. The missing ingredient is funding, which they hope to secure through the California Water Resources Control Board.

Though the study would be conducted along the California coast south of San Francisco, Monterey County environmental health director Walter Wong said the results would be applicable to other areas of the state. Until a study is conducted, Monterey County won't allow

treated sludge to be used on a regular basis.

A 1991 state law has put wastewater plant operators under the gun to reduce the amount of material they send to landfills by 25 percent before Dec. 31, 1995, and by 50 percent by the year 2000. Sludge purveyors have looked to farmers as recipients because of the large amount of land on which they could spread the material.

Group Favors Keeping Pollution-Control Rules

In a rare bipartisan consensus, a presidential panel said existing pollution con-

trol rules could be improved but they shouldn't be weakened.

The recommendations, which were forwarded to President Clinton, come despite Republicans last fall demanding that anti-pollution rules be rolled back.

The President's Council on Sustainable Development, comprised of an unlikely mix of industry and environmental groups, also called for a thorough review of taxes and corporate subsidies.

The goal is to raise taxes on pollution and consumption in exchange for cutting income taxes. **EP**

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THE GRAPEVINE

A subsidiary of **ICF Kaiser International Inc.**, Fairfax, Va., won a \$111 million contract to support the marketing and communication efforts of the Environmental Protection Agency's Energy Star programs....Frank J. Meyer has been named director of sales for chemical processes at **CSM Environmental Systems**, of Summit, N.J.

Westinghouse Savannah River Co. selected Ogden Environmental and Energy Services Co. Inc., of Fairfax, Va., to provide environmental management and technical support services to the Department of Energy's Savannah River facility in North Carolina....**Planet Polymer Technologies Inc.**, of San Diego, Calif., announced an agreement with Mitsubishi Corp. and Nippon Shokubai Co. Ltd. for exclusive distribution in Japan of its EnviroPlastic resins, which will be marketed under the trade name "Lunare"....**Montgomery Watson**, of Pasadena, Calif., and a client, ARCO Alaska Inc., were awarded the 1995 Industrial Water Quality Achievement Award for optimizing the Prudhoe Bay

Operations Center wastewater treatment plant in Alaska.

GTS Duratek, of Columbia, Md., and **BNFL Inc.** announced an agreement formalizing a previously announced strategic alliance under which the two companies will jointly pursue major Department of Energy waste stabilization projects....**ERM Computer Services** and **ENFLEX®** environmental, health and safety databases have been sold to Information Handling Services Group, of Englewood, Colo....Michael Basel was appointed quality assurance director for **CDF Corp.**, a Plymouth, Mass., manufacturer of plastic drums and pail liners, inserts, and lids and covers for industrial use.

Nalco Fuel Tech, of Naperville, Ill., was awarded two contracts to supply the NOxOUT® process for two municipal solid-waste incinerators in northern Italy....Greg Buffaloe joined **Action Instruments** of San Diego, Calif., as southeastern regional sales manager....John W. Snow, chairman, president and chief executive of-

ficer of **CSX Corp.**, was elected 1996 chairman of the board of the **Association of American Railroads**, which is based in Washington, D.C.

Steven J. Eckard assumed the responsibility for daily operations for **Enthalpy Analytical Inc.**, a laboratory specializing in analysis of stack testing samples and based in Raleigh, N.C.

Kirby L. Cramer and Henry E. Riggs were elected directors of **International Technology Corp.**, an environmental management company based in Torrance, Calif....**EcoWater Systems Inc.**, of St. Paul, Minn., has a home page site on the World Wide Web with an address of www.ecowater.com.

Monsanto Enviro-Chem, of St. Louis, Mo., announced the licensing of a patented treatment process with ICI Katalco of Cleveland, England, for Odorgard™....**Smith Fiberglass Products Inc.**, of Little Rock, Ark., formed a joint venture with the Harbin Composites Corp. to supply fiber-

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glass pipe to the Chinese oil industry....**Accutech Remedial Systems Inc.**, of Keyport, N.J., and **DOWA Mining Co. Ltd.**, of Tokyo, Japan, have entered into an agreement for DOWA to market and apply Accutech's soil- and groundwater-cleanup technologies in the Japanese market.

NFS-Radiation Protection Sytems, of Old Lyme, Conn., has taken up residence on the World Wide Web at <http://www.nfsrps.com>....**American Waste Services Inc.**, of Warren, Ohio, announced that its subsidiary, **American Landfill Inc.**, and the Ohio Environmental Protection Agency have an agreement resolving outstanding compliance issues at the facility....**Earth Tech**, a Long Beach, Calif., engineering firm, announced earnings of 15 cents for the fourth quarter ended Aug. 25, 1995, and 51 cents for the fiscal year.


BOC Gases, of Murray Hill, N.J., was the first industrial gas company to receive certification from the National Sanitation Foundation for carbon dioxide....**Odetta Mina** was hired as the director of **SSM/Laboratories Inc.** and **Lorraine E. Faccenda** was promoted to manager of the Reading, Pa., firm....**Elf Aquitaine Production** has asked **Petrosystems** and **ESRI France**, the French arm of the Redlands, Calif., firm, to develop a new POS: C-compliant information system.

John D. Johns joined **ECO Purification Systems U.S.A. Inc.** to coordinate marketing and sales of the Baltimore, Md., company's environmental process equipment for the treatment of industrial waste and process water....The Environmental Protection Agency awarded a contract to **URS Operating Services Inc.**, of Denver, Colo., to provide services for the Superfund Technical Assistance and Response Team program in Region VIII....**Rust Environment & Infrastructure**, a subsidiary of **Rust International of Greenville, S.C.**, is providing environmental consulting and remediation management services for Boston's Central Artery/Tunnel project.

Thomas J. Brennan joined **Semcor Inc.**, a Mount Laurel, N.J., engineering consulting and services corporation, as director of operations....**Environmental Science & Engineering Inc.**, of Peoria, Ill., created a new subsidiary, **Ordnance/Explosives Environmental Services Inc.**, to address unexploded artillery and explosive waste and debris.

Fluor Daniel Inc., Irvine, Calif., and **Groundwater Technology Inc.**, Norwood, Mass., agreed to merge Fluor Daniel's environmental services unit into GTI, and the combined company will be headquartered in Norwood, Mass....**Wheelabrator Water Technologies Inc.** and the **Betz Water Management Group**, Horsham, Pa., announced the formation of a strategic alliance to pursue opportunities for building, owning and operating industrial water and wastewater facilities on customer sites.

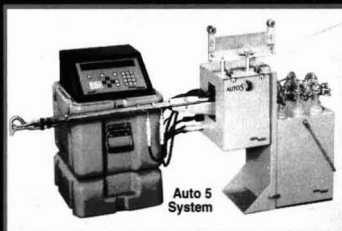
Gruber & Allison Inc., Coral Springs,

Fla., was selected to be the worldwide distributor for **Eco Sensors Inc.**, a manufacturer of low-cost ozone sensors....**MKS Instruments Inc.**, Andover, Mass., signed **Midwest Control Products Inc.** as a representative of its vacuum process management products in the Mid-Atlantic and Midwest United States....**Dean L. Buntrock**, chairman and chief executive officer of **WMX Technologies Inc.**, Oak Brook, Ill., was selected one of 10 Americans who triumphed over great adversity and achieved remarkable success to receive the 1996 **Horatio Alger Award**. 

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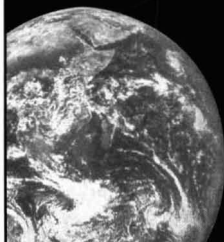
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When in Doubt, Check it Out... Get That Second Opinion

ARE YOU REALLY HONEST? HONEST WITH YOURSELF, your clients and your kids and neighbors? Or do you have a different set of ethics for friends and family, another for co-workers and still another for clients? How does this question relate to the need for a second technical opinion?

Several recent experiences with remediation projects have called to mind the ethical failure of many in our profession. In the first instance, a consultant in Illinois performed an assessment for the owner of a former gas station site which had been converted to a convenience store. The consultant reported contamination based upon the results of a photo-ionization detector survey without any laboratory confirmation. The cost for the poor and incomplete assessment was about \$30,000. A second consultant called in later performed the sampling and cleanup work and obtained closure on the site for less than \$10,000. Was the second technical opinion valuable to the property owner? Definitely.

Again in Illinois, a consultant performed an assessment and reported finding deposits that indicated a heavy oil leak and told the owner to report the "incident" to the state as a release. The owner became suspicious and retained another firm for a second technical opinion.

The second consultant reviewed the earlier work and found that a sample of asphalt pavement, which had been in place for a number of years, was being erroneously reported as the heavy oils that were in need of remediation.

In many Southeastern states, underground storage tank (UST) program personnel are so overworked that they are accepting closure reports without review. Consultants and owners are recommending "no further remediation" alternatives while there is still free product petroleum on the sites. Prospective purchasers of the property need to beware of the residual contamination—they need a second technical opinion.

In Georgia, a large international manufacturing firm sold a division to a smaller firm. In the process of the sale, the big firm first corrupted the assessment process

by demanding a separate report for prospective purchasers—a report that did not show all the environmental liabilities. The seller then retained a different firm to perform illegal and incomplete cleanups at the buyer's sites after the sale was completed. At one site, soil containing more than 1,500 parts per million of polychlorinated biphenyls was deliberately mischaracterized and sent to a nonhazardous landfill for disposal. The buyer could have used a second technical opinion.

In Georgia, a church bought the adjoining property that contained a house and garage. The seller was a contractor who had a valid blasting license and a hobby of racing cars. When the church members found old dynamite and blasting caps in the basement of the house and a number of partially filled drums of unknown material beside the garage, the membership called the bomb squad and a remediation firm. The cleanup firm thought they had found a mother lode.

The bomb squad removed the explosives and cleared the area before performing any remediation work. The cleanup firm performed some necessary remediation work including overpacking the leaking oil drums, consolidating the waste drums and collecting samples. The firm slanted the sampling program and descriptions to make the problems appear worse than they were. The firm even biased its sampling program and description to alarm the church board.

Fortunately, some church board members became suspicious about the proposed scope of activities and got a second opinion. The church's consultant debunked the false claims and hysterics in the remediation report and recommended a much smaller scope of remediation, which would clean up the small quantity of contaminated soil. The remediation was accomplished for one-fifth the total cost estimated by the remediation firm. A second technical opinion paid off.

In these instances, profitability was determined to be more important than integrity and character. Deliberate efforts were made to inflate the customer's bill and take money for poor or subprofessional work.

We cannot ignore the fact that each of us has our own viewpoints and self-interest. Our perspectives and professional judgment are reflected in our writing and our action. We also have a boss to whom we must report, and we are under pressure from that person to do our

Though requiring a second opinion was a way of ensuring accuracy and managing liability, it now may be a good idea for all technical matters and documents.

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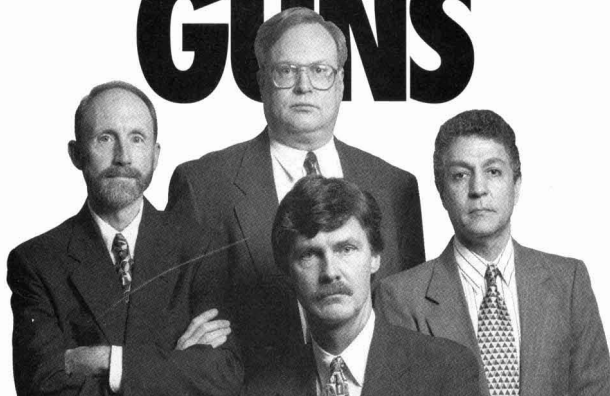
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Commentary

jobs well and profitably.

We also have a second boss—one with whom we live constantly—our inner voice. When we look at ourselves in the mirror of honest self-examination, what do we see? Is our mirror reflecting someone with a balanced professional judgment and viewpoint, or is it reflecting a dishonest moral and ethical failure? Who are we really serving and for what cause?

How does unethical behavior impact our lives and our careers? One has only to look at the bankruptcy of Florida's UST trust fund. It is a microcosm of where Superfund is headed.

The reasons for the bankruptcy are too numerous to recount, but it is almost as if the regulators and the cleanup contractors conspired to make the cleanup process as difficult and expensive as possible.

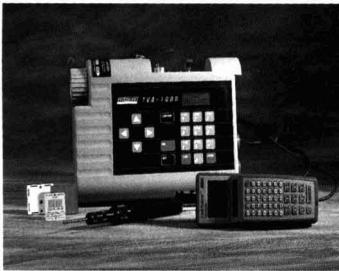
All of us need to take a step back and review our actions and their consequences, especially when we deal with the interpretation of facts. The idea of getting a second or independent opinion is not new. Other professions have been doing it for years, especially in the legal field. The time has come to codify it into the environmental profession.

In the geotechnical business and other related fields, some firms have required a second technical opinion as formal policy. In some instances, this policy, which requires two signatures, covers all letters that say anything more than "hello." Other firms subject reports and technical documents to a "peer review" committee before they are sent out.

While the practice of requiring a second technical opinion was instituted primarily as a method of ensuring accuracy and managing liability, it now may be a good idea in relation to all technical matters and documents to ensure ethical performance and truthfulness. It may help reduce some of the questionable ethical practices in the field. Perhaps one of the professional societies would be willing to set up and sponsor such a group, even if only on a trial basis. Long term, I see the need for such an activity being carried out by a professional licensing and ethical standards board. This board could regulate the conduct of our profession among our members, much as the professional engineers' boards regulate the conduct between consultants and clients. **ED**

David L. Russell is a professional engineer and president of Global Environmental Operations Inc. in Lilburn, Ga.

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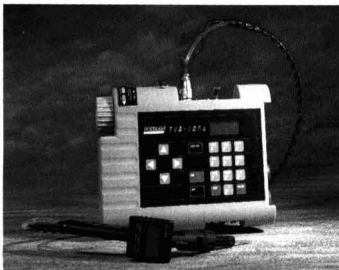
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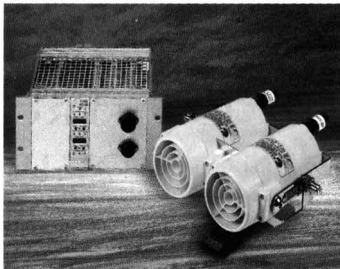
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TECHNOLOGY PROFILE

AIR POLLUTION CONTROL AND MONITORING EQUIPMENT

The ability to detect toxic gases and control fugitive emissions is important in an industrial environment. This profile highlights air pollution control and monitoring equipment currently used in the market.

Continuous Gas Analyzer

The Enviro-FTIR is designed for continuous monitoring of stack emissions and provides simultaneous measurement of gases such as HCl, SO₂, NO, NO₂, HF, CO, CO₂ and H₂O. The heated extractive gas-handling system maintains sample integrity that is necessary for monitoring the highly water-soluble components in up to 40 percent water. Based on the FTIR Spectrometer, the FTIR precisely measures absorption over an entire range of wavelengths, allowing the Enviro-FTIR to measure the concentration of many different gases simultaneously.

Applied Automation.

Circle 60 on card.

Mini Gas Detector

The MD-16 is a series of single gas, wall-mounted, continuous detectors for toxic gases and oxygen. Dedicated units are available for the continuous monitoring of carbon monoxide, chlorine, hydrogen, hydrogen chloride, hydrogen cyanide, hydrogen sulfide, nitric acid, nitrogen dioxide, oxygen and sulfur dioxide. Alarms can be tested, silenced and reset remotely by shining a flashlight on the front panel. CEA

Instruments Inc.

Circle 61 on card.

Leak Detector

The new Regal Chlorine Gas Detector is designed for reliable use wherever chlorine is stored,

distributed, or where potential leakage would pose a risk for personnel and property. The detector senses and displays the presence of free chlorine in the environment throughout the life of the sensor. Features three-digit display, bar graphs, warning alarm, and is capable of transmitting digital information for computerized data logging. Chlorinators Inc.

Circle 62 on card.

Portable Hydrocarbon Analyzer

ViewPort is a portable hydrocarbon analyzer for fugitive emissions monitoring and is designed to be a complete monitoring system, integrating sampling, datalogging and report generation all in a single package. Its design features user-friendly Window-type screens accessed through an intuitive touchscreen and a powerful built-in datalogger.

Control Instruments Corp.

Circle 63 on card.

Personal Gas Detectors

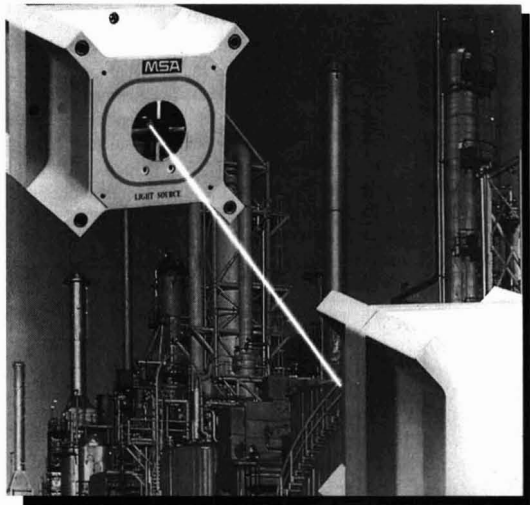
The new Spectrum series features inexpensive, high-performance, microprocessor-based personal gas monitors featuring simple operation, large easy-to-read continuous digital display and a new generation of toxic sensors in a small, durable package. Instruments are available to monitor CO, H₂S, CL₂, HCN, SO₂, NH₃, and O₂.

Enmet Corp.

Circle 64 on card.

Open Path Gas Detection

SafEye Gas Detection System is a new long-range open-path gas detection system that can detect hydrocarbons and toxic gases from very low concentrations to the lower explosion limit. By



Open Path Gas Detection – MSA

using the optional ultraviolet detector, hydrogen sulfide and aromatic hydrocarbons can be detected. MSA.

Circle 65 on card.

Oleum Vent Package

The Oleum Vent Package is a fully-engineered skid-mounted package used to collect oleum and SO₃ from storage and loading/unloading operations. Without control, upon exposure to moisture in the air, oleum/SO₃ emissions form a persistent, corrosive and toxic acid fog. The package includes a fan, a hydrolysis section to convert the oleum/SO₃ to acid mist, and a high-efficiency Brink® Fiber Bed Mist Eliminator to collect the acid. It is traced and insulated for outdoor installation. Monsanto

Enviro-Chem Systems Inc.

Circle 66 on card.

Precipitator Upgrades

A new product sheet titled "Precipitator Upgrades and

Rebuilds" describes Wheelabrator's capabilities, experience and knowledge in providing system and equipment improvements, major rebuilds, upgrades and technical services for all types of electrostatic precipitator designs. Wheelabrator provides pre-engineered and custom-engineered systems and services that measure and control particulate and acid gases, volatile organic compounds, hydrogen sulfide and nitrogen oxides. Wheelabrator Clean Air Systems Inc.

Circle 67 on card.

Combination Fuel Burner

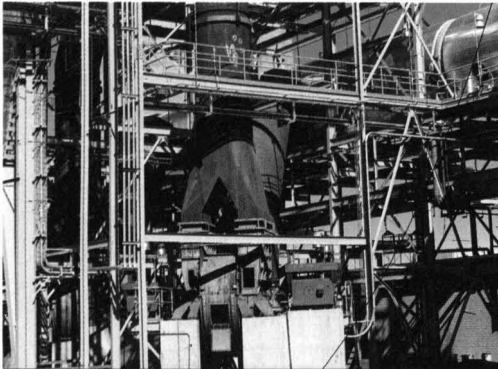
The INFURNO_x™ Combination Fuel burner achieves extremely low emissions and also radically reduces the emission of particulates. The technology combines in-furnace gas recirculation with other combustion modification techniques to achieve the lowest NO_x emissions generated from a combustion source. John Zink.

Circle 68 on card.

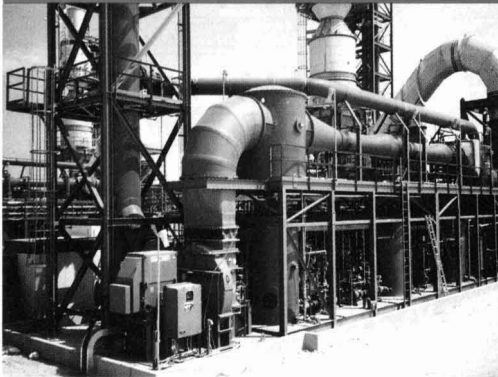
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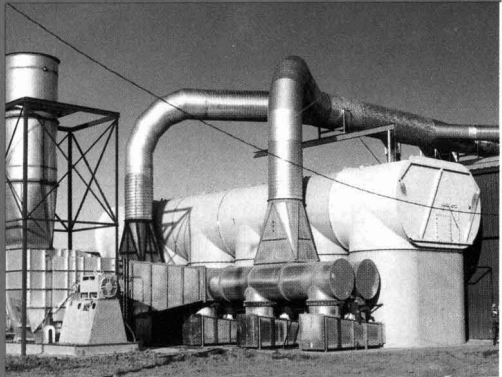
Application: Pollution control system for a copper mining and processing facility
Fan description: 1000-hp, induced-draft fan with center support casing
Special considerations: Designed for 800° F service



Application: Sewage sludge incinerator
Fan description: Seven 800-hp, single-inlet, induced-draft fans of alloy construction
Special considerations: Fan is located downstream from a venturi scrubbing system.



Application: Incinerator
Fan description: 600-hp, single-inlet, induced-draft fan installed downstream from a gas scrubber. Rotor is high nickel alloy with heavy-duty fiber-glass casing.
Special considerations: Fan handles extremely corrosive gas.



Application: Thermal oxidizer incineration system
Fan description: 700-hp, double-inlet, induced-draft fan
Special considerations: Thermal regenerative oxidizer is used in the incineration of waste process materials. Fan must withstand temperatures of 1000° F.

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1996 WATER AND WASTEWATER MANAGEMENT SOFTWARE GUIDE

Water and Wastewater Management Software Guide

COMPANY	SOFTWARE	DESCRIPTION	STORMWATER MGMT.	GROUNDWATER MGMT.	DRINKING WATER	COMBINED SEWER	OVERFLOW	WASTEWATER	WATER QUALITY	PARAMETERS	PERMIT TRACKING	MONITORING	MODELING	REPORTING	DEMO	COST: \$100-\$500	COST: \$500-\$1,000	COST: >\$1,000	
AV Systems 4657 Platt Road Ann Arbor, MI 48108-9726 313-973-3000 Fax: 313-677-4480 Circle 72 on card.	MIRS	Comprehensive, modular, integrated software for environmental management and compliance.	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
	NPDES	MIRS module for water-related environmental data management and compliance.	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Achieve! Technology Inc. P.O. Box 668 Amherst, NH 03031-0668 603-595-1414 Fax: 603-595-0088 Circle 73 on card.	FastRegs	Regulation management software that provides federal and state regs on CD-ROM or diskettes.	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Alternative Systems Inc. (ASI) 225 S. Cabrillo Hwy. Ste. C Half Moon Bay, CA 94019 415-726-5700 Fax: 415-726-7846 Circle 74 on card.	TINIA	Integrated ESOH data management system.	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Citation Publishing Inc. 1435 N. Hayden Road Scottsdale, AZ 85257 602-994-4560 Fax: 602-994-4456 Circle 75 on card.	FESA	Comprehensive regulatory compliance database, covering all OH&S-related topics.	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Cochrane Associates Inc. 155 Massachusetts Ave. Boston, MA 02115 1-800-4-TRECOM Fax: 617-247-2785 Circle 76 on card.	TREDAT	Data handling and reporting (NPDES, state reports).	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
	TREMAIN	Maintenance work order management.	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
	PreTre2	IPP management.	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Computational Mechanics Inc. 25 Bridge St. Billerica, MA 01821 508-667-5841 Fax: 508-667-7582 Circle 77 on card.	PRISE	Calculates air- or waterborne effluent dispersion.	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
	Applied Envirometrics	Calculates air- or waterborne effluent dispersion of three scientific tables: hydrological, oceanographic and meteorological.	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Dakota Software 7 Tobey Village Office Park Pittsford, NY 14534 716-381-8710 Fax: 716-381-1614 Circle 78 on card.	Audit Master	Walks users through an audit to develop profile of compliance status with EPA, OSHA and DOT regulations.	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Environmental Systems & Technologies Inc. 2608 Sheffield Drive Blacksburg, VA 24060 540-552-0485 Fax: 540-951-5307 Circle 79 on card.	ARMOS	Models groundwater and separate phase hydrocarbon migration and recovery.	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
	BIOTRANS	Transport and natural attenuation of organic chemicals.	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
	SPILLCAD	Tool kit for subsurface hydrocarbon spill assessment and product recovery system design.	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
	BIOVENTING ^{plus}	Design of soil vacuum extraction, bioventing, air sparging and related systems.	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
	PMWIN	Integrated Windows™ model for groundwater flow and transport with MODFLOW and MT3D.	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
	EQWin	Environmental data management system.	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
	RBCA Tool Kit	Risk-based corrective action calculations for Tier 2 ASTM guidelines.	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
EarthInfo Inc. 5541 Central Ave. Boulder, CO 80301 303-938-1788 Fax: 303-938-8183 Circle 80 on card.	CD-ROM	Fast access to vast amounts of weather, water and soil data.	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	

1996 WATER AND WASTEWATER MANAGEMENT SOFTWARE GUIDE

COMPANY	SOFTWARE	DESCRIPTION	STORMWATER MGMT.	GROUNDWATER MGMT.	COMBINED WATER	OVERFLOW	WASTEWATER	WATER QUALITY	PARAMETERS	PERMIT TRACKING	MONITORING	MODELING	REPORTING	DEMO	COST: \$100-\$500	COST: \$500-\$1,000	COST: >\$1,000
EcoAnalysis Inc. 221 East Manila St. Ojai, CA 91214 805-646-1461 Fax: 815-646-4141 Circle 81 on card.	LabTRAQ	Laboratory Information Mgmt. System (LIMS).					▲	▲	▲	▲	▲	▲	▲				▲
	EcoDB	Fully integrated database and GIS system for all types of environmental data.	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲				▲
	TOXIS	Software to manage toxicity labs, calculates EPA statistics and produces reports.						▲	▲				▲				▲
	EAP	Ecological Analysis Package is a comprehensive set of multivariate analysis programs for environmental data.	▲	▲	▲			▲	▲			▲					▲
Hoestad Methods 37 Brookside Road Waterbury, CT 06708 203-755-1666 Fax: 203-597-1488 Circle 82 on card.	StormCAD for Windows	Storm sewer design and analysis.	▲								▲	▲	▲	▲	▲		
	SewerCAD for Windows	Sewer design and analysis.	▲				▲				▲	▲					
	FlowMaster for Windows	Pipe and open channel flow design and analysis.	▲								▲	▲			▲		
	Pond Pack (Pond-2 and Quick TR-55)	Urban stormwater management and detention pond design.	▲								▲	▲					▲
	CYBERNET	Water network modeling.	▲					▲			▲	▲		▲	▲	▲	
	KYPIPE2	Water network modeling.	▲					▲			▲	▲					▲
	CulvertMaster	Culvert design and analysis.	▲								▲	▲		▲			
Hydromantis Inc. 1685 Main St. W. Ste. 302 Hamilton, Ontario Canada L8S 1G5 905-522-0012 Fax: 905-522-0031 Circle 83 on card.	GPS-X	Interactive modeling and simulation of wastewater treatment plants.					▲	▲	▲	▲	▲	▲	▲	▲			▲
	SimWorks	Interactive simulation of wastewater treatment plants. Uses models developed in the GPS-X software and is Windows-based.					▲	▲			▲	▲					▲
	Capdet-PC	Preliminary cost estimation of new wastewater treatment facilities. Batch processing and DOS-based.						▲	▲		▲						▲
	Mass Balance	Mass balance calculation software for wastewater treatment plants. Windows-based.						▲	▲		▲						▲
	MIDUSS	Interactive design of stormwater system with pipes, channels ponds and diversion structures. Unlimited size.							▲		▲						▲
Intec Controls Corp. 55 West St. Walpole, MA 02081 508-660-1221 Fax: 508-660-2374 Circle 84 on card.	Paragon TNT	PC-based instrumentation and control software for process monitoring of water and wastewater sites, groundwater remediation and other environmental applications.	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Pacific Environmental Services Inc. 5001 S. Miami Blvd. Ste. 300 Research Triangle Park, NC 27709 919-941-0333 Fax: 919-941-0234 Circle 85 on card.	iSTEPS®	MS Windows industrial wastewater management and reporting.					▲	▲	▲	▲	▲	▲	▲				▲
Tahoe Design Software P.O. Box 8128 Truckee, CA 96162 916-582-1509 Fax: 916-582-8579 Circle 86 on card.	HYDROMET, HYDROFLOW and H-CAL	Fluid flow analysis, piping design and operation.	▲	▲	▲	▲	▲				▲		▲	▲	▲		
Water Management Consultants 1401 17th Street #310 Denver, CO 80202 303-297-9005 Fax: 303-297-9007 Circle 87 on card.	WEMGIS	Water and environmental management geographical information system. Windows database with Autocad interface.		▲				▲	▲	▲	▲						▲

Activated Carbon to the Rescue

Activated-carbon cleanup is a fast and efficient way to handle emergency spills.

By Sallil Sen

Images of the aftermath of an emergency spill are all too familiar. The longer it takes to begin cleanup, the greater the injury to the environment, wildlife and the reputation of the companies involved.

In June 1994, a pipeline carrying ethylene dichloride (EDC) ruptured, releasing chemical into a drainage ditch that discharged into a commercial shipping channel. The rupture was caused by external corrosion, which led to pipeline failure. The release occurred on the property of an oil refinery at an underground railroad pipeline crossing.

The oil company implemented its incident command system (ICS) to coordinate the cleanup process. "Because the spill occurred on our property and the threat was so immediate, we didn't waste time determining who was at fault," noted a spokesperson for the oil company.

The company used hydraulic dredging, on-land solids separation and water treatment through activated carbon adsorption to clean up the channel. Carbon will adsorb most organic—and some inorganic—compounds. In the liquid phase, it will adsorb any organic contaminant from the bulk solution. The more soluble a contaminant is in the bulk solution, the more carbon is

needed because its capacity will be lowered since the contaminant will want to stay in the solution. In the vapor phase, the biggest factor affecting the capacity of activated carbon is the vapor pressure of the contaminant. The higher the vapor pressure, the higher the capacity.

More than 10,000 tons of dredge soil and 50 million gallons of surface water

During delivery, changeout, transport, storage, thermal reactivation and return delivery to the site, the carbon never came into direct contact with operating personnel or the atmosphere.

were processed during the emergency response. All of the water was successfully processed through Calgon Carbon's activated carbon and met discharge quality criteria established in conjunction with a multi-agency oversight team.

Using Activated Carbon

The activated carbon removed EDC from the surface water through a system comprised of three sets of dual module vessels.

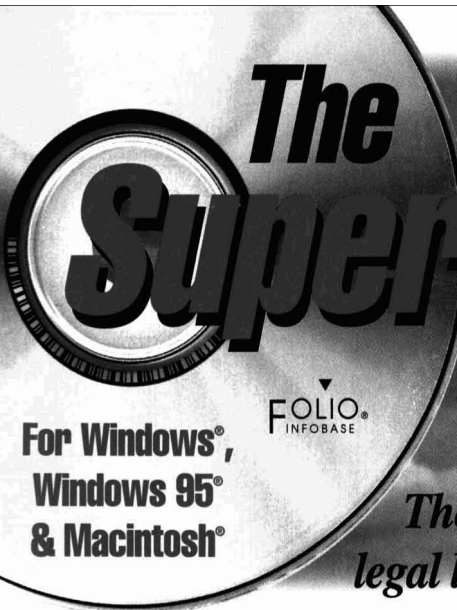
Two parallel sets of two vessels in series were used as adsorbers, each vessel containing 20,000 pounds of carbon. A third set served as a reserve so carbon regeneration could be accomplished without process interruptions.

"At first, the concentration of EDC was so high that we were going through carbon as fast as we could load it," said an oil refinery technician. "After six months, things slowed down to a normal pace."

When carbon is changed, spent carbon is removed from one vessel and placed into a transfer bank. Fresh carbon is unloaded from a trailer into the empty vessel. The spent carbon is then loaded into the same trailer and shipped to Kentucky for thermal reactivation, eliminating the need for solid-waste disposal.

"We were using carbon so quickly in the beginning that we literally didn't have time for certification of carbon acceptance," said a company representative, referring to the protocol for reactivating carbon. "That's why we adopted this transfer-tank system."

At Calgon Carbon's facility, which is under a Resource Conservation and Recovery Act permit, materials adsorbed by the carbon were thermally destroyed and the carbon was reactivated for reuse. During delivery, changeout, transport,



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Activated Carbon to the Rescue



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Vessels of carbon stand ready for an emergency.

storage, thermal reactivation and return delivery to the site, the carbon never came into direct contact with either operating personnel or the atmosphere.

Nearing Completion

From July through December 1994, the refinery used 30 truckloads totaling 600,000 pounds of activated carbon in the cleanup. The EDC concentration fell so significantly in the first quarter of 1995 that carbon use dropped to two truckloads—only 40,000 pounds.

"During the course of the project, the concentration of EDC fluctuated dramatically," said the company's technical representative. "Analytical data proved that the activated-carbon system consistently satisfied the objective of the application, irrespective of EDC concentration. Activated

carbon consistently reduced the varying influent EDC concentration to nondetectable levels. Naturally, as the project winds down, we're using less and less carbon."

The oil company plans to complete the cleanup in the next few months. They will gradually phase out the project, removing one system at a time.

"Naturally, a spill like this is something we hope never to encounter again," said the refinery

engineer. In a matter like this, technological know-how and immediate response are the keys to a successful conclusion. **EP**

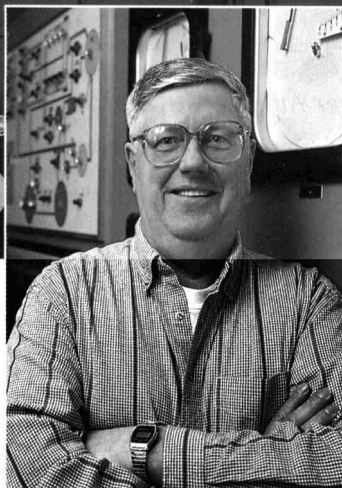
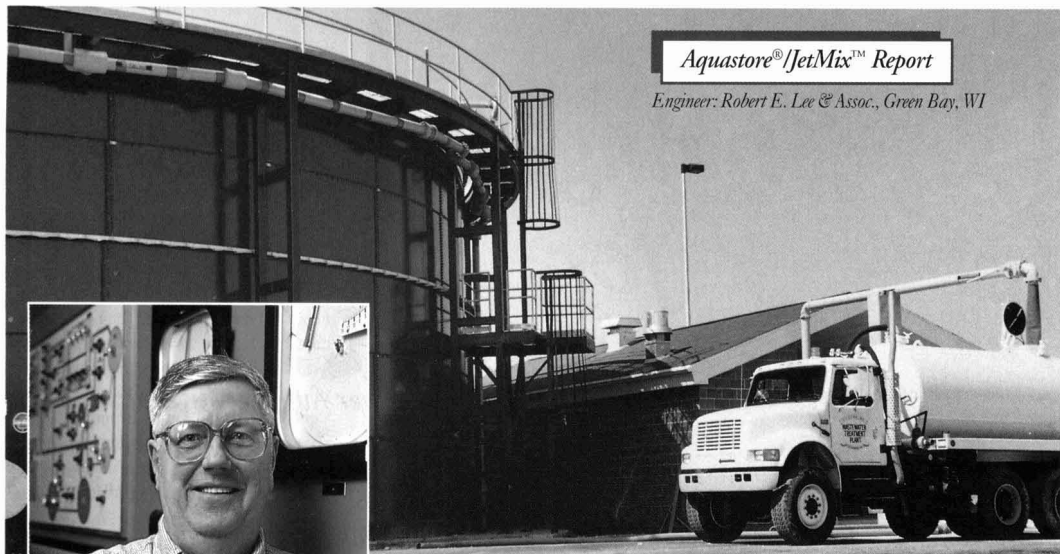
Salil Sen is senior technical sales representative for Calgon Carbon Corp. in Pittsburgh, Pa.

For more information, circle 69 on card.

More than 10,000 tons of dredge soil and 50 million gallons of surface water were processed during the emergency response.

Aquastore®/JetMix™ Report

Engineer: Robert E. Lee & Assoc., Green Bay, WI



“This sludge storage and mixing system is a key part of our successful land application program.” Jim Krueger, Plant Supt./Denmark, WI

Sludge disposal options were finalized in 1993 with EPA regulation 40CFR 503 which mandated the following sludge management practices: land application, land filling and incineration.



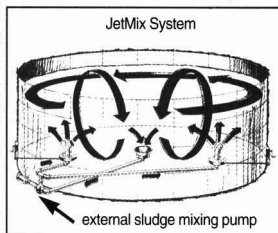
Denmark, Wisconsin chose land application of sludge because it was the best fit for their operation and also gave area farmers an inexpensive source of fertilizer.

For the land application option to work for Denmark, sludge had to be stored for up to six months because

of their northern Wisconsin location. Storing 7% - 8% solids sludge for up to six months is not difficult, however, pumping it out at the end of that time required that sludge be mixed so it could be pumped into land application vehicles.

The estimated energy cost to continuously mix the stored sludge was prohibitive which led to the selection of the JetMix sludge storage and mixing system designed and supplied by Great Lakes Aqua Sales and Service. Krueger reports he turns on the powerful mixing pump only three to four days before sludge is discharged to land application vehicles. This system uses three adjustable nozzles on the bottom of the 70' diameter x 24' high Aquastore® tank.

Krueger says, “This JetMix sludge system thoroughly mixes sludge prior to disposal, providing uniform sludge consistency for proper land application.”



A.O. Smith Harvestore Products has focused its resources on meeting the needs of those municipalities who are considering

land application of sludge. A.O. Smith Harvestore Products, its authorized, independent dealers and Great Lakes Aqua Sales and Service are available to work closely with your engineers to provide an efficient and reliable solution for sludge storage.

For the full story on the Denmark sludge storage and mixing system, call or write today for Case History No. 294.

The JetMix sludge mixing system is designed and supplied by Great Lakes Aqua Sales and Service, Inc.

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Mining the Digesters for 'Black Gold'

The Brazos River Authority in Texas is using European technology to convert treated sewage sludge—once considered a waste product—into a valuable soil amendment.

water and wastewater treatment under contract to many of the region's residents.

The Waco Metropolitan Area Regional Sewerage System, one of three regional wastewater plants the authority operates, serves about 150,000 people in seven Waco, Texas-area communities, said system superintendent Raymond Curtis. The plant is permitted to handle up to 37.8 million gallons a day average flow. Depending on the season and rainfall, it normally averages about 22 mgd.

The plant uses anaerobic digestion for secondary treatment of sludge, which eventually is stored in lagoons. The three lagoons, each with about 15 surface acres and a depth of 10 to 12 feet, were built about 15 to 20 years ago. When the lagoons began nearing capacity about four years ago, the authority began looking at options.

Among them were periodically emptying the lagoons, composting the anaerobically digested sludge either in wind rows or in vessel, or applying the sludge to land,

said authority water treatment division manager Tom G. Clark.

Emptying the lagoons wasn't a long-term solution because the authority would have to find somewhere to spread or store the sludge, Clark said. Landfilling the sludge dredgings, which are in a semi-liquid state, is difficult and expensive, Clark said.

The authority already composts sludge in windrows at its Temple-Belton, Texas, plant, but the operation has had occasional odor problems. Nearing the end of the study, Clark said the authority learned of sludge drying, which is different from incineration.

Drying involves running anaerobically digested sludge through grinders and belt presses and then drying it to a moisture content of 10 percent or lower. The end result is a soil amendment resembling the pelletized commercial fertilizers homeowners spread on their lawns.

Working with the authority since the study's beginning was W. Clay Roming, a consulting engineer with Roming-Parker Associates, L.L.P., of Temple, Texas. An economic evaluation of the alternatives showed sludge drying to be the least expensive. Roming said drying would cost about \$35 per wet ton, compared to \$50 per wet ton for composting and \$40 per wet ton for incineration.

Based on an average daily production of

Vicky Boyd

Mention "black gold" to Texans, and crude oil is probably the first thing that comes to mind. But the Brazos River Authority of central Texas is dealing with a type of black gold that few Texans probably would think of—treated sewage sludge.

Using one of the first dryers of its type in the nation, the authority is converting tons of sludge daily into a rich organic pelletized soil amendment that has Waco, Texas-area residents clamoring for more. Serving about 42,000 square miles of Texas, the Brazos River Authority provides

BY VICKY BOYD

20 dry tons, that translates to \$185 to produce one ton of dry product. But the cost doesn't include the \$25-per-ton revenue the authority receives from the product's sales.

At the time the authority was considering sludge drying, Clark said the Environmental Protection Agency's 40 CFR 503 regulations—which govern sludge use and disposal—had not been drafted yet. However, he said it appeared that by producing "exceptional quality" sludge using a Class A-type process for pathogen control, the authority wouldn't face many additional regulations.

Drying also meets Section 503 requirements for pathogen and vector attraction reduction.

Clark said the lower cost coupled with minimal anticipated regulations sold the seven communities that are plant customers on drying. Sludge drying also fits the charge of the river authority, which is to put resources, whenever possible, to the best beneficial use.

Only a handful of other U.S. wastewater treatment plants dry sludge, and all of them use processes that differ from Waco's. Much of the technology for the earlier plants was developed by the Dutch, who used it to pelletize hay. The Waco facility also differs from other dryers because the sludge makes three passes through the drying drum.

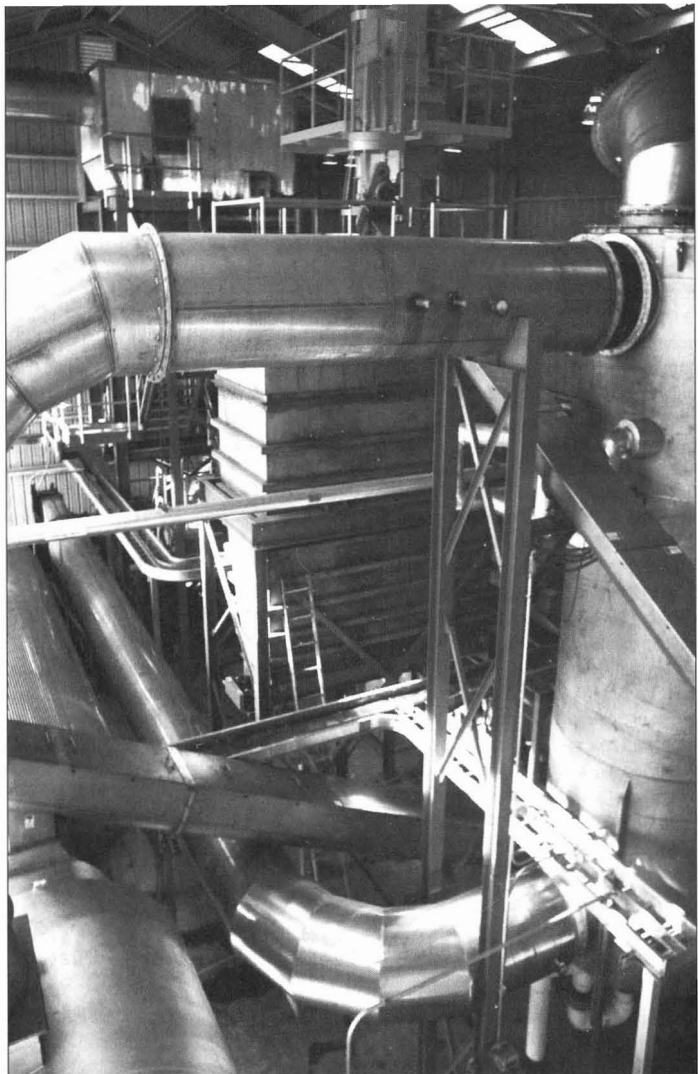
In Milwaukee, Wisc., where the municipal wastewater treatment plant produces Milorganite®, the sludge makes only one pass.

The authority went with the Austrian firm, Andritz Ruthner Inc., which developed equipment to handle sludge in the early 1970s and has installed dryers throughout Europe. To learn about the technology, Roming—at his company's expense—traveled to Europe and toured about a dozen operations.

"I was hesitant to begin designing it until we learned more," Roming said. "We combined the best features in Europe with those things that we understand about treatment processes in the United States."

The result is a drying system that can turn out 20 tons of pelletized soil amendment a day, although the authority currently averages about 14 tons a day.

The entire drying system can be run by a computer or a human operator. At any stage in the process, an operator can monitor what's occurring by going to a com-



Vicky Boyd

Stainless steel baffles carry heated air to the drying drum, which turns out 20 tons of dried sludge pellets a day.

puter and making a few clicks of the mouse. The software, run on Windows, is simple to use and can be easily modified, Curtis said.

Pipes carry sludge from the anaerobic digesters to grinders, which pulverize the larger material, and then to two 14-roll high solids belt filter presses for dewatering. Afterward, the sludge is about 19 percent moisture and has the consistency of putty.

An auger moves the dewatered sludge into a mixer, where it is combined with recycled pellets at a 60:40 ratio of wet to dry. Any pellet less than 2 mm or more than 6 mm goes to a grinder and eventually into a dry materials bin for future mixing and reuse.

The dry material acts as a carrier for the sludge as it moves through the drying drum. Probes, situated at the inlet and outlet of the drum, monitor and record drying temperatures and send the information to the computer. The inlet temperatures run between 400 and 450 degrees Celsius. The drying is controlled by the temperature of the pellets exiting the drum—about 195 degrees Fahrenheit. If the temperature gets too hot, the pellets scorch, creating odor and particulate problems.

The pellets make three passes through the drum before exiting and moving to the sizing screens. Pellets falling between 2 mm and 6 mm move either to overhead storage silos or a ground-level storage area. Those

not meeting size go to a grinder, where they are reduced and moved into the recycling bin for use in the mixing chamber. At the end of drying, the pellets are 92 percent to 95 percent solids and meet EPA Section 503 requirements for vector control.

Only 10 percent of the heated air is released into the atmosphere, and the remaining 90 percent is recycled. Because of the releases, however, the authority had to obtain an air emissions permit from the Texas Natural Resources Conservation Commission.

"When the project was begun, measurements of the constituents in the air discharge or any straight-forward limitations on permitting were not available," Clark said. The authority ended up collecting data on the ingredients in its emissions as part of the permit process. The permit, which Clark described as "quite strict," governs emissions of particulates, volatile organic compounds, nitrogen oxides and mercury.

Fueling the drying furnace is a mixture of methane, a byproduct of anaerobic digestion at the plant, and natural gas. The authority found that using only methane in generators used to make the plant's electricity increased engine corrosion. Curtis

Houston, Texas, sells the remaining 75 percent within a 200-mile radius of Waco.

The product is so popular that the firm already has a backlog of orders for more than 9,000 tons, including requests from a local sod farm. With a chemical makeup of 5-2-2 nitrogen, phosphorus and potassium, Clark said the pellets are not being marketed as a fertilizer. Instead, they are a soil amendment to help increase the organic content of the soil.

Although not high by commercial fertilizer standards, Clark said the nitrogen level was high for sludge. "The nitrogen is higher than we had originally expected—that's a

pleasant surprise," Clark said.

Also pleasant but not a surprise, the cost of the drying facility came in slightly under the \$5.4 million budgeted for it, Clark said. **EP**

Vicky Boyd is managing editor of Environmental Protection magazine.

***We combined the best features in Europe
with those things that we understand about
treatment process in the United States.***

said he believed the methane-natural gas mixture would minimize the corrosion while allowing the authority to use the gaseous byproduct captured during wastewater treatment.

The authority diverts about 25 percent of the pellets to sell locally. Under a contract with the authority, MBT Fertilizers of

March Buying Plans Survey-Air Pollution Controls

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Thanks,
Angela Neville
Editor

1. Which of the following air pollution controls systems product(s)/service(s) do you plan to purchase in the next 12 months? (Select all that apply)
- | | |
|---|--|
| A <input type="checkbox"/> Scrubber | I <input type="checkbox"/> Burners |
| B <input type="checkbox"/> Activated Carbon Adsorber | J <input type="checkbox"/> VOC Emission Control |
| C <input type="checkbox"/> Electrostatic Precipitator | K <input type="checkbox"/> Ceiling Hung Precipitator |
| D <input type="checkbox"/> Fabric Filter (Baghouse) | L <input type="checkbox"/> Air Quality Instrumentation |
| E <input type="checkbox"/> Thermal Oxidizer | M <input type="checkbox"/> Title V Operating Permit Consultant |
| F <input type="checkbox"/> Cyclone | N <input type="checkbox"/> Nozzles |
| G <input type="checkbox"/> Replacement Bags Filter Bags | O <input type="checkbox"/> Fans/Blowers |
| H <input type="checkbox"/> Scrubber Packing | P <input type="checkbox"/> Recorders |

2. What is your reason for purchasing the selected products/services? (Select one)
- | | |
|--|--|
| A <input type="checkbox"/> New Construction | B <input type="checkbox"/> Plant Upgrade |
| C <input type="checkbox"/> Replacement/Maintenance | |
3. What is your projected budget for the selected products/services? (Select one)
- | | |
|---|---|
| A <input type="checkbox"/> Over \$200,000 | E <input type="checkbox"/> \$10,001 to \$50,000 |
| D <input type="checkbox"/> \$100,001 to \$200,000 | C <input type="checkbox"/> \$5,000 to \$10,000 |
| B <input type="checkbox"/> \$50,001 to \$100,000 | F <input type="checkbox"/> Under \$5,000 |
4. How immediate is your need for the selected products/services? (Select one)
- | | |
|---------------------------------------|---|
| A <input type="checkbox"/> 0-3 months | E <input type="checkbox"/> 9-12 months |
| D <input type="checkbox"/> 3-6 months | C <input type="checkbox"/> over 12 months |
| B <input type="checkbox"/> 6-9 months | |

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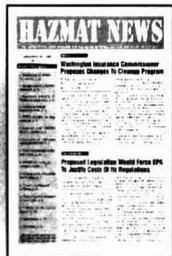
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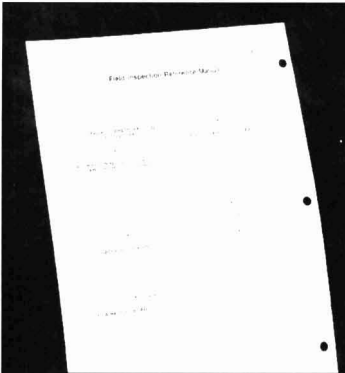
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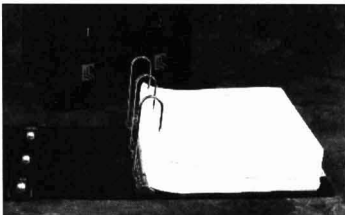
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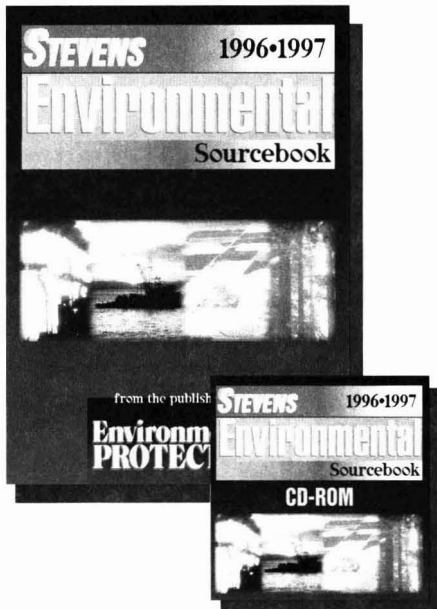
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Risky Business

Environmental insurance provides solutions in financing and managed liability for brownfields redevelopment.

By Bruce Amos

In the past, redeveloping "brownfields" had been economically and legally impossible. Potential purchasers and developers avoided contaminated industrial sites because of inordinate cleanup expenses, ongoing liabilities, sign-off requirements of regulatory agencies and financing contingencies. The result was potentially viable property left untouched.

Recently, however, legislation has spurred reasonable standards for cleanup and future use of brownfields. State and federal governments have jumped on the brownfield bandwagon, seeking new ways to help the business community redevelop these ailing properties. Through the passage of voluntary cleanup laws, more than 20 states currently have programs that can expedite brownfield cleanup. The state laws reduce the burdensome cleanup standards, provide liability protection and promote economic incentives for redeveloping or reusing the property. The results are increased employment, a broader tax base and ultimately a boost to the economy—all practical business solutions to once-neglected environmental eyesores.

What Shape Are They In?

Brownfields exist with varying levels of contamination. Although small sites may have limited contamination, large sites, such as former steel mills, may involve serious contamination over a large area. Unfortunately, there are even sites with no

"real" contamination, only the past stigma of an environmental problem. Still, remediation and some type of indemnification are often required by a lender or potential buyer.

Contaminated sites can also be found in one of several stages: completely or partially remediated, about to be remediated or unaddressed. Each stage presents a different potential regarding regulatory treatment and the availability of indemnification between transacting parties. The challenge is finding a way to proceed with site cleanup while eliminating or limiting the present and future liability of the parties involved.

The Brownfields Challenge

Due to the risks associated with brownfield development, purchasers and developers in the past have avoided the sites, preferring to develop "greenfields"—uncontaminated farmland, forest land, or residential and commercial land. From a public policy point of view, the development of greenfields should be curtailed by the brownfield redevelopment. Why? Greenfield development reduces the finite inventory of pristine and virgin land and inhibits the redevelopment of urban, contaminated industrial sites. This reduces urban employment opportunities, erodes a municipality's tax base and allows polluted land to remain unabated.

Although brownfield redevelopment presents a unique business opportunity, potential concerns—including site characterization, remediation, legal liability and

financing—still exist. However, an expanding environmental insurance market is helping to minimize these concerns.

Today, environmental insurance underwriters are confident of their evaluation of brownfield exposures. The primary role of environmental insurance is to eliminate or reduce uncertainty for all parties involved. As a transfer of risk mechanism, insurance can help municipalities, property owners, potential purchasers, developers and financial institutions reduce risks involved in cleanup and the future. Most involved in a brownfield transaction can benefit from a risk-management plan that includes the purchase of insurance.

Potential Environmental Exposures

A few examples of the environmental exposures faced by parties involved in brownfield transactions include:

- For a financial company or developer: The discovery of additional contamination during redevelopment or aggravation of existing contamination by a consultant or contractor may result in unanticipated cleanup costs.
- For a purchaser: Discovery of residual contamination due to the improper cleanup or possible future environmental problems may result in additional cleanup costs. Contamination could also affect an adjacent property or business, leading to third-party bodily injury and property damage.
- For the property owner or seller:

continued on page 37



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Champagne-Type Cleanup on a Beer Budget

Value engineering helped consultants reduce the time and cost of cleaning up a Superfund site in Upstate New York.

By Robert E. Murphy

Value engineering, developed by two consulting firms, helped remediate a National Priorities List site in near-record time and at about half the cost of the original design. The project involved the Marathon Battery Superfund Site—280 acres in the Hudson River Valley town of Cold Spring, N.Y., that had been occupied by the Marathon Battery manufacturing plant as well as other owners from 1953 to 1979.

During that period, the occupants had discharged process wastes, mostly nickel and cadmium, into Foundry Cove and the Hudson River at the Cold Spring Pier. Blue crabs from area waters and surface soils in surrounding residential areas had elevated cadmium levels. The New York State Department of Health warned that blue crabs from area waters should not be consumed and that surface soil contaminants may enter the food chain via home-grown vegetables.

Site cleanup posed many technical, environmental and regulatory challenges. After

years of investigation by the New York State Department of Environmental Conservation and the U.S. Environmental Protection Agency, the U.S. Army Corps of Engineers and its consultant prepared the initial design for site remediation. Plans and specifications were drawn up and ready for bid. Gould Inc., of Cleveland, Ohio, assumed control of the project and believed it could get the job done quicker and cheaper. Gould retained Advanced GeoServices Inc. to oversee the value engineering process and aid in contractor selection.

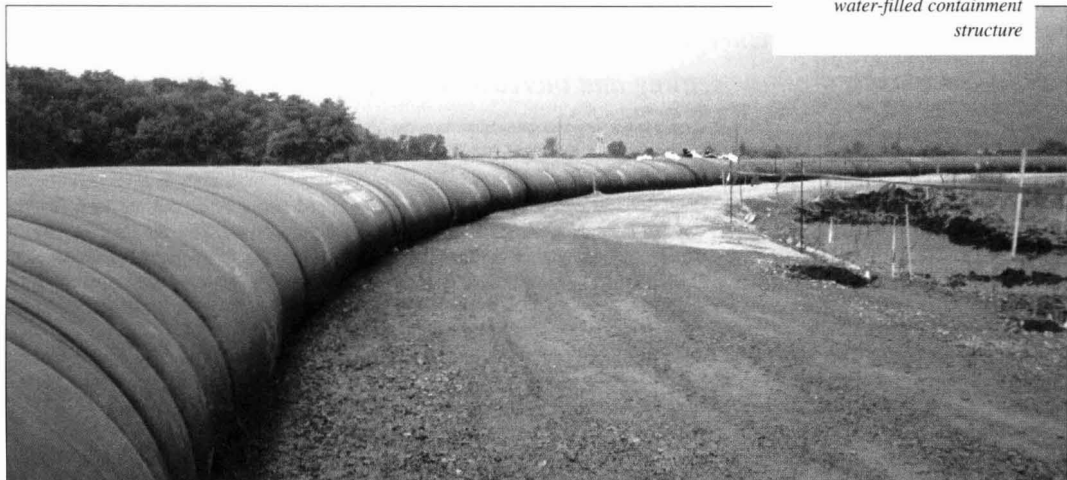
The contract went to Severson Environmental Services Inc., a fourth-generation firm whose environmental experience began with the Love Canal cleanup. Severson selected URS Consultants Inc. to assist in revising the existing design through value engineering proposals, conceptually developed by the Gould-Severson-AGC team and conditionally approved by EPA Region II.

The site was divided into three areas. Area I was a wetlands comprising Constitution Marsh and East Foundry Cove Marsh. Remedial actions included removing contaminated soil and restoring East Foundry Cove Marsh.

Remedial actions for Area II, encompassing the former battery plant site and residential yard area, involved removing contaminated soil from the plant grounds and an on-site vault.

Area III consisted of the open waters of East Foundry Cove, West Foundry Cove,

The temporary multi-chamber water-filled containment structure



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Champagne-Type Cleanup



URS Consultants

On-site water treatment and soil stabilization/solidification system

East Foundry Pond and the Hudson River near Cold Spring Pier. Remedial actions included dredging contaminated sediment from East Foundry Cove, East Foundry Pond and the Hudson River adjacent to the pier.

Applying Value Engineering

The revisions to the original design, using a Value Engineering Change Proposal (VECP), addressed five major elements and several minor elements. The major elements included water structure, land-based water treatment, marsh backfill and restoration, reuse of materials as general backfill, and optimizing the stabilization/solidification process.

1. Dike/water structure:

The original design proposed an 8-foot-high, 80-foot-wide, 1,800-foot-long earthen dike overlying soft organic soils. The structure provided areas for storing and dewatering dredge effluent, as well as a settling basin for dredge water treatment.

However, the use of the proposed land-based treatment equipment eliminated those needs. The dike's function was reduced to hydraulically isolating the tidally influenced cove from the marsh, minimizing the contamination risk and dewatering during marsh excavation.

Value engineering enhanced the dike design in two ways. The upper half was replaced by a water-filled containment structure, and a geogrid was added to reduce settling and increase stability. As a result, the dike/water structure barrier was

constructed in three weeks rather than the several months originally anticipated. Marsh excavation also was able to proceed immediately, skirting the 12-month consolidation period required in the original design.

2. Land-based water treatment: A land-based treatment plant was substituted for the originally specified settling basins overlying the contaminated marsh, enabling marsh restoration to proceed simultaneously with cove dredging. Since

Value engineering enhanced the dike design in two ways. The upper half was replaced by a water-filled containment structure, and a geogrid was added to reduce settling and increase stability.

the land-based water treatment system was capable of treating and processing water faster than the settling basins, construction time was further reduced.

3. Marsh backfill and restoration: Originally, marsh soils were to be regraded and fill placed after excavation to prepare a subgrade. A 6-inch clay cap was to be installed on the subgrade.

However, the feasibility of placing compacted clay on the low-strength marsh soils was, at best, uncertain. The design alterna-

tive specified a geocomposite clay liner (GCL), underlain by a geogrid. The desired grades were achieved by placing fill on top of the GCL.

4. Reusing materials as general backfill: Washing contaminated site soils for reuse on-site as general backfill reduced disposal costs, the need for off-site fill and the amount of truck and rail traffic.

5. Optimization of stabilization/solidification process: While not a departure from the original specification, optimizing the required soils solidification/stabilization process cut disposal costs significantly by reducing the prescribed additive amount from 50 percent to a range of 3 percent to 8 percent.

Minor elements of the value engineering redesign included realigning and lengthening a required railroad spur to increase the available staging area and aid loading of treated soil. In four months, URS, working closely with Severson, developed the redesign and obtained government approval. Through the use of value engineering, the project was constructed in half the time and at a comparable reduction in cost. **EP**

Robert E. Murphy is senior project manager with URS Consultants Inc., Buffalo, N.Y.

For information on URS, circle 71 on card.

Lenders Get Break In EPA Final Rule On Underground Storage Tanks

EPA HAS ISSUED A FINAL RULE THAT LIMITS the liability of financial institutions and others that lend money based on properties with underground storage tanks (USTs). The rule took effect Dec. 6, 1995.

In the Sept. 7, 1995, *Federal Register*, the EPA said lenders that hold security interests in property on which petroleum USTs are located will have limited regulatory obligations. Specifically, under this rule based on Subtitle I of the Resource Conservation and Recovery Act (RCRA), a lender would be exempt from all federal UST requirements before and after foreclosure on such property, if the lender holds only an ownership interest in the property. Such properties are typically held as collateral in loan transactions.

The rule is the EPA's latest step in an ongoing effort to encourage cleanup and redevelopment of contaminated land. To avoid liability for cleanup costs from UST property, a lender would need to show it does not engage in petroleum production, refining or marketing, or management or operation of the UST.

Industry gave the rule a warm reception. "It's not that often, it seems, that an industry association can sing the praises of a regulatory agency," said David Moorehead, vice president for communications at the Petroleum Marketers Association of America. "But we believe this is good for the marketers who have to upgrade their tanks...and lending institutions will be a little more forthcoming in making loans."

To develop the final rule, the EPA looked at how some governmental entities act as conservators or receivers of assets acquired from failed lending and depository institutions. The EPA interpreted the security interest exemption of RCRA to preclude the imposition of the insolvent estate's liabilities against the government entity. The EPA found the relationship analogous to a trustee in a bankruptcy case. There, the insolvent's liabilities generally are satisfied from the estate being administered and not from the assets of the conservator or receiver.

"The EPA does not believe that requiring [security interest owners] to comply with highly detailed technical requirements is appropriate where requiring them to do

so is not necessary for protection of human health and the environment," the EPA stated in the *Federal Register*. "Furthermore, the agency believes an exemption from these regulatory requirements is appropriate in the context of this rule, where an exemption will serve, albeit indirectly, to advance the goals of Subtitle I by making credit more available and thus aiding in the implementation of tank upgrading and replacement requirements."

The EPA does not expect the rule to increase the number of abandoned tanks because the rule, while clarifying security interest exemptions, does not change the number of regulated tanks or change the responsibilities of a previous owner who may have abandoned a tank.

On the other hand, the rule aims to help tank owners get capital to keep their businesses afloat and comply with environmental regulations, the EPA stated.

The 24-page rule also:

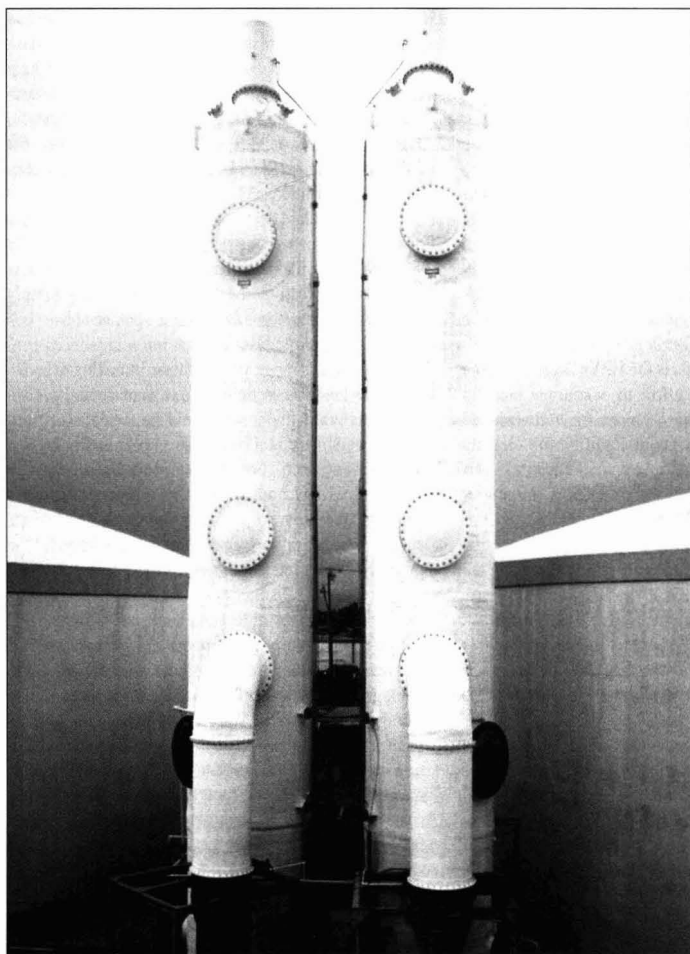
- Specifies a range of activities, including foreclosure, that lenders can undertake to manage and protect their collateral without being held responsible for compliance with environmental rules.
- Uses the term "primarily to protect a security interest." This key phrase refers to a property owner's holdings that are held primarily for the purpose of securing payment or performance of an obligation on the property, not an interest in the UST per se.
- Explains the distinction between holders and operators of USTs. "Holder" means generally a party holding ownership to protect a security interest, whereas "operators" refers to those who participate in management of a UST in a day-to-day sense, for storage, filling or dispensing of petroleum. The rule describes circumstances under which a financial institution would be considered to be participating in management of a UST property.
- Allows lenders to regularly monitor or investigate borrowers' collateral, business conditions and financial health.
- Allows a lender to buy and resell a UST property, provided the foreclosed UST is no longer storing petroleum, or the lender empties the UST within 60 days after foreclosure and closes the UST.
- Grants owners 60 days to empty unknown tanks discovered on a property, starting on the date of discovery.

Those holding "security interests" in land with USTs are exempt from liability for cleanup costs.

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The Sweet Smell of Success

Hydrogen-sulfide oxidation helped a Florida town eliminate noxious odors from its water.



The 55-foot-tall scrubber columns can treat a total of 30,000 standard cubic feet per minute

Though conventional air stripping can remove hydrogen sulfide (H_2S) from a potable water supply, it can create serious odors if the stripped H_2S is released into the atmosphere. The town of Jupiter, Fla., solved its H_2S problem by treating the air-stripper emissions with a catalytic liquid-oxidation unit. Provided by Wheelabrator Clean Air Systems Inc., the LO-CAT® process removes more than 98 percent of the H_2S , converting it to non-hazardous elemental sulfur suitable for landfill disposal.

The Problem

Jupiter, Fla., a community about 75 miles north of Miami, found its conventional sources of freshwater insufficient to meet the needs of a growing population. So Jupiter became the first city in southeastern Florida to use water from the Floridan aquifer.

Located 1,200 feet below the surface, the aquifer contains brackish water contaminated with H_2S . To make the water suitable for domestic use, Jupiter constructed a 6-million-gallon-a-day treatment plant that included reverse osmosis, air stripping and chemical treatment processes.

The reverse osmosis and air stripping processes successfully removed the dissolved salts and H_2S , allowing the plant to produce high quality potable water. During the initial operation, however, it was discovered that raw water from the aquifer contained higher-than-anticipated H_2S concentrations. This caused the H_2S -laden air from the stripper to produce serious odors that wafted into nearby residential

Wheelabrator Clean Air Systems

and business areas.

Conventional methods for removing H₂S from air streams involve wet scrubbing with chemicals such as sodium hydroxide, sodium hypochlorite and ozone saturation. The scrubbing chemicals are consumed in the process and require continuous replacement. The chemicals themselves are hazardous and often produce hazardous byproducts.

The continuing costs of replacing chemicals plus the potential hazards of handling them and their byproducts contribute to high operating costs.

Good Water and Good Air

After a comprehensive study of H₂S-removal alternatives, Jupiter selected a turnkey LO-CAT oxidation system. Because of the town's immediate need for good potable water as well as good air, the H₂S-removal system had to be operational within 22 weeks after the contract was awarded.

LO-CAT is a proprietary H₂S-treatment system that uses ferric ions (Fe⁺⁺⁺) to oxidize H₂S to elemental sulfur. A chelating agent is used to tie up the ferric and ferrous ions and keep them in solution. The entire process occurs in a counter-current flow column.

As H₂S-contaminated air flows through the column, a counter-current flow of water containing the chelated ferric ion scrubs it. The ferrous ion (Fe⁺⁺) formed as the H₂S oxidizes to elemental sulfur immediately oxidizes back to ferric ions from contact with oxygen in the air.

The internals in a conventionally packed column could easily plug as solid elemental sulfur is formed. But the LO-CAT column contains mobile packing—consisting of spherical, hollow plastic balls—that is constantly agitating. The constant movement and the balls' smooth surface prevent sulfur from adhering to the packing.

The scrubber water containing particles of elemental sulfur is continuously filtered to remove the sulfur and then recirculated to the column. The only replacement needed is the small amount of chelated ferric ion lost with the elemental sulfur.

The system was installed within the 22-week contract schedule and met all the H₂S-removal requirements. Currently, the elemental sulfur is disposed with lime waste from the plant's softening process directly into a nonhazardous landfill. **EP**

For information on the LO-CAT scrubber, circle 70 on card.

continued from page 31

Exposures include the spread of existing contamination during cleanup, adjacent property devaluation, or in some cases business interruption due to inadvertent spread of contamination and third-party bodily injury and property damage.

- For municipality or city government: An environmental incident may result following redevelopment and trigger an investigation of the property. Contamination, linked to improper cleanup during the municipality's or city's property ownership, could result in additional costs to local government.

- For a contractor, consultant or project manager: Contracting or consulting activities may aggravate or result in additional contamination cleanup expenses as well as the potential for third-party bodily injury and property damage.

What Insurance is Available?

The growing sophistication of the environmental insurance industry and its ability to evaluate and determine the extent of risk is why this insurance has become more available and affordable. Unlike traditional risk-management underwriting, which relies heavily on the financial make-up of the purchaser, underwriting sites with existing contamination puts an equal emphasis on financial analysis, detailed loss control and aggressive claims supervision.

There are several insurance policies that have a directly beneficial effect on helping a brownfields project:

- Pollution cleanup: This covers the cost of on-site cleanup, including unknown pre-existing contamination and future operational and environmental exposures.

- Pollution and remediation legal liability (PARLL): This policy combines coverage for first-party on-site cleanup and third-party pollution legal liability, including bodily injury, property damage and cleanup costs. It also covers unknown, pre-existing contamination, current and future operational and environmental exposures, the costs of an investigation, adjustment and defense of claims.

- Remediation stop-loss: This policy provides coverage for unknown, pre-existing contamination, as well as for ongoing operational and environmental exposures. If the extent of the contamination is quantifiable, an underwriter can determine a retention or "stop-loss" amount equal to the amount of the cleanup plus an additional "buffer" layer base. For example, if the estimated cost to clean up a site is

\$500,000, the underwriter could allocate a 20 percent additional cost, or \$100,000, as the "buffer" layer. The policy would then provide on-site coverage for any amount more than \$600,000, up to the policy limits.

The policy offers several benefits to the owner, potential purchaser or developer. First, the "stop-loss" mechanism limits the policyholder's cleanup expenses resulting from the remediation. Second, the availability of third-party coverage will protect the insured against third-party bodily injury claims, as well as the costs of legal defense.

In addition, after the remediation has been completed, the PARLL policy can be transferred to the new owner to ensure that future claims arising from an incomplete cleanup or other known conditions at the site are covered.

- Contractor's pollution legal liability (CPL): This policy covers both sudden and gradual pollution conditions resulting from covered operations performed by a cleanup contractor, including third-party bodily injury, property damage, cleanup and defense costs. Under this policy, subcontractors can be covered as additional insureds.

- Consultant's environmental liability (CEL): This policy combines CPL with environmental professional liability coverage. Consultants, project managers and contractors performing cleanup services and providing professional advice and consultation are eligible risks.

Environmental Risk Management

A critical component of the risk-management process during the entire transaction includes:

- Reviewing the qualifications of outside consultants/contractors,
- Auditing remedial project costs and
- Negotiating pricing for remediation.

In the event of an environmental incident, the cleanup is supervised, comprehensive and cost-effective legal defense strategies are developed, and settlement proposals are analyzed.

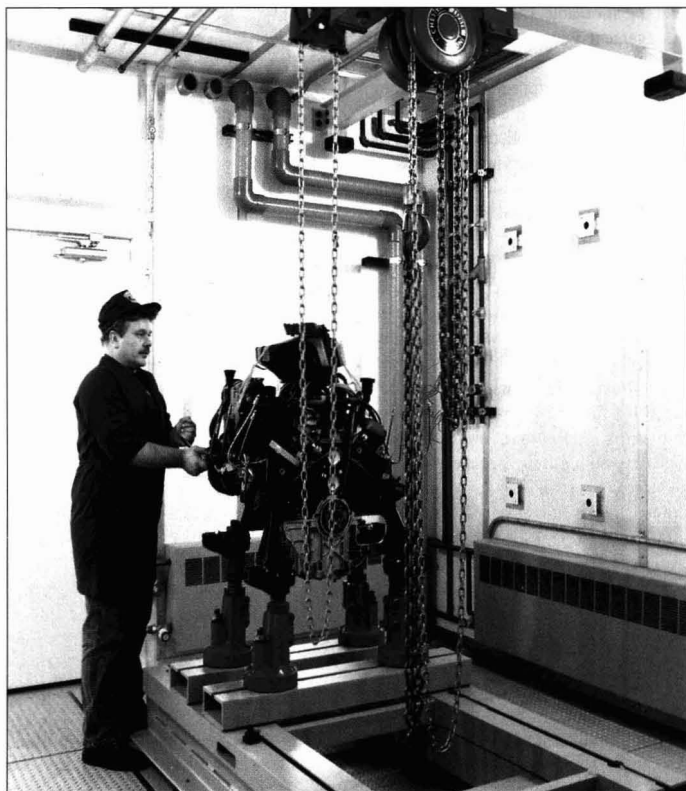
There are more than 500,000 brownfields in the United States. The role of insurance in brownfields is only in the embryonic stage. With the implementation of insurance as an integral part of these transactions, parties can be protected against potential liabilities, assuring the success of brownfields redevelopment. **EP**

Bruce Amos is brownfields redevelopment manager for ECS Inc., in Exton, Pa.

Gentlemen, Start Your Engines

Haz-Mat buildings provide a safe environment for the potentially dangerous practice of testing engines and equipment.

By Marion Petty



A gasoline piston engine waits for a crane hoist to drop in dynamometer test equipment.

Anything could happen—a fire, an explosion, an equipment malfunction. The dangers to personnel and property are high. No one knows this better than Klaus Meyer, product manager of Schenck Pegasus Corp., an engine testing company in Troy, Mich.

“Bear in mind, assemblies are tested to see if and under what circumstances they fail and how long they will last.

Imagine the damage done if a flywheel breaks loose from its shaft while rotating at high speed. And when testing fuel-related components, there is always a danger of fire and explosion.”

Schenck Pegasus—whose customers include the Big Three automobile manufacturers—needed a safe testing environment. Haz-Safe Buildings by Design in Leechburg, Pa., had the solution. “It was not economical to add a hazardous testing area inside our existing building,” said Meyer. “Local building codes and insurance were a problem. The hazardous testing area would have to be completely sealed off with explosion panels in exterior walls. We found out that it was actually less expensive to install a good quality pre-fabricated building than to construct a building of the required utility using brick and mortar. We were just better off with a

Haz-Safe Buildings by Design

separate testing area.”

Protecting the environment was a major concern in the decision to purchase a Haz-Mat building, Meyer said. “Considering the potential cost of a fuel spill cleanup, we certainly wanted to make sure our test cell was built to prevent the spill of hazardous liquids.”

Although considered to be a small quantity hazardous-waste generator, Schenck Pegasus wanted to be sure that any hazardous waste produced was contained properly. If a spill occurs, it flows through an elevated floor plate down a sloped sump, activates a detector and triggers an alarm.

Haz-Safe Buildings by Design prefabricates systems of liftable steel modules for mixing, dispensing, storing and enclosing manufacturing areas using hazardous materials.

With a tough tubular skeleton covered in 10-gauge plate steel, they can be custom-designed and made to “plug” into existing utility connections. They are safe and durable—exactly what Klaus Meyer was looking for.

“We test engines for a variety of reasons,” Meyer said. “One application might require durability testing of drive train components. Another might require emissions compliance testing. There are instances where engines are used just to produce the hot exhaust gases needed to test catalytic converters.”

The air emissions generated by engine testing—hydrocarbons, carbon monoxide, nitrous oxides and carbon dioxide—are handled by a complex ventilation system. Since engines running at full power generate a tremendous amount of heat, large fans are installed to carry the heat away.

The buildings can also withstand intense temperatures and blasts. Should an explosion occur, the pressure in the building is safely released by lightweight explosion panels that open outward under pressure. In case of fire, a built-in sprinkler system activates, an alarm sounds and fire dampers in the fan ducts close. The building itself is fire-rated for two hours, and a fire can be contained inside the Haz-Mat building without spreading to the rest of the plant.

Meyer had found his solution. Schenck Pegasus purchased its first Haz-Mat building four years ago and has added another one since.

The first building was designed with an additional room for a control area or operator station. The second building was

specifically designed and modified as a dynamometer test cell and required a different floor arrangement, coolant pipes, fuel lines and a crane.

“We looked at the design and the quality of execution of the building, and we knew we were getting an excellent value,” Meyer said. Haz-Safe buildings exceed all federal, state and local regulations. **EP**

Marion Petty is associate editor with Environmental Protection magazine.

For more information, circle 88 on card.

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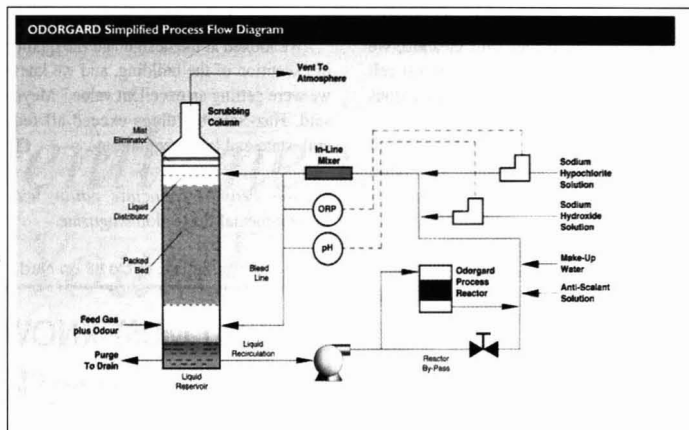
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Profiled in *EP's* January article, "Guarding Against Odors," **Odorgard** is an enhanced hypochlorite scrubbing process that eliminates odors and low-level VOCs in gas streams. The odorless gas passes through a scrubbing column filled with high-efficiency packing, in counter-current flow against a dilute alkaline hypochlorite solution. The scrubbed vapor travels through a mist eliminator and out the stack. The malodorant and/or low-level VOCs are absorbed into the aqueous phase where ionic and autogenous reaction occurs before the liquid leaves the tower. After exiting the tower, the liquid is passed through a catalyst fixed-bed reactor where the absorbed organics and odor compounds are oxidized. The caustic and hypochlorite levels of the liquid are adjusted on pH and redox control levels, and the liquid is returned to the top of the column.



Odorgard is a fouling resistant, cost-efficient process that can be used in a wide variety of industries, including meat rendering, water and sewage, fine chemicals, food and spice processing, and leather tanning. Monsanto Enviro-Chem

Systems Inc. of St. Louis, Mo., is the exclusive U.S. licensee of Odorgard. **Monsanto Enviro-Chem Systems Inc.**

Circle 100 on card.



Field Fluorometer

The Model 10-AU Field Fluorometer is a continuous-flow, on-site water monitor used in chlorophyll and algae analysis, detection and measurement of hydrocarbons, and dye tracer studies. It is a rugged field instrument designed for on-site environmental water measurements. With a 12-VDC power cable, samples can be conveniently measured in the field on a small boat, field station or research vessel. **Turner Designs.**

Circle 101 on card.

Temperature Controllers

The Watlow Anafaze CLS is a stand-alone 1/8-inch DIN size multi-channel PID temperature controller available in four-, eight- and 16-channel versions. Each unit features dozens of advanced hardware and software



features, so even small machines, experiments and processes can enjoy the advantages of modern computer-based control. **Watlow Anafaze.**

Circle 102 on card.

Oil-in-Water Analyzer

A new portable direct-reading infrared instrument, the Infracal Oil-in-Water Analyzer, is used for the current EPA Methods 413.2 and 418.1, or the newly-proposed hexane/IR sample card procedure. It provides direct readout of concentration levels

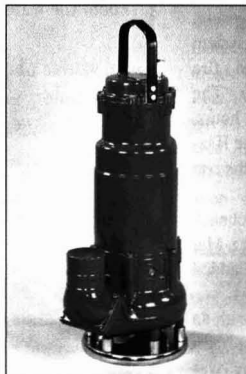


in parts per million and permits the option of converting from the Freon extraction method to the hexane method. **Wilks Enterprise Inc.**

Circle 103 on card.

Portable Sludge Pump

The high-performance Pumpex SP sludge pump is used by building maintenance, environmental and landscaping contractors for installation in a wide variety of applications, including sewer bypass, fountains, flooded basements, building sites and water and wastewater treatment. It provides a clogless



flow of effluent containing high levels of solid waste and sludge. **Pumpex Inc.**

Circle 104 on card.

Linear Pumps

The new Double Diaphragm Linear (DDL) series pumps operate on the principle of electromagnetic oscillation with no rotating parts, resulting in high efficiency, smooth air flow, minimal maintenance, quiet operation and low vibration. The series is available in a variety of 18 models. **Gast.**

Circle 105 on card.

Fume Recovery System

The new FRS-6000™ Fume Recovery System is a self-con-



tained system made of five different filtration modules, each designed to filter various oils, solvents, fumes, smoke and particulate associated with the

application of coal tar and asphalt build-up roofing. **Aercology Inc.**

Circle 106 on card.

Control Valve

The Ogontz ST Surface Temperature Sensing Control is a fully self-contained valve that automatically regulates steam flow in response to changes in fluid temperature as sensed through the pipe or tank surface. The valves are ideal for controlling temperature for a wide range of problem fluids. **Ogontz Corp.**

Circle 107 on card.

Software

An upgrade release to the Civil Engineering and Surveying Advantage Series on Microstation™ has been announced, with added dynamic features based on client requests. Highlights include expanded project management tools, including the incorporation of individual scales and styles for each symbol. **Eagle Point Software.**

Circle 108 on card.

Compliance Software

Chemical Compliance Monitor™ users can now reference the database on a window while



writing MSDSs or other reports. CCM allows environmental, health and safety managers to use their desktops to stay current with regulated chemicals, associated limits and other hazardous chemical information. **Logical Technology Inc.**

Circle 109 on card.

Acoustic Profiler

The new battery powered PA1 Acoustic Profiler weighs less than 100 lbs. and can be used in the most remote locations without AC power or portable generators. The battery powered unit achieves the same performance as the standard PA1. **Climatronics.**

Circle 110 on card.



Doppler Flowmeter

The Profiler™ designates EIT's new Doppler flowmeter. Valid flow readings in a wide range of flow applications are possible by the Intelligent Doppler Signal Recognition (IDSR) technology, which combines intelligent electronic design, advanced software algorithms and powerful dual-head transducers. **EIT.**

Circle 111 on card.

Rubber Expansion Joint

General Rubber style 1050 multiple arch, rubber expansion joint is designed to provide pipe motion compensation wherever there is extensive expansion and contraction in a piping system. It handles a variety of corrosive and abrasive fluids in many environmental applications. **General Rubber Corp.**

Circle 112 on card.

Chlorine Testing Guide

A new 24-page Chlorine Testing Guide offers a complete selection of chlorine testing methods and instruments. The guide covers more than 25 products for monitoring chlorine in drinking water, wastewater, industrial process water and swimming pool water. **Hach Co.**

Circle 113 on card.

Mixers

Designed for efficient operation, the mixers provide maximum energy transfer and dispersion in fluids during tank agitation. Units are available for tank sizes from 30 gallons to 5,000 gallons with fluid viscosities up to 2,000 cps. **J. L. Wingert Co.**

Circle 114 on card.

MSDS Software

STOR™M™ provides easy-to-use entry screens, intelligent

query options, departmental authorization and tracking, and employee logs for auditing compliance with Right to Know regulations. In addition to tracking key information, STOR™M can store full MSDS text in the ANSI 16 section or other user-defined formats, and as scanned images of the full data sheet. **Jordan Systems Inc.**

Circle 115 on card.

Portable Calibration Kit

Toxic gas monitors can be safely and efficiently calibrated in the field with KIN-TEK's Span Chek™ portable calibration kit. The accurate, low concentration test mixture consists of a toxic gas, provided by a permeation tube, and a larger controlled air flow. Interchangeable permeation tubes provide easy adaptation to produce mixtures of a variety of compounds, including sulfurs, hydrocarbons, nitrogens, halogens and more. **KIN-TEK Laboratories.**

Circle 116 on card.

Rapid Freezing Apparatus

Prepare multiple frozen samples in seconds with the new CyroPrep Rapid Freezing Apparatus. This easy-to-use apparatus is quick, portable, safe, reliable and economical. It offers rapid freezing of tissues and other biological samples with a chuck or in a microcentrifuge tube in less than 30 seconds at an optimum -78° C temperature without ice crystal formation or distortions. **Nalge Nunc International.**

Circle 117 on card.

Solvent Recovery System

The SK-6000/CF is an on-site solvent recovery system that automatically feeds used solvent from the waste drum into the solvent recovery unit. On-



site solvent recovery reduces the costs and risks associated with the transport and disposal of solvent waste as well as the need to purchase new solvents. **Solvent Kleene.**

Circle 118 on card.

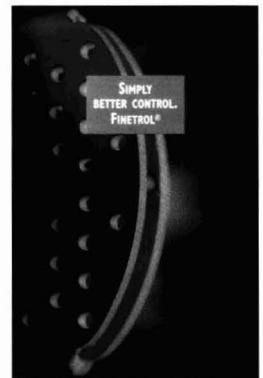
Evaluation Kit

A new technical bulletin features 100 Nyliner Plus™ engineered polymer bearings. An application development kit enables the designer to easily identify the bearing best suited to his application. The bearings are corrosion resistant and withstand high temperatures. **Thompson Industries Inc.**

Circle 119 on card.

Valve Brochure

A new eight-page color brochure from Neles-Jamesbury details the design philosophy of



Finetrol® valves, which combine the best features of rotary and globe control valves. The brochure uses diagrams and cut-away illustrations to show how the Finetrol valve meets the strictest environmental regulations. **Neles-Jamesbury.**

Circle 120 on card.

Activated Carbon Filtration System

Highland Tank Oil/Water Separators equipped with liquid phase activated carbon filtration systems are used in applications where strict water quality discharges are mandated. The convenient, compact modular system is designed for low-flow wastewater treatment. **Highland Tank.**

Circle 121 on card.

PRODUCTS & SERVICES



Personal Surveyor

The Personal Surveyor is the only confined space monitor with a Windows-based information management system (IMS). Hard copy, computerized record keeping and automatic gas calibration eliminates human error. **McNeill.**

Circle 122 on card.

Protection Mat

Encakushion is a mixture of 1-3 mm recycled tire crumbs in a three-dimensional matrix of entangled nylon monofilaments fused at their interstices. It provides a strong, stable mat that has high puncture resistance. It is used as a replacement for the sand required to provide puncture protection for a landfill liner. **Akzo Nobel Geosynthetics Co.**

Circle 123 on card.

Sampling Accessory Kits

Spectra-Tech reintroduces four Baseline FT-IR Sampling Accessory Kits for laboratories that analyze a large variety of repetitive samples. It simplifies the analysis of liquids, pastes, gels, films and powders. The horizontal sampling surface permits convenient acquisition of infrared spectra. **Spectra-Tech Inc.**

Circle 124 on card.

Extraction Systems

CARBETROL introduces a line of Multi-Phase Extraction Systems suited for high vacuum recovery applications. A single extractor supports as many as 20 extraction wells. When the MPX System is integrated with CARBTROL vapor and liquid treatment components, a pre-assembled treatment package can be supplied. **CARBETROL Corp.**

Circle 125 on card

Absorbent Socks

Three new absorbent socks for hazardous spill control have been introduced by GREEN STUFF™ Absorbent Products Inc. Each model contains GREEN STUFF Absorbent in light-weight, highly absorbent phenolic foam granules. The granules can absorb up to 15 times their own weight. **GREEN STUFF™ Absorbent Products Inc.**

Circle 126 on card.

Heavy-Duty Tipper Trailer

Galbreath Inc. introduces a newly designed tipper trailer engineered for heavy-duty applications and the long-term contracts market. The trailer measures 52-feet by 8-feet and has 124 cubic yard capacity. Other standard models in 45 feet and 48 feet are also available. **Galbreath Inc.**

Circle 179 on card.

Hazardous Waste Absorbent

Safe Harbor is a new hazardous waste absorbent that assimilates 60 times its weight in liquids or land or water, is light-weight, biodegradable, environmentally safe and cost-effective. It is a cellular material composed of water, carbon and nitrogen, with a web of interspersed capillary tubes that absorb and encapsulate the unwanted waste material. **McPhee Supply Co.**

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Autosampler Vial Catalog

The new 1996 full-color, 53-page Autosampler Vials and Accessories Catalog is now available, featuring over 50 new products and a complete line of vials, closures and accessories. Helpful charts, indexes and detailed descriptions allow for easy selection of products. **Kimble/Kontes.**

Circle 128 on card.

DXF Drawings

DXF drawings, representing numerous configurations of the turbine, mixed flow and propeller pump lines, are now available on diskette. The drawings—almost 100 in number—can be imported into AutoCad of Microsoft Word for Windows, then manipulated, stretched, fattened or otherwise modified. A directory listing provides quick and easy access. **Johnston Pump Co.**

Circle 129 on card.

Stainless Steel Line Expanded

Type 316 polished stainless

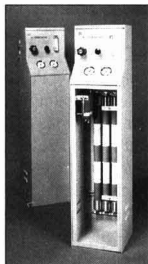


steel drums have been added to Skolnik's product line. Compared to other types of stainless steel, Type 316 has enhanced corrosion and pitting resistance and strength at elevated temperatures. The drums are available in 20-gallon to 55-gallon sizes, with top, body and bottom gauges of 1.5 or 1.2 mm. **Skolnik.**

Circle 130 on card.

Nitrogen Generators

Scott nitrogen generators offer nitrogen users a convenient, safe and cost-effective method of producing a continuous supply of nitrogen—on demand. They are capable of generating

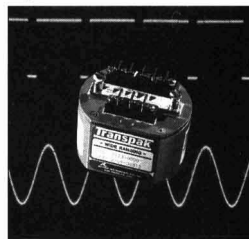


dry, gaseous nitrogen up to 99.9 percent pure, with flowrates up to 500 standard cubic feet per minute. **Scott Gas Generators.**

Circle 131 on card.

Two-Wire Transmitter

The Transpak™ T773 Frequency Input Isolating, Field-Configurable Two-Wire transmitter has been evaluated and approved for use in hazardous locations, meeting parameters required in Class I, II and III,



applicable Groups A through G, by the Canadian Standards Association. It offers a choice of

Revolutionizing Odor Control

Epoleon Corporation introduces an all new concept for odor control that works through specific methods of chemical neutralization to actually eliminate odor-causing gases. Epoleon's water-based formulas can be dripped or fed into wastewater, added into scrubber systems, or sprayed topically. Best of all, Epoleon's biodegradable, all-natural composition makes it equally safe and effective.

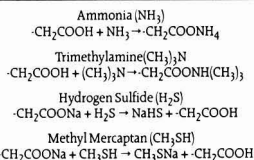
Unprecedented Achievement

Upon contact, Epoleon's unique formulations will chemically attack and neutralize both acidic and alkali gases **simultaneously**. This makes for a thorough reduction in odor.

Epoleon chemically converts odorful organic acids into stable, organic salt compounds which are odorless, non-toxic and biodegradable. Because of its advanced organic composition, Epoleon agents are compatible with many types of bacteria and inorganic chemicals.

Here's how Epoleon works:

Deodorization process for Epoleon N-100 and N-7C formulas.



Effectiveness Proclaimed Worldwide

Since its introduction, Epoleon has achieved international acclaim. Reports documenting Epoleon's effectiveness continue to pour in from around the

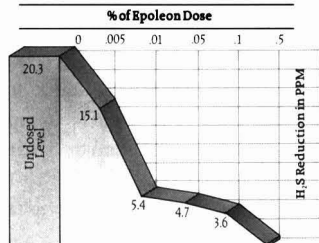
world. To quote Dr. Lawrence C. Koe from the University of Singapore, "Epoleon N-7C has been tested under laboratory conditions for reactions with municipal sewage samples. The chemical was found to be capable of reducing the potential of sewage to emit H₂S volatiles. A dose of 0.5% Epoleon N-7C on sewage resulted in complete elimination of H₂S emission."¹

¹ Dr. Lawrence C. Koe, Laboratory Study on the Effectiveness of Epoleon N-7C for Hydrogen Sulphide Reduction (National University of Singapore), 1991.

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PRODUCTS & SERVICES

five input ranges and two output ranges, which are field selectable. **Action Instruments.**

Circle 132 on card.

Storage Tanks

A complete line of computer-designed filament-wound and contact-molded FRP storage tanks are offered by Belding Tank Technologies Inc. Standard mold sizes are from 2 feet to 14 feet in diameter, and standard capacities range from 50 gallons to 50,000 U.S. gallons. Large fabricated tanks up to 20 feet in diameter are also available. **Belding Tank Technologies Inc.**

Circle 133 on card.

Booster

The Barco Booster Pac is an affordable multiple-use power source. It can be used as an emergency jump starter, battery charger, alternative power source



for use during battery replacement and a portable power source for 12-volt accessories. The Booster Pac delivers 30 starts before it needs to be recharged. **BARCO Products Co.**

Circle 134 on card.

Anchor Piston Pump

The new Anchor Piston Pump is designed for pumping groundwater or hazardous liquids in groundwater cleanup, product recovery and leachate recovery applications. It is a positive displacement pump with bottom intake, allowing for zero submergence recovery.



This field-proven pump can pump in either vertical or horizontal directions. **Blackhawk Environmental Co.**

Circle 135 on card.

Biodegradable Barrier

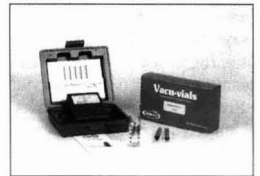
A new barrier coat for water-based paints has been formulated to provide clean, dry masks to painting operations while dramatically reducing the cost and environmental impact

of mask washing. The Challenge 6335 is a water-soluble, zero-VOC barrier system engineered for use with pressure-type mask washers. It is based on an advanced, proprietary molecule that has been field-tested for more than two years. **Challenge Inc.**

Circle 136 on card.

Visual Kit for Low-Range Total Hardness

A new one-minute visual test is available to quantify low-level total hardness. The test features CHEMets® self-filling reagent ampoules, which the user snaps in a sample. A color forms in the ampoule that the analyst com-



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pare with color standards provided by the kit. It is a one-step procedure and requires no accessory reagents or sample preparation. **CHEMetrics**.

Circle 137 on card.

Washing System

SmartWasher is a complete parts washing system that cleans powerfully but without harming



the environment. It is a complete and balanced system that combines a rugged parts washer machine with highly effective aqueous-based cleaners, specialized filters and microbial technology. The system provides clean pollution control without transferring hazardous wastes to another medium. **ChemFree Corp.**

Circle 138 on card.

Sonic Weather Station

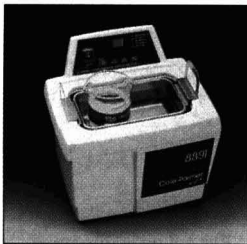
Featuring a new, no moving parts, two-axis wind sensor, Climatronic's rugged, compact weather station measures wind speed, direction, temperature and relative humidity—providing a digital output. Available in several configurations, options include an internal compass for self-alignment of wind direction, heaters for ice-free operation, immersible units and additional sensors. **Climatronics**.

Circle 139 on card.

Truss Pipe

Contech's PVC Truss Pipe, with a minimum 200 psi pipe stiffness, has more than four times the stiffness of conventional flexible PVC sewer pipes. According to a new brochure, the added pipe stiffness results in improved deflection control and allows for a wider range of bedding and backfill material. **Contech Construction Products**.

Circle 140 on card.



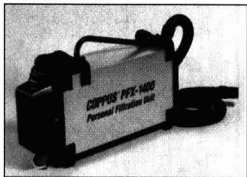
Ultrasonic Cleaners

Ultrasonic Cleaners are ideal for removing dirt, rust, grease and other contaminants from any part, large or small. Transducers create sinusoidal waves that cause cavitation in the tank. The waves scrub every surface the solution makes contact with—and it is not harsh with delicate items. Thirty different models and five sizes are available. **Colo Parmer**.

Circle 141 on card.

Fume Removal

In an expansion of the PFX Fume Removal and Filtration Products line, PFX-1400™ and PFX-3000™ models are



announced. Both are high-performance welding fume filtration units that offer standard two-stage filtration with HEPA and carbon filtration available as options. **Coppus Portable Ventilation Div., Tuthill Corp.**

Circle 142 on card.

Silicone Tubing

SILCON@MED-X is a platinum-cured, flexible, unreinforced silicone tubing that is perfect for applications where total purity is of paramount importance. It is specially made for the medical, biomedical and laboratory markets and is perfect for use in fluid analysis in other markets. It will not react with body tissues or fluids, does not support bacteria growth and contains no materials that could lead into critical streams. **New Age@ Industries**.

Circle 143 on card.

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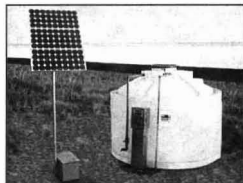
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Circle 31 on card.

PRODUCTS & SERVICES



Chemical Metering System

Municipal and industrial wastewater systems need to place chemical storage tanks beyond the reach of plant power grids. Powering the metering pumps at the tanks can be a problem. The Davis Solar Feed™ chemical metering system provides an economical alternative to generators or extending the power line. The system can be equipped with one or more gel cell battery-powered bellows pumps to meter the chemicals. Includes batteries, timer and a solar panel to maintain a charge. **Davis Water & Waste Process Division.**

Circle 144 on card.

Pump Video

"The GP40 Intelligent Pump: The Underlying Design Strategy"



for Superior HPLC Pump Performance" is a fast-paced video from Dionex that illustrates how peak retention time and peak area response are impacted by flow rate variability typical of conventional HPLC pumps. The video shows how the GP40's innovative, patented design overcomes the limitations to provide flow rate accuracy and reproducibility over a broad range of chromatographic conditions. **Dionex.**

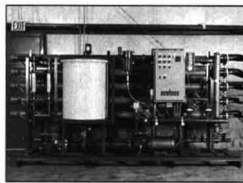
Circle 145 on card.



Leak Detection

The TriCorr 2001 correlator is a portable microprocessor system that pinpoints fluid leaks in pressurized pipe systems. Providing fast, accurate leak detection, the digital signal processing and enhanced time delay provide increased success on large diameter mains and PVC pipe—the most difficult leak environments. **Fluid Conservation Systems.**

Circle 146 on card.



welded wire products has been announced, solving problems associated with alkaline washing stations. The membrane system operates continuously, returning the treated fluid to the wash bath tank. The system design allows for a weekly turnover of the liquid. Some removal of surfactant from the wash liquid occurs, so the liquid is periodically titrated and the surfactant replaced. **Dynatec Systems.**

Circle 147 on card.

Wastewater Treatment System

A new membrane filtration wastewater treatment system for

Hazmat Accumulation Center

The Accumulation Center is one of the most versatile pieces of equipment designed for spill control and the organization of

Emission measurement

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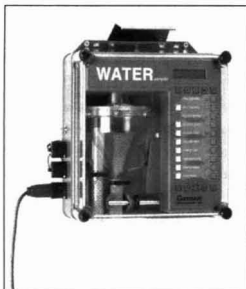


hazardous chemicals. It serves as a hazwaste accumulation area, a spill control base for a pumping station, a staging zone for project management, a satellite location for recyclables, a holding zone for drums awaiting transfer and a spill collection base for dry chemicals. **Justrite Manufacturing Co.**

Circle 148 on card.

Automatic Water Sampler

The PSW 2000 Automatic Water Sampler is ideal for clean, process water and wastewater applications. It offers a wide variety of standard and optional features that make the system easy to operate without



losing the flexibility to solve a variety of specific needs. It features simple, programmable control of sampling parameters, external control inputs, composite or separate samples and is ISO 9000 manufactured. **HF scientific inc.**

Circle 149 on card.

Cold Cathode Gauge Sensor

The SensaVac® Series 953 Pirani/cold cathode gauge controller now operates the Series 423 I-Mag™ cold cathode gauge

sensor. The combination provides economical pressure measurement from atmosphere to 10⁶ Torr. Standard analog output and two setpoints provide fast system control. **HPS.**

Circle 180 on card.

Haz-Mat Building

The first prefabricated, Factory Mutual (FM)-approved explosion-resistant haz-mat building has walls and doors blast-rated at 150 pounds per square foot. The hidden strength is in the 0.25-inch-thick steel skeleton clad with a 10-gauge steel plate, all continuously welded together. The explosion-

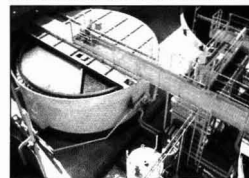


relief panel prevents shock and thermal waves. Custom-engineered buildings are available in sizes up to 14 feet wide by 17-foot long by 16 feet high. **Haz-Safe Buildings.**

Circle 181 on card.

Dissolved Air Flotation System

Remove suspended solids and BODs with the HEI Dissolved



Air Flotation (DAF) System. The DAF technology successfully separates suspended solids, oils, fats, greases, emulsions and heavy metals from wastewater. **Hoffland Environmental Inc.**

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PRODUCT LITERATURE



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National Association of Environmental Professionals Purchasing Group provides General & Professional Liability Insurance to small and midsize environmental consultants. Deductibles and limits are flexible; minimum premiums start as low as \$3,500. Phase One ESA & Transactional Screening E&O coverage also available for as low as \$1,250. Call NAEP toll free at 800-334-0652 for more information. Program administered by: **Liability Insurance Administrators.** E-mail: lia@liability.com

Circle 51 on card.

continued on page 52

PRODUCTS & SERVICES

Dust Monitoring System

The Model 4200 Opacity/Dust Monitor is an economical monitoring system that incorporates the latest technology available. It provides accurate, reliable, double-pass transmission to accommodate a wide variety of applications and industries at an affordable price. Typical uses include performance evaluation of particulate control systems, process control and compliance with local legislation. **Land Combustion.**

Circle 183 on card.

Chemical Analyzer

Enviroscreen is a computer-linked, optoelectronic analyzer



than can be used for cuvette and sensor-based detection and measurement of more than 100 types of metals, VOCs and other organic and inorganic substances. This field-portable, spectrograph-based instrument measures absorbance, reflectance and fluorescence over the range of 200-2,000 nm. **Life Sciences.**

Circle 184 on card.

Hydrocarbon Analyzer

The Model 5000 is a heated total hydrocarbon analyzer that offers high reliability, accuracy, sensitivity and overall stability in a compact, self-contained package. Utilizing a hydrogen Flame Ionization Detector (FID) within



a heated oven to prevent loss of high-molecular-weight hydrocarbons, the Model 5000 provides dependable analysis of trace-level contaminants in air, high-purity gases and all other gases. **Pace Environmental Products Inc.**

Circle 185 on card.

Respirators Brochure

Neoterik Health Technologies presents a free, convenient tri-fold selection and ordering guide for respirators and breathing air systems. Included are information and photographs on air purifying respirators, gas masks, battery-powered air purifying respirators, agricultural respirators, fresh air pumps, supplied air respirators, powered hoods for welders, panels, breathing air compressors and fume extractors. **Neoterik Health Technologies.**

Circle 186 on card.

Wastewater Sampling

A line of portable and stationary samplers is designed to provide reliable, repeatable sampling of wastewater. The samplers feature high-performance vacuum pumps that allow higher sample transport velocity and provide a more representative sample. **Manning Samplers.**

Circle 187 on card.

Portable Colorimeter

The new Model 975 Portable Colorimeter, the Analyst, is factory prefabricated for more than 90 water and wastewater tests.



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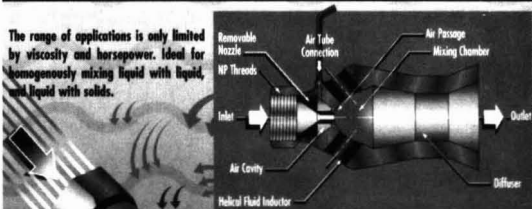
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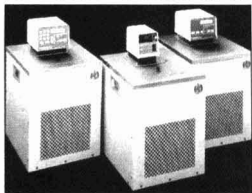
Circle 37 on card.

General purpose photometer mode serves for other colorimetric analytical applications. Seven internally mounted wave-length filters serve all tests—no extra modules required. **Orbeco Analytical Systems Inc.**

Circle 188 on card.

Lower Temperature Circulators

The new 9700 Series Circulators are now available, have a



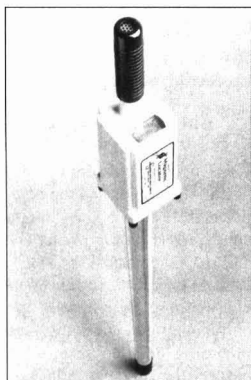
13-liter reservoir and offer temperatures of 15 degrees Celsius lower than most circulators of this size. They have an extended temperature range of -45 degrees C to 200 degrees C, a choice of

three controllers, and temperature stability as close as plus or minus 0.01 degree C. **PolyScience.**

Circle 189 on card.

Magnetic Locator

The latest in a line of underground locator products, the GA72Cd Magnetic Locator is the first using environmentally safe Lithium nine-volt batteries



that provide a 10-year shelf life and more than twice the operational life of alkaline batteries. The GA72Cd has a two-mode operation control switch—in the normal mode the audio output idles at 40 hertz and increases as ferrous is detected, peaking over the target. In the silent mode, there is no audio output until ferrous target is detected, then it increases and peaks over the target. **Schonstedt Instrument Co.**

Circle 190 on card.

On-Line Toxicity Test System

The Microtox-OS System is a new on-line test system for automatic monitoring of aquatic toxicity. The new test system provides unmanned toxicity monitoring for 14-day periods with automatic sampling and testing every 20 minutes. It is designed to continuously measure toxicity in wastewater and drinking water. Applications

include WWTP influent and effluent monitoring and toxicity testing of raw drinking water. **Microbics Corp.**

Circle 191 on card.

Documentation Kit for ISO 9000

The Media Group and the Polaroid Corp. announce they are teaming together to market a unique solution for documenting an ISO 9000 quality management system. The Documentation Kit includes a Polaroid camera and a video titled "Simplifying the ISO 9000 Documentation Process." The presentation educates the user on documenting for ISO 9000 and using the camera. **The Media Group.**

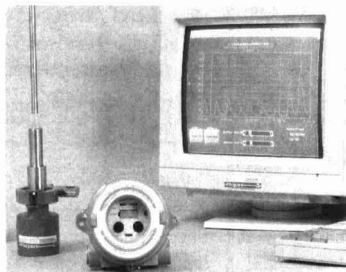
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Reverse Osmosis systems meet industrial system supplier needs

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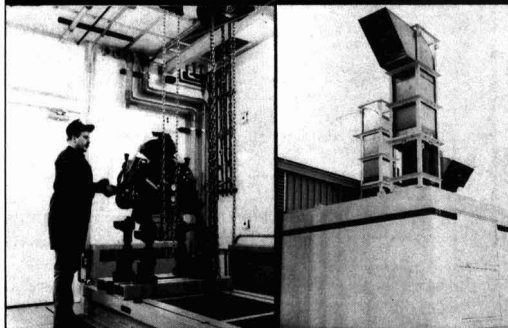
The analog **TRIBOGUARD II** system is available with a 4-20mA output and **PRE-VENT**, the new Dual Alarm system that gives you an early warning alarm *BEFORE* a high emission is reached. The all new design will meet the requirements of Parametric Monitoring, so maintenance can use it to reliably detect broken bags, while the plant Continually Demonstrates Compliance. Ask about **Auburn's** new **PC Communications & Software** which will help you not only log data, but also **LOCATE** the failed filter in your dust collector. Produced by the pioneers in Triboelectric Technology.

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5,396,742 Others Pending

Circle 39 on card.

PRODUCTS & SERVICES

and range in sizes from 6,000 gallons to 1 million gallons per day. Applications include seawater desalination systems, potable drinking water, bottled water, industrial process water and wastewater recycling systems. **Water Group Systems Inc.**

Circle 193 on card.

Acoustic Baffles

These 2-foot-by-4-foot acoustic baffles are lightweight, convoluted on both sides, 3 inches thick, available in several colors and have an internal wire frame for easy verticle suspension. They control unwanted sound pressure levels by absorbing the reverberation in and around any industrial noise source. **NetWell Noise Control.**

Circle 194 on card.

Multi-Well Jet Pump System

The EconoPump is a new multi-well jet pump system that

is self-adjusting and will maintain a constant water level, resulting in a continuous, predictable cone of depression. The system allows the strongest producing wells to reach peak flow and will not be affected by other wells running slow or dry. Models are available that handle from one to five wells per system. **North East Environmental Products.**

Circle 195 on card.

Indoor Air Quality Monitoring Kit

A new kit is available for monitoring gases and vapors and includes the Model 800 precision piston pump with direct-reading detector tubes for carbon monoxide, carbon dioxide, ozone, chlorine, ammonia and formaldehyde. A qualitative detector tube for organic vapors and the qualitative Rainbow tube for the simultaneous identification of eight common gases are



also included with an extension hose and an air flow indicator kit. **Sensidyne Inc.**

Circle 196 on card.

Gas Chromatographs

Controlled by a lap-top computer, the Portable Gas Chromatograph analyzes air, water and soil for thousands of VOCs. Easy to use, it is the functional equivalent of a lab-scale gas chromatograph, deriving and recording detailed results. To ensure the highest precision



level and repeatability, the GC can be easily recalibrated on-site. **Sentex Systems Inc.**

Circle 197 on card.

Drive Point Piezometers

Solinst #615 piezometers are inexpensive and use 0.75-inch NPT pipe for drive extensions and do not require a drilling rig. The #615 can be used for groundwater, soil gas sampling and water level measurement. For extra portability, the Sand Piper™ Model #690 allows drive-point installation with a vibrating hand hammer. It

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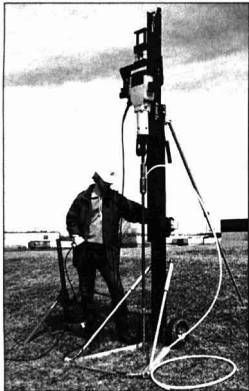
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allows safe and easy placement of monitoring wells. **Solinst.**

Circle 198 on card.

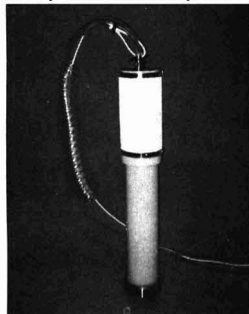
Sludge Blanket Level Control

Markland's new Series 602 Sludge Depth Meters monitor and control the settled sludge level in gravity clarifiers, lamella inclined plate separators and dissolved air flotation thickeners. The microprocessor-based intelligent system has no moving parts, an LCD readout, membrane switch front panel, advanced self-diagnostics and error trapping. **Markland Specialty Engineering Ltd.**

Circle 199 on card.

Petro Sense/Recover

The floating PetroPore filter canister unit is used to both sense and recover free floating liquid hydrocarbons from recovery wells and sumps. This

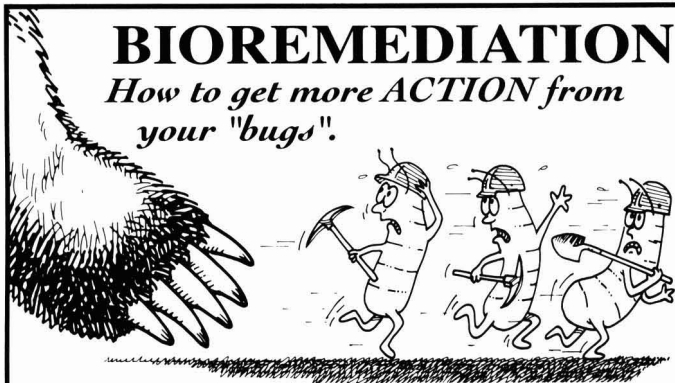


normally passive unit is coupled to an air valve. When the unit's reservoir has collected a few inches of product, the air valve activates a visual or audio alarm. **PJ Products Co.**

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PRODUCT LITERATURE



continued from page 47
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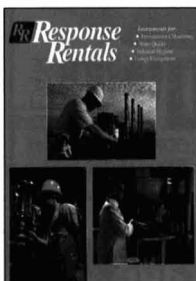


Environmental Monitoring Equipment

HAZCO Services, the nation's leading instrument rental, sales and repair company, offers its 1995-96 324-page catalog featuring air monitors and samplers, gas detectors, water quality instruments, sampling equipment, safety supplies and decon/lab trailers for the environmental industry. HAZCO services its clients through 12 nationwide locations, same-day shipments and premier customer service.

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Circle 52 on card.



Environmental Monitoring Instrument

Response Rentals' new 48-page catalog features an expanded line of rental instruments for environmental monitoring. It includes analyzers and monitors for hazardous waste investigators, remedial assessment surveys, continuous emissions monitoring (CEM), groundwater sampling and perimeter monitoring. Portable instruments for field testing as well as continuous analyzers are available. Response Rentals offers applications assistance, nationwide overnight delivery, and instrument calibration and repair.

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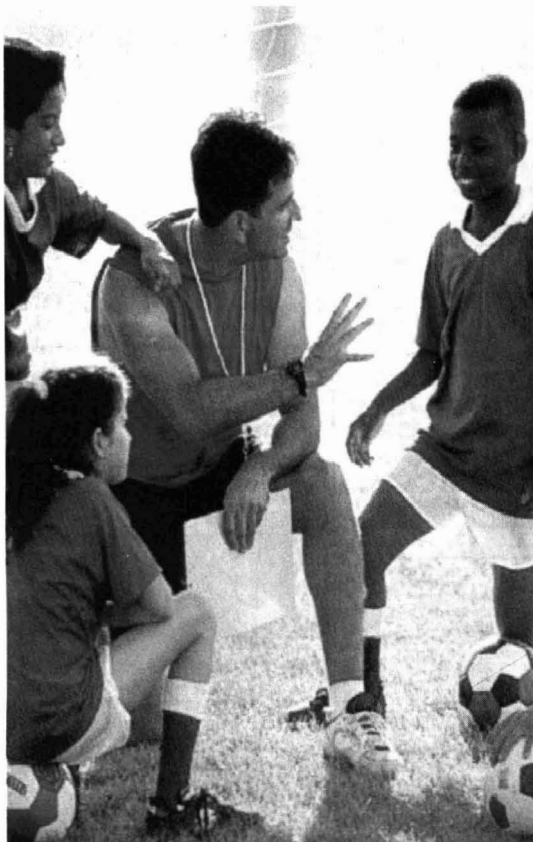
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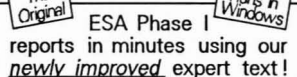
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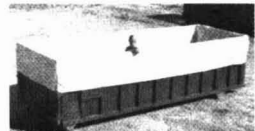
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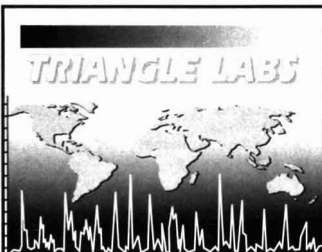
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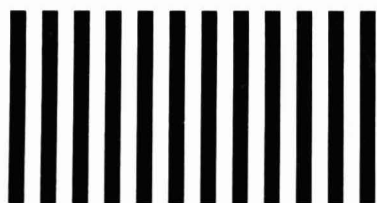
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19	Robinson Industries Inc.	21	113	Hach Co	41	55	Environmental Contracting	55
150	Stevens Publishing Corp.	30	181	Haz-Safe Buildings by Design	47	56	Chemical Safety Associates, Inc.	56
13	TRC Environmental	18	149	HF scientific inc.	47	57	RCM Industries	57
32	Testo Inc.	46	121	Hoffland Tank	47			
30	Texas Workers Insurance Fund	44	182	Hoffland Environmental Inc.	47			
33	Tri-Mer Corporation	46	114	J.L. Winger Co.	41			
12	Turner Designs	17	129	Johnston Pump Co.	43			
7	Vista Information Solutions Inc.	11	115	Jordan Systems Inc.	41			
			148	Justrite Manufacturing Co.	47			



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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
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200

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Business Phone () _____ FAX No. () _____

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1. 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 (please specify) _____

3. Approximate number of employees at this address (check only one):

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

2. Type of Business (check only one):

A Manufacturing. If manufacturing, please check the appropriate SIC (check only one):

- | | |
|-----------------------|---------------------------------------|
| J (20) Food | J (30) Rubber/Plastic |
| J (21) Tobacco | J (31) Leather |
| J (22) Textile | J (32) Stone/Clay/Glass |
| J (23) Apparel | J (33) Primary Metal |
| J (24) Lumber & Wood | J (34) Fab. Metal |
| J (25) Furniture | J (35) Mach., except Elect. |
| J (26) Paper | J (36) Elect. & Electron. Mach. |
| J (27) Print/Publish | J (37) Trans. Equip. |
| J (28) Chemicals | J (38) Instru/meas/analyz/controlling |
| J (29) Petrol. & Coal | J (39) Miscellaneous Mfg. |

- B Mining
- C Agriculture
- D Engineering & Contracting
- L Consulting
- M Insurance
- E Utilities, public, private & cooperative
- F Govt. including municipal or district sanitary water or wastewater trmnt. sys. or plants

Type of Govt:

- G City H County
- I State J Federal
- K Transportation
- N Labs O Training P Real Estate
- Z Misc. Services (please specify) _____

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

- A Pollution Control Equipment
- B Instrumentation
- C Chemicals
- D Parts & equipment for maintenance operation and control
- E Services/Consulting
- F None of the above (please specify) _____

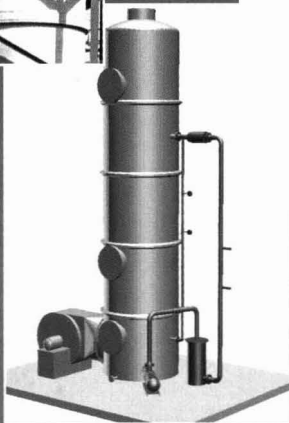
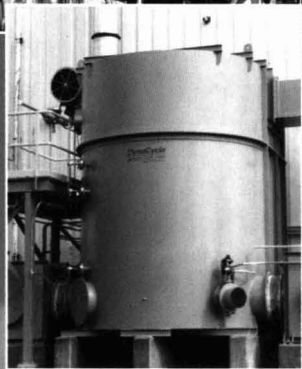
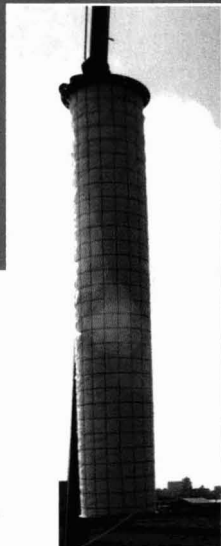
5. What types of Pollution Control are you responsible for? (check all that apply):

- A Air F Toxic & hazardous materials
- B Water G Energy control/energy conservation
- C Noises H None of the above
- D Solid waste disposal (please specify) _____
- E Industrial hygiene

6. 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 (please specify) _____

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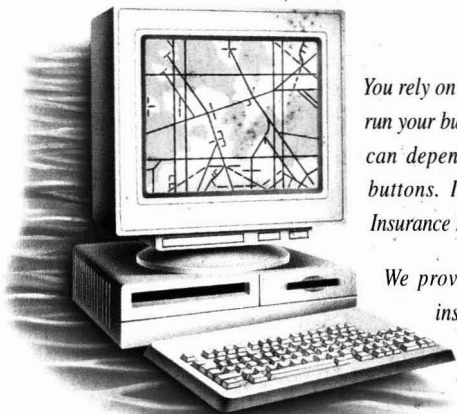
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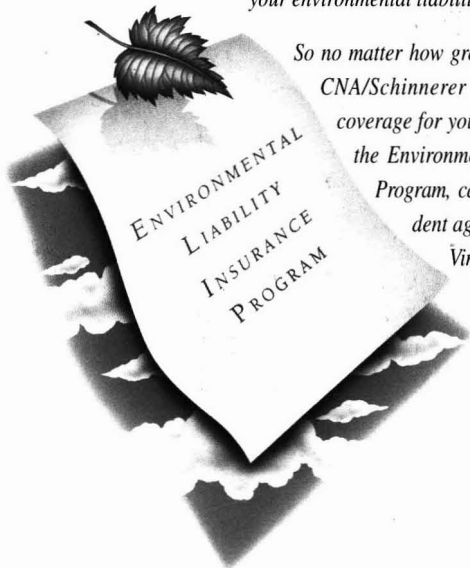
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