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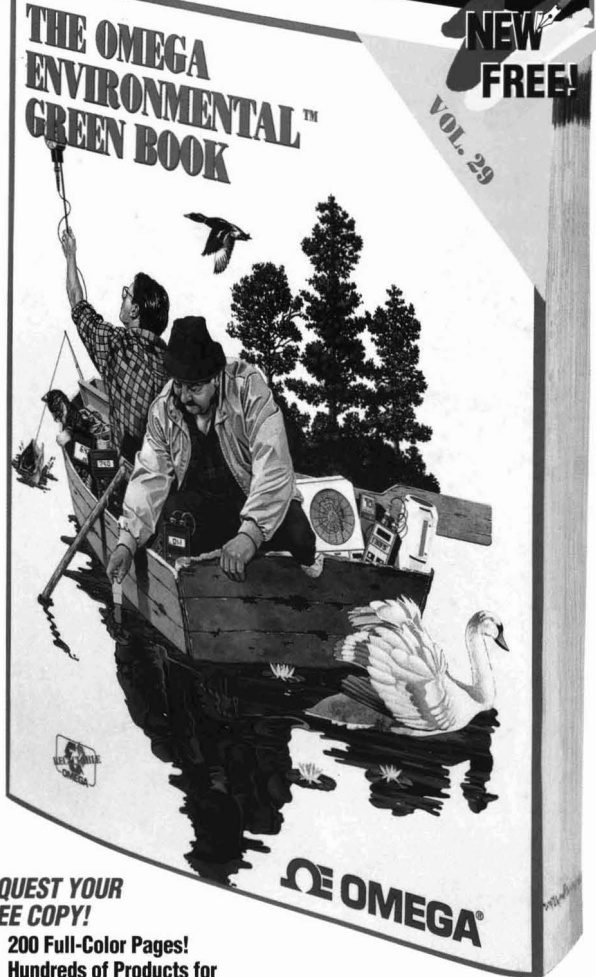
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Environmental PROTECTION

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- 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) _____

2. Type of Business (check only one):

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

- | | |
|--|--|
| <input type="checkbox"/> (20) Food | <input type="checkbox"/> (30) Rubber/Plastic |
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| <input type="checkbox"/> (23) Apparel | <input type="checkbox"/> (33) Primary Metal |
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| <input type="checkbox"/> (27) Print/Publish | <input type="checkbox"/> (37) Trans. Equip. |
| <input type="checkbox"/> (28) Chemicals | <input type="checkbox"/> (38) Instru/meas/analyz/controlling |
| <input type="checkbox"/> (29) Petrol. & Coal | <input type="checkbox"/> (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

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- Z Misc. Services _____ (please specify)

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

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

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):

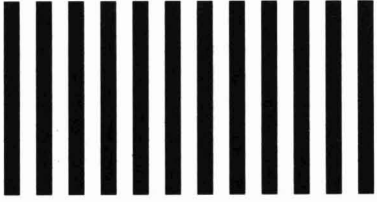
- A Air
- B Water
- C Noise
- D Solid waste disposal
- E Industrial hygiene _____ (please specify)
- F Toxic & hazardous material
- G Energy control/energy conservation
- H None of the above _____ (please specify)

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

- A Pollution Engineering
- B Environment Today
- C Hazmat World
- D Pollution Equipment News
- E The National Environmental Journal
- F Water Environment & Technology
- G None of the above _____ (please specify)



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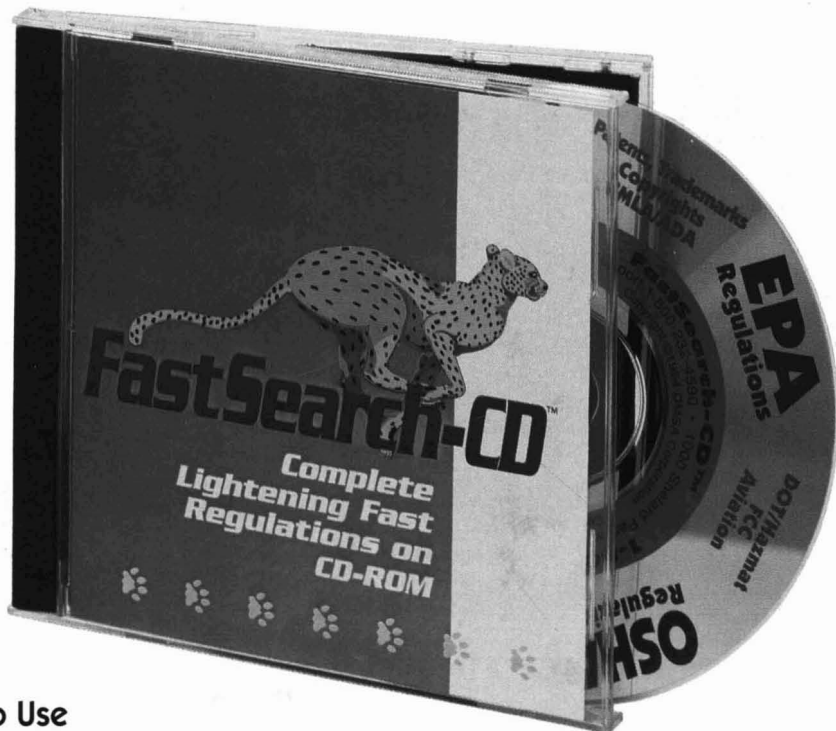
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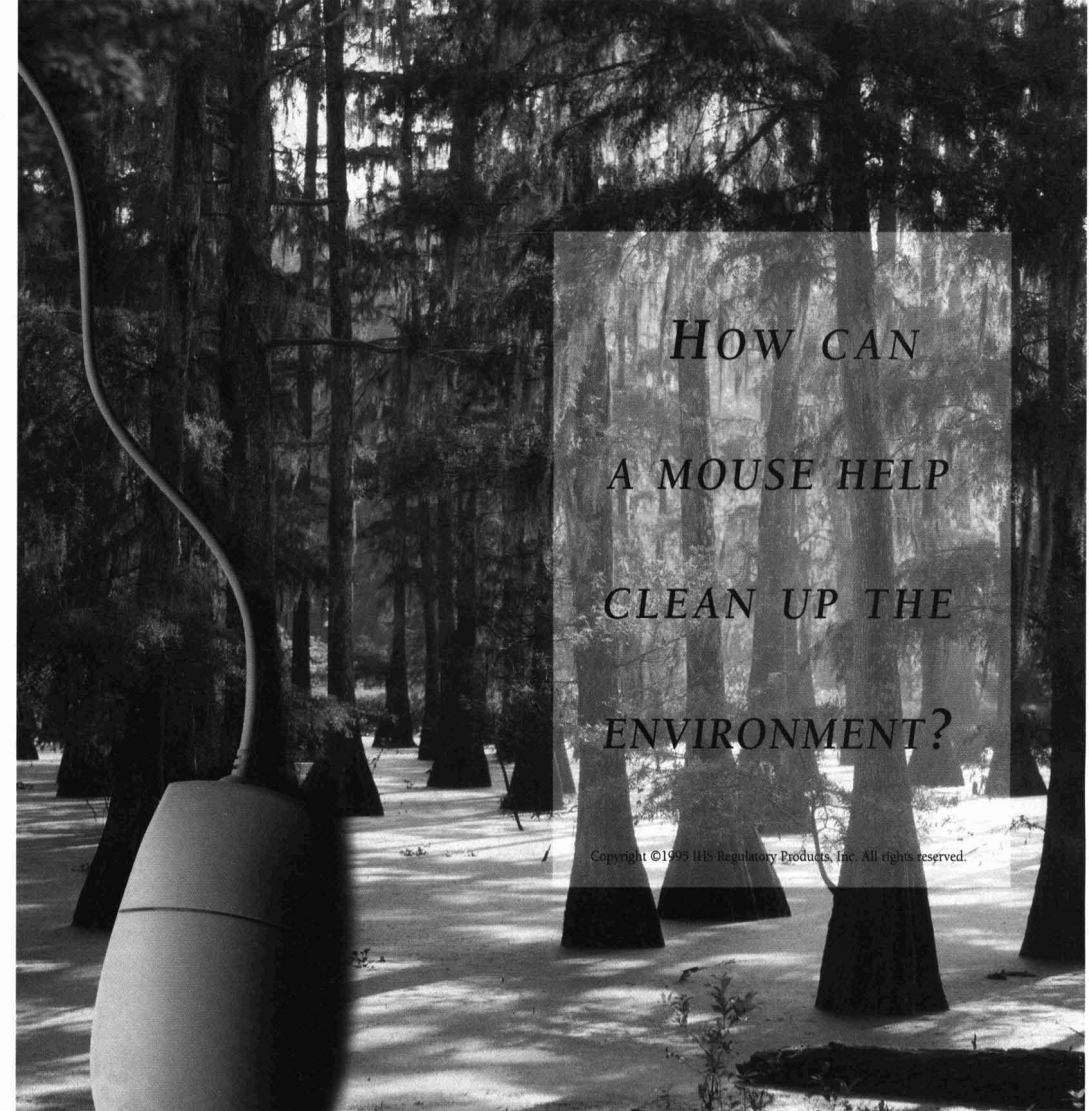
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Cover:

As more companies approach environmental challenges from the perspective of economic opportunity, the need for environmental training among corporate officers grows. See article, p. 22.

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Back to School

A trend pioneered by leading manufacturers, that of integrating environmental health and safety management into larger strategic objectives, has begun to trickle down to a far larger pool of mid-sized and smaller firms. And with it has come a growing need for environmental education among corporate managers accustomed to viewing their firm's environmental concerns as a downstream cost center.

And as environmental professionals have found themselves as likely to be in the boardroom as a facility's control room, they too are finding a need for some lessons in the financial arena.

Indeed, a cross-pollination of sorts is afoot—at least among Fortune 100 firms—as more environmental managers with engineering backgrounds top off their education with an MBA, while financial and other corporate managers seek some basics in environmental science.

As Professor Rick Irvin of the National Environmental Management and Education Center notes in this month's cover story, financial and banking industry officials, accountants, property insurance and real estate professionals are also finding a need to do some environmental homework. Risk managers in each of these fields have a compelling reason to pursue training in environmental science and management issues, Irvin argues—and education and training programs have not kept up with the growing demand. New programs being developed with those professionals in mind will hopefully restore some balance to the equation.

* * *

ISO 14000, the international environmental management standards being fashioned under the auspices of the International Organization of Standardization, is of little interest to companies not interested in overseas markets...right? Not so, says Roy F. Weston consultant Glenn Nestel in this month's Guest Commentary. Nestel and coauthor Joseph DelRossi see ample reason for mid-sized and smaller firms to pay heed to the voluntary credentialing program, parts of which are nearing completion after four years of development.

The standards, scheduled for final review and passage within a year, set organizational objectives for environmental management, auditing, and performance evaluation, as well as much-needed standards in environmental labeling, life cycle assessment, and product standards.

While Fortune 100 firms will surely lead the way in pursuing what one consultant describes as the "sexiest voluntary standard since ISO 9000," smaller firms—even those not chasing European markets—should give the program serious consideration. The reason: Whether or not they're in the hunt for Eurodollars, companies will find significant economic advantages in pursuing the objectives of the standards program. And bragging rights for those that win ISO certification shouldn't be underestimated.

For those companies that see Europe in their crystal balls, pursuing an ISO 14000 designation is all but *de rigueur*. Like ISO 9000, European firms will likely lead the way in winning certification—and demanding a similar commitment from overseas suppliers. European consumers will be equally choosy about their products.



Thomas E. Barron
Editor-in-Chief

Environmental PROTECTION

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EPA Penalty Amount Grows Again

The amount of civil and criminal penalties collected by EPA amounted to \$151 million in fiscal year 1994, up 12 percent from 1993's figure of \$134.8 million. In its latest annual report on enforcement activities, the agency said it brought a record 2,246 enforcement actions, which included 220 criminal cases, 1,596 administrative penalty actions, 403 new civil referrals to the Department of Justice, and 27 additional civil referrals to enforce existing consent decrees. States also were active in the enforcement arena, taking 11,334 enforcement actions, EPA said.

While touting the records, EPA also promoted its Environmental Leadership program. In April, EPA chose 12 facilities to take part in the program, which is "designed to recognize facilities that develop and implement innovative environmental management systems and 'beyond compliance' programs," the report said. The agency also plans to work with the companies in the program order to understand how their systems work, and then share that information with the regulated community. In return, EPA gives companies in the program a limited period to correct any violations identified during the pilot program. The agency also waives routine inspections.

The \$151 million total in fines is made up of \$65.6 million in civil judicial penalties, \$48 million in administrative penalty orders, and \$36.8 million in criminal fines. The criminal fines total is up from \$29.7 million in fiscal 1993, but down from its high of \$37.9 million in fiscal 1992. The number of years of prison sentences totaled 99, up significantly from 74.3 years in fiscal 1993.

The number of enforcement agents also grew in fiscal 1994, to 123 from 110 in fiscal 1993 and 72 the year before. The number of agents has doubled since 1991.

Endangered Species Act Applies to Private Property: High Court

The Endangered Species Act's reach extends to private property, the Supreme Court ruled June 28, in a decision certain to lend urgency to congressional efforts to reform the law (*Babbitt v. Sweet Home Chapter of Communities for a Great Oregon*).

The 6-3 decision was hailed by environmentalists but criticized by business interests that say the ESA unfairly limits the use of their property. Essentially, the court

upheld the Interior Department's decision to define habitat modification on private land as "harm" to endangered species.

The definition of "harm" in the ESA "naturally encompasses habitat modification that results in actual injury or death to members of an endangered or threatened species," Justice John Paul Stevens wrote for the majority. "When it enacted the ESA, Congress delegated broad administrative and interpretative powers to the Secretary [of the Interior]," the court's decision said.

"The Court has recognized that you can't protect species without protecting their habitat on private lands," said David Wilcove, an Environmental Defense Fund ecologist. "The Court has recognized what all good scientists know: habitat destruction is the primary cause of extinction."

But Ike Sugg, a fellow in Wildlife and Land-Use Policy with the Competitive Enterprise Institute in Washington, said the decision "failed to uphold congressional intent, giving license to a regulatory agency that is out of control."

"By penalizing landowners for having endangered species on their land, the 'harm' regulation will continue to create enemies of wildlife," Sugg said. "This is a call to arms for Congress to scrap the current ESA and write a law that works, for wildlife as well as for landowners."

Cut Needless Reports, SBA Says

EPA and Small Business Administration officials are discussing company reporting obligations, including Emergency Planning and Community Right-To-Know Act requirements on underground gasoline tanks. "We have a tremendous number of issues to talk about with respect to small and medium-sized businesses," said Jim Makris, director of EPA's Chemical Emergency Preparedness and Prevention Office. In addition to EPCRA inventory requirements, Makris listed Clean Air Act Section 112(r), which covers chemical accident prevention.

In a recent letter, SBA's Chief Counsel for Advocacy, Jere Glover, said gasoline stations file a lot of needless reports. Glover said small gasoline stations should not have to report the existence of underground tanks containing gasoline to EPA under EPCRA. In the letter, which was sent to EPA's assistant administrator for solid waste and emergency response, Elliott Laws, Glover said local communities already know about the tanks, and re-

lated the experience of an Arkansas gas station operator who contended that "filing 66 reports annually with 15 different reporting locations identifying the fact that 22 gasoline outlets do, in fact, store gasoline does not appear to add significantly to the community's right-to-know about hazardous chemicals in the neighborhood." The annual inventory reports are required under EPCRA sections 311 and 312.

Glover said SBA's Office of Advocacy agreed with the operator. "The local community already knows that gasoline stations store gasoline; fire marshals and local emergency planning officials already know the locations of all such facilities; each gas station is also required to file a very comprehensive underground storage tank form with the state; [and] over 300,000 unnecessary inventory forms are required each year," he said.

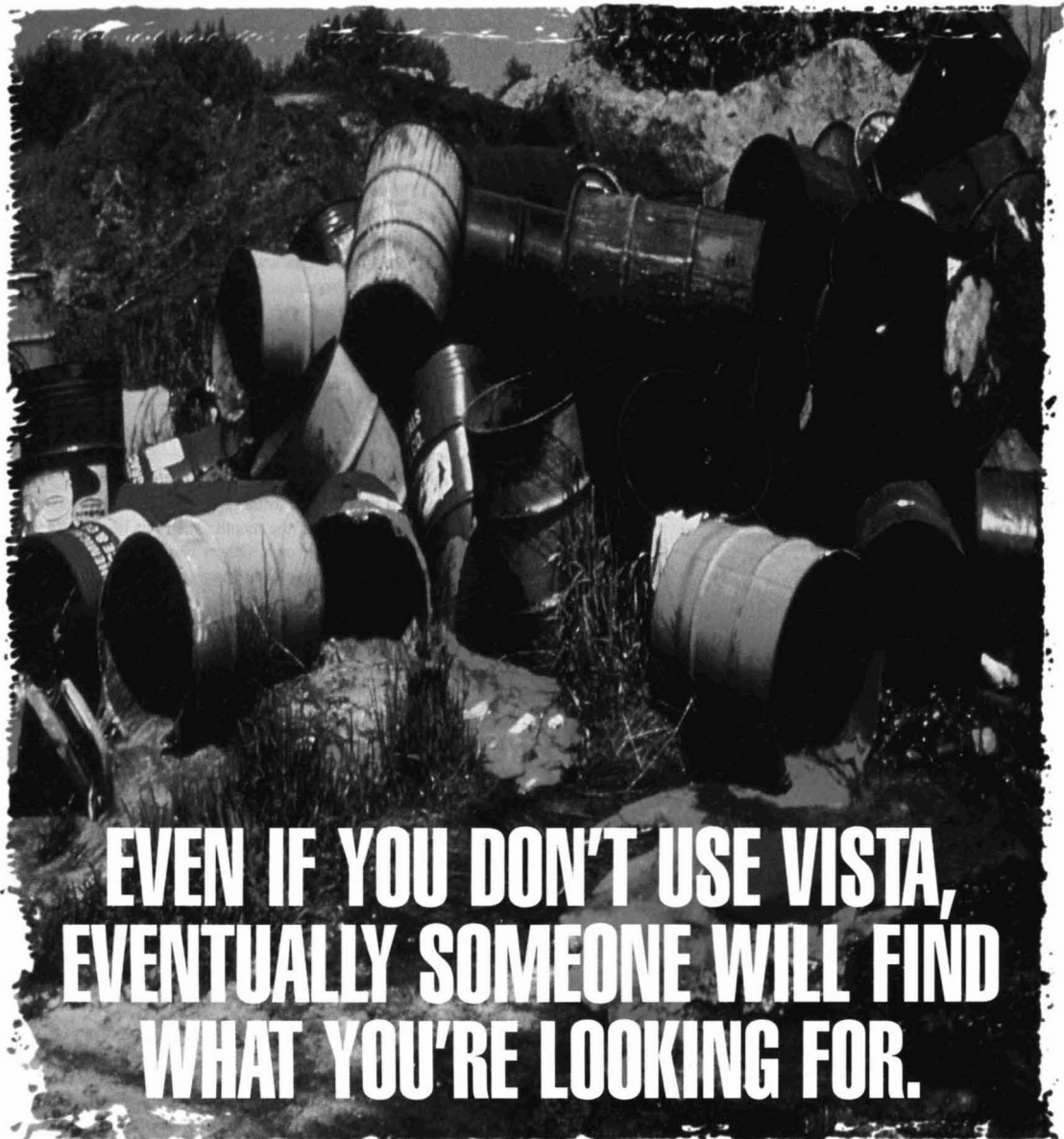
New Center Will Help Metal Finishers

The metal finishing industry's small- and medium-sized businesses will soon gain access to pollution prevention assistance through a new government-industry operation. The National Metal Finishing Resource Center, one of four such outlets planned by the Clinton Administration, is expected to begin operating on a pilot basis by the end of 1995, with full services available within six months, EPA said. EPA, the Commerce Department and four industry groups recently announced the opening of the center.

EPA said the center, based in Ann Arbor, Mich., will give metal finishers access to comprehensive information on regulatory compliance and pollution prevention opportunities, technologies and techniques. The information will enhance the international competitiveness of smaller manufacturers, while reducing adverse effects on the environment, the agency said.

The center will provide an electronic information source that can be accessed through the World Wide Web on the Internet, EPA said, noting that such a connection will enable users to browse through a technical library, query the center's assistance providers or post questions to other subscribers. The center will also offer a toll-free number for in-person information requests and fax-back services of standards material, the agency said.

For more information, contact EPA's Greg Waldrip at (202) 564-7024 or Brian Sweeney at (301) 975-3591.



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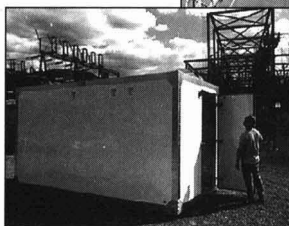
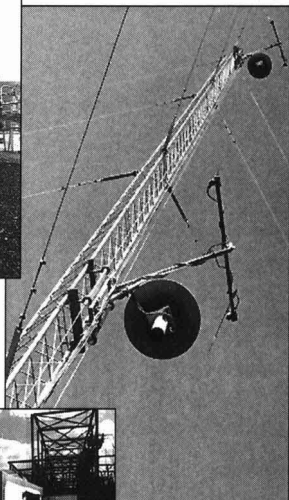
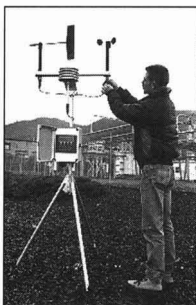
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NEWS UPDATE

EPA Axes Needless Regs

In response to a presidential request, EPA has removed dozens of obsolete or redundant regulations from the Code of Federal Regulations. The cuts took effect June 29, when the rules were listed in the *Federal Register*.

Water-related rules on the list pertain to the National Pollutant Discharge Elimination System and Pretreatment Programs, State and Local Assistance Programs, Effluent Limitations Guidelines and Standards, and Public Water Supply, and Underground Injection Control Programs. Other rules deleted pertain to solid and hazardous waste, oil discharge and Superfund and clean air programs.

By removing these rules from the code, EPA hopes to clarify their legal status for the regulated community and the public. The move comes in response to President Clinton's order March 4 for all agencies to review their rules and cut those that are redundant, obsolete or unduly burdensome—part of his initiative to reinvent government. EPA sent the list to the White House June 1, which then released it at the end of the month. The rules in some cases had simply expired on their own. Others became obsolete when their statutory basis was repealed. Some have been vacated by court decisions, while others were made moot when the grant programs for which they applied were completed, EPA said.

On the water rules, call Cynthia Puskar at EPA at (202) 260-8532. On clean air, call Maureen Delaney at (202) 260-7431. On the solid and hazardous waste rules, call Jim O'Leary at EPA at (202) 260-0724 or Jim Fary at (703) 603-8899 or the RCRA/Superfund Hotline at (800) 424-9346.

Electric Arc Furnace Dust Removed From RCRA

EPA has published a final rule removing stabilized electric arc furnace dust from its hazardous waste list. Once the steel-mill byproduct is altered through a detoxification process, it can be disposed of in Subtitle D landfills, the agency said.

The rule, which came in response to a petition from Conversion Systems Inc. of Horsham, Pa., says de-listing will be on a "generator-specific" basis, which requires initial approval of CSI processing sites and periodic testing to ensure the waste remains non-hazardous.

The rule's issuance was hotly contested by Horsehead Resource Development, a company that specializes in recycling the dust. "EPA is sending a loud message," HRD said in a statement, "that environmentally sound, successful and innovative recycling is no longer a priority." HRD and one congressman petitioned EPA for a public hearing, which the agency denied. EPA did receive written public comments from 18 interested parties, including steelmakers, legislators, and HRD on the rule. The agency said HRD was the only party that had strong objections to the rule.

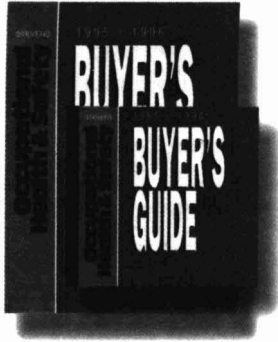
HRD said 75 percent of the dust is being recycled and that the rule, which "[allows] the second largest inorganic waste stream to escape hazardous waste regulation", violates RCRA's and the Pollution Prevention Act's recovery-oriented stipulations.

But EPA said de-listing EAF dust will not promote the dumping of the dust in landfills. The agency said the assumption that the waste "will be disposed of in a Subtitle D landfill is conservative and represents a . . . worst-case management scenario."

Correction

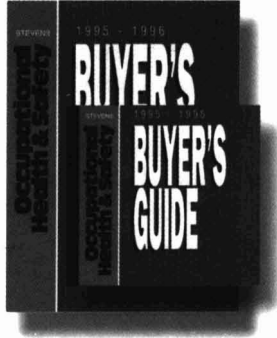
A June News Update item incorrectly stated that the Ecova incineration facility in Kimball, Neb., was closing. The facility was acquired by Clean Harbors Inc. in May and continues to provide hazwaste incineration services.

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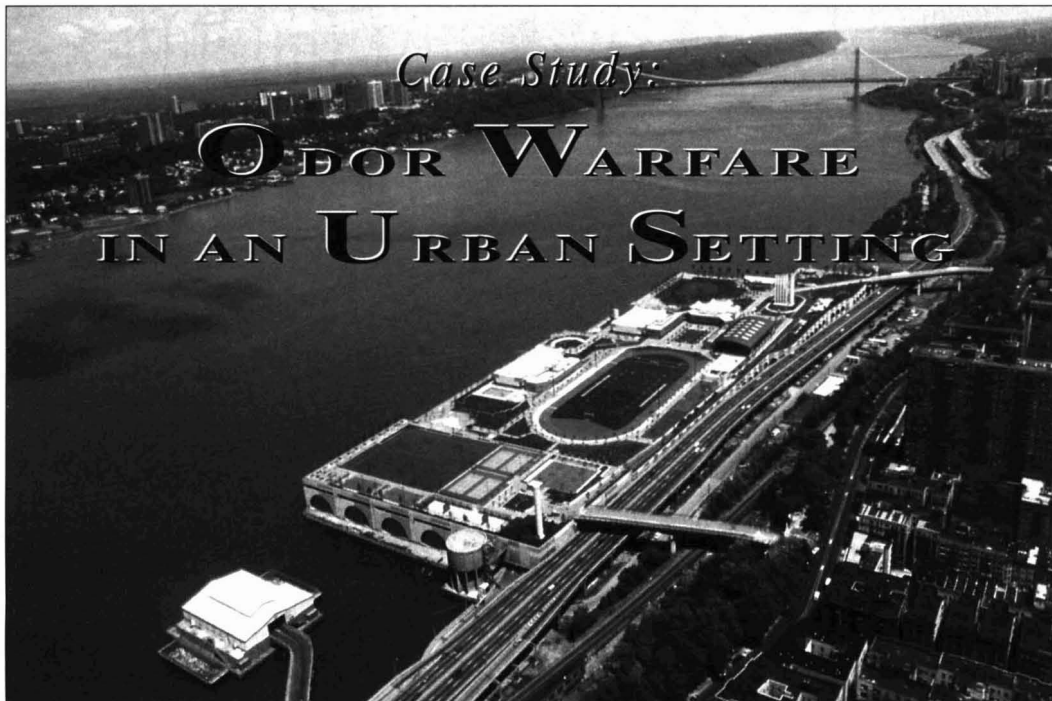
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By Richard J. Pope, Dominick P. Profaci, and Alfonso Lopez

The North River Water Pollution Control Plant in New York City is the newest addition to the city's 14-plant wastewater treatment battalion. The five-year-old plant, located on the upper west side of Manhattan (see photo above), treats millions of gallons of raw sewage that once flowed unimpeded into the Hudson River. The concrete mammoth is built entirely over the Hudson, supported by a myriad of static piles, and hosts a 28-acre rooftop state park. Because it's situated in a densely populated area and is meant to blend into its surroundings, the North River Plant has one of the most extensive odor control systems of any wastewater treatment facility. Yet, despite careful planning in facility design and odor management schemes, odor complaints began to be registered shortly after the facility began operating in 1986.

Exposure

The North River Plant supports some 20,000 visitors to its rooftop park each day. More than 100,000 cars a day pass within a few feet of the open plant side walls, and scores of people live adjacent to the plant in low- and high-rise apartment buildings. The high visibility of the plant, and the lingering controversy over its sit-

**New York's North
River wastewater
treatment plant poses
a real challenge to
odor control experts.**

ing, have placed significant pressures on the City to mitigate odor releases from its multiple and variable sources.

To preclude the perception of odors off-site, the City retained Pirnie-Baker, a joint venture of Malcolm Pirnie, Inc., and Baker Engineering, Inc., to develop a multi-tasked project to reduce odor emissions. The project comprised on-site odor assistance, field odor evaluations, plant staff odor training, community outreach program, conventional odor control upgrades and additional, nonconventional odor control evaluations.

The neighborhood adjacent to the North River Plant is primarily residential; however, a number of nearby industries add to the odor situation. A Department of Sanitation transfer station is located directly south of the plant and shares the same entrance

roadway. The garbage barges, which are open to the atmosphere, and daily line of garbage trucks emit significant odors. Unfortunately for the North River Plant, these non-plant odors have typically been attributed to the plant alone. Multiple neighborhood field odor investigations by Pirnie-Baker have consistently shown that a predominance of the odors in the community are not plant related. That is not to say that the plant is odor free. Odors from the North River Plant have been perceived in the neighborhood, and to the greatest extent in the rooftop park.

Odor Sources

Riverbank State Park, directly above the plant, receives periodic wafts of odors from the plant beneath it. More than 25 percent of the odors have been attributed to the final settling tanks, nearly 22 percent to the anaerobic digesters, more than 12 percent to the primary settling tanks, 16 percent to other plant processes, and fully 25 percent to non-plant-related odors. This last finding means that even if odors from the plant were completely eliminated, odors would still be reported in the park and would most likely be attributed to the plant below. A major portion of the non-plant-related odors are garbage odors from the nearby solid waste transfer station.

Odor Control

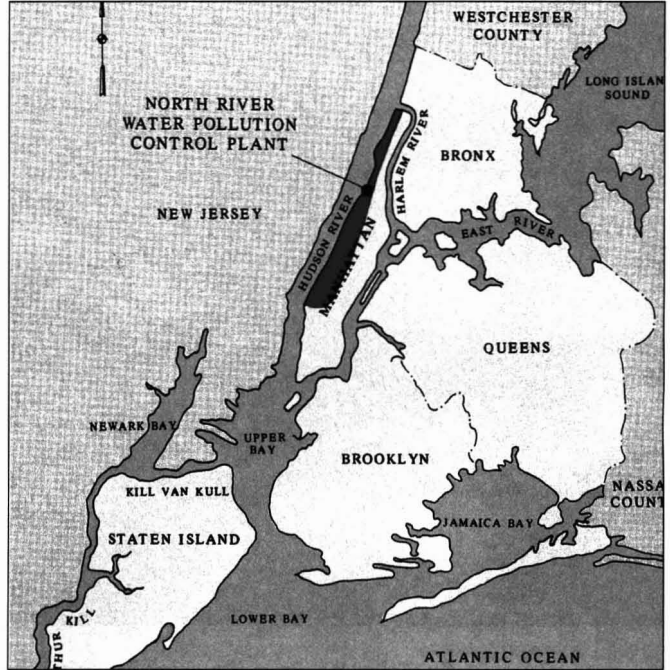
Odor Control Options

Effective odor control is essential when you have more than 100,000 people at your plant fence-line daily, and the state regulatory agency is limiting the release of specific emissions to near or below analytical and human detection levels. At the North River Plant, conventional containment, conveyance, and treatment systems treat the most odorous areas. These include the influent wastewater forebay, influent screens and channels, grit processing area, grit and screenings handling area, scum concentrator, aeration tanks, RAS distribution box, WAS wet well, thickeners, digester overflow boxes, digester pressure relief valves, gas storage tank volume relief valve and shell, sludge storage tank, final settling tank RAS lift boxes and scum pits, sludge barge, and primary settling tanks.

Treatment of odors consist of a two-stage system. The first stage is an absorption process carried out by packed bed wet scrubber units. These units utilize a mass transfer reaction between the air and liquid phases to remove odorous constituents from the air and convert them to an aqueous form where they are oxidized. The second stage consists of a physical adsorption process carried out by granular activated carbon (GAC) adsorption units. This process makes use of the pore structure and large surface area of GAC to remove odorous compounds from the air stream and trap them on and within the GAC media.

Conventional odor control for treating expected plant odor sources is effective, but residual odors continue to be released from other, sometimes unusual and unlikely, locations. Because of the North River Plant's unusual architecture, processes that typically would not be significant odor contributors at other facilities play an important role. Light odors, which would typically dilute and disperse just above the tank surface, slowly migrate upwards to the rooftop and become concentrated. Shifts in wind direction and speed release variable puffs of concentrated odors from the perimeter arches.

A group of specially trained North River Plant staff make up an Odor Action Team. The group is trained to conduct daily perimeter odor surveys of the plant's processes as well as neighborhood odor evaluations. Members are attuned to the causative factors of odor production and emissions and have established levels of response to escalating odor intensities and sources to allow for quick and effective odor mitigation procedures.



Unconventional Controls

After Pirnie-Baker was called in, the city negotiated a Consent Order Agreement with New York State to immediately implement odor control measures. Since a lot of time was needed to implement conventional odor control strategies at the facility, some interim odor control measures were evaluated. Unconventional odor control techniques to supplement the long-term efforts were also examined. These included: addition of odor-reducing chemicals in an unconventional manner; installation of air/wind baffles; operation of existing fog fans; creation of a "wall of water" around the plant archway perimeter; modification of landscaping at sensitive rooftop areas; and ventilation of digester area.

A brief description and evaluation of several of these strategies follows.

Chemical Weapons

Many of the odors at the North River plant are organic- or sulfide-based. Both types of odors can be detected within the secondary system area. Toxicity limitations have typically prohibited the addition of odor-reducing chemicals to biological treatment systems in the past. The specific odor problems at this facility allowed for use and study of these chemicals at nonconventional dosing points.

Ferric chloride. Specifically for elimi-

nating aqueous solution, ferric chloride induces a precipitation reaction that removes sulfide ions from aqueous sulfide and forms a non-odorous ferric sulfide precipitate.

- A number of plant surveys containing aqueous sulfide concentration measurements have shown very low wastewater sulfide concentrations at the facility. In addition, a number of bench scale analyses were conducted by DuPont Chemical to determine ferric chloride's effectiveness in reducing odors in the secondary area. These evaluations indicated that ferric chloride would not effectively reduce non-sulfide odors found in the secondary area at the North River Plant.

- Another shortcoming: ferric chloride consumes alkalinity, thereby reducing the buffering capacity of the treated wastewater. Further reducing the already marginal alkalinity concentration of the North River Plant wastewater could adversely affect the biomass, as well as effluent pH. Therefore, ferric chloride was eliminated from consideration as an interim odor control means.

Potassium permanganate. Potassium permanganate is a strong oxidizer that reduces hydrogen sulfide odors as well as organic-based odors. It is, however, an expensive option for wastewater odor control applications.

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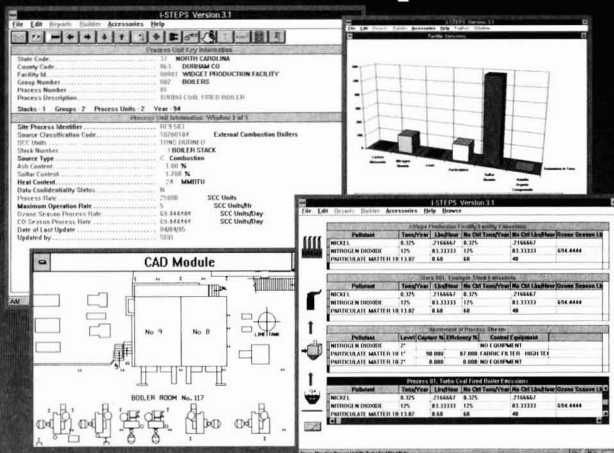
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Odor Control

• A bench-scale analysis was conducted to assess the effectiveness of potassium permanganate in reducing odors from the final settling tanks—and showed that it was successful in reducing odor generation potential of return activated sludge.

• On a cost-effectiveness basis, potassium permanganate was deemed impractical for full-scale application for odor control. Its high cost in this application overshadowed its odor reduction benefits.

Sodium hypochlorite. Like potassium permanganate, sodium hypochlorite is a strong oxidizer that will effectively reduce hydrogen sulfide odors as well as organic-based odors. It is less expensive than potassium permanganate, but is toxic to the mixed liquor microorganism population.

• In a test of the chemical, sodium hypochlorite was added to the influent of the North River Plant, and it yielded little to no reduction of odors within the primary settling tank area. In addition, studies conducted at other facilities indicate that the sodium hypochlorite dosage needed to reliably counteract odor-causing compounds in the secondary system would be too high to prevent detrimental effects on microorganisms.

Masking agents. Masking agents do not change the odor-causing compound in any form, but rather "cover" the offensive odor with another intended to be more pleasing to nasal receptors. Masking agents are very dependent on dose, dispersion, and concentration.

• Various masking agents were tested at the North River Plant, with only marginal results. At times, odors from high-dosage applications of masking agents were found more offensive than the treatment odors they masked. Lower dosage applications can result in a combined odor that can be equally displeasing. Dosage, point of application, and method of application make the use of masking agents very difficult to control and, at best, only marginally effective.

Counteractants. Counteractants work to chemically change, envelop, and/or neutralize offensive odors. A number of products are available to neutralize the following odor types: phenolic; amine; mercaptan; organic, fatty acids; aldehydes; solvent odors; and aromatics.

The selection of the proper counteractant agent and the amount required to control any odor problem is a matter of trial and error. A number of products provided by various manufacturers were tested for odor-reducing effectiveness, none of which delivered satisfactory results.

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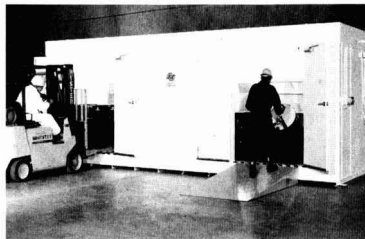
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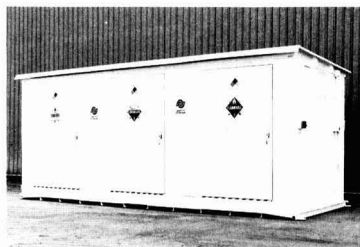
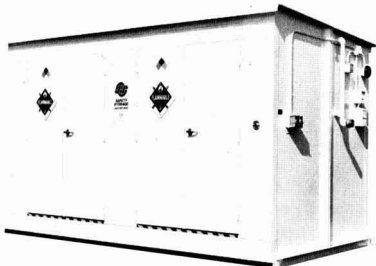
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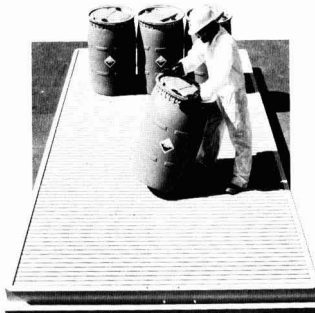
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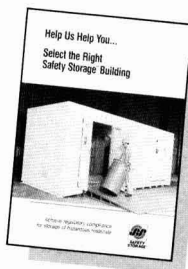
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Odor Control

One counteractant evaluation still to be performed involves placing various counteractants in the facility's east side archways, adjacent to the final sedimentation tanks. A short-term study will be performed, including days with unfavorable wind patterns that would cause odors to carry towards the surrounding community. This study is to make use of fence-line and neighborhood odor surveys, as well as odor complaint data as determinants of the odor-reducing ability of the counteractant.

Physical Approaches

Several structural changes were also explored as possible solutions to the odor problem. A series of air/wind baffles were installed on the north side of the rooftop to prevent concentrated fugitive odors from escaping. However, the baffles succeeded only in redirecting air flow to other areas, ultimately increasing odor emissions on the south side of the plant.

Fans installed in the primary and secondary tank settling areas to prevent fog from forming inside the facility in cold conditions were tested for their ability to prevent buildup of odors in the plant. They, too, proved ineffective at preventing odors from affecting residential areas.

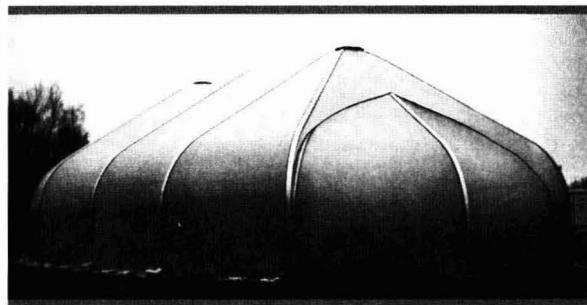
The radical idea of enclosing the entire archway perimeter with a "wall of water" was even considered to seal fugitive emissions inside. Problems including the impact of water leakage on the Henry Hudson Parkway, adjacent to the facility, not to mention the cost of such an addition, quickly closed that option.

The North River facility faces several unique circumstances in its odor control efforts. It could be considered the most daunting odor control challenge ever to face a municipality. The methods that are ultimately developed for the plant could help advance odor control technology on a broader scale. **EP**

Richard J. Pope, a senior associate with Malcolm Pirnie Inc., heads odor control services for the White Plains, N.Y.-based consulting firm. Dominick Profaci is a project engineer and licensed wastewater treatment plant operator with the firm. Alfonso Lopez is deputy director for facilities operations with the New York City Department of Environmental Protection.

Editor's note: This article is based on a paper presented at the Air & Waste Management Association's annual conference last June.

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FILTERS TO THE RESCUE

By Beth Cahape

With stiffer pretreatment requirements for wastewater discharges on the one hand and EPA's upcoming phaseout of ozone-depleting solvents on the other, membrane separation technologies—including microfiltration, ultrafiltration, nanofiltration, and reverse osmosis—are providing new solutions to environmental managers' compliance challenges.

Already well established in the food and chemical processing industries, where various filtration systems are used to ensure product purity, membrane separation developers are targeting a new audience: manufacturers such as metal products makers and finishers that are moving toward aqueous and semi-aqueous cleaning systems in anticipation of an upcoming solvent phaseout. Such systems, which put a premium on wastewater treatment, are driving demand for filtration and other technologies to treat wastewaters before discharge.

In some cases, separation technologies are creating cost-saving treatment opportunities. Winsert Inc., a Marinette, Wis.-based maker of valve seat inserts for heavy equipment engines, provides a perfect example. In need of a new system to treat process wastewater streams laden with oil, grease, dipenetrant, and fine metal filings—the result of grinding, finishing and dye penetrant processes—the company discovered that an ultrafiltration system that could treat each of those wastewater streams in one fell swoop.

Filtration vs. Chemical Treatment

"We did an initial engineering study to evaluate the problem," says Paul Korn, Winsert's vice president of engineering. "The study suggested that conventional chemical treatment approaches would be very labor intensive, plus we'd have to deal with the expense of chemicals and sludge disposal for each waste stream."

Winsert approached Dynatech Systems, a Burlington, N.J.-based ultrafiltration company, to develop and install a filtration system. Under the new treatment regimen, "all wastewaters are collected into a big holding tank, then put through a processing tank and into the ultrafiltration process. Now we've got it centralized in one place and handle it in the same manner. The company also saved floor space in switching to the system, which takes up a roughly 20-foot-square area.

With an estimated wastewater load of 2200 gallons per day, the membrane technology yields surprisingly low amounts of waste. "We're removing much of our metal filings with simple paper filters, but the rest of the contaminants amounts to just one 55-gallon drum every three weeks," Korn says.


Porous Membrane

As the name implies, ultrafiltration makes use of porous filter membranes with pores 0.1 microns in diameter or smaller. In Dynatech's system, water passes through the membrane, leaving oils, suspended solids and other contaminants behind. Other filtration methods are centered on porous membranes of various sizes, as

large as 10 microns in particulate screening microfiltration systems, and as small as .001 microns and smaller in newer nanofiltration applications.

Common among many filtration vendors, a pilot ultrafiltration unit was installed at Winsert's plant to confirm the system's viability with the facility's wastes. Says Dynatech sales manager Archie Ross: "Although membrane technology has a good reputation, there have been misapplications of this process." And while problems are often less about quality than excessive quantity of wastewater to be treated, Ross says, "when we put a pilot system in, we get a clear idea of what a company's needs are. Then we recommend the appropriate size."

Another filtration developer, Minnetonka, Minn.-based Osmonics Inc., recently announced a rental service for a range of filtration systems that allow facilities to conduct on-line pilot testing before investing in membrane separation systems.

Winsert's Korn says he's happy with the bottom line on Dynatech's system, noting that the \$50,000 tab—together with \$20,000 in installation costs—will be recouped by lower treatment costs in short order. "We don't have the cost of chemicals and maintenance, and compliance is no longer a worry. . . . We're pleased," says Korn. Dynatech's Ross concurs. "It's not unusual for a company to recover their costs within one year, especially if they have high oil and grease loading." 

Beth Cahape is associate editor of Environmental Protection.

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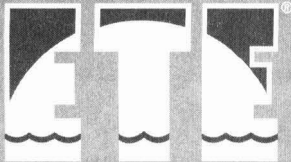
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Hayward Industrial Products

without costly media migration. A variety of filter media sizes, types and bed depths are available to fit specific needs. **Davis Gravisand.** *Circle 70 on card.*

Compact Filter-Press

Diagenex's FiltraPak filter press system has been configured to be used as a flow-through filter that offers up to double the filtration area in

the same floor space as other types of filter systems.

Solids are easily discharged into an appropriate vessel below the filter plates. The filter media remains on the filter plate, needing replacement only every one to three years of operation. Among its applications: computer hard disk conditioning water, silicon ingot slicing, bandsaw cooling water and liquid fertilizer filtration. **Diagenex.** *Circle 71 on card.*

Filter Reliability Testing

A filter validation testing system developed by Ultrafilter Inc. provides filter users with data on the efficiency and performance reliability of individual filters.

The Ultracheck Vario system is a computer-controlled electropneumatic device which conducts a series of tests on used filters to measure their operational performance, reliability and integrity. Tests include stabilization pressure drop, pressure hold, minimum and maximum pressure, bubble point and flow rate. The system can test a wide range of filter types; Ultrafilter provides users with a comprehensive computer printout of test results. **Ultrafilter.** *Circle 72 on card.*

Backflushing Filter

A new automatic self-cleaning in-line filter from Hayward Industrial Products provides continuous, zero-bypass filtration of process and cooling fluids. Regardless of the nature or specific weight of the solids, Model 2596 can remove and divert such wastes



Davis Gravisand

as Zebra mussel veligers, Asiatic clams, sand, scale, silt and algae in a single pass. Entirely automatic, these units do not need to be shut down or have the flow diverted. Solids larger than 40 microns are trapped on the filter surface and removed by a backflush arm rotating within the filter. The system performs at pressures as low as 10 psig, and the stainless steel filter element is designed in accordance with ASME VIII regulations. **Hayward Industrial Products.** *Circle 73 on card.*

Rotary Vacuum Precoat Filtration

With the Model RVP, dewatering solids and clarifying waste streams variable in solids and character—or oily and difficult to separate—is possible via rotary vacuum precoat filtration. Appropriate applications include bulk tanker wash water, latex and resins, DAF float, and flexographic ink.

Developed by Great Lakes Environmental, these units provide continuous filtration of wastewater through a preapplied layer of inert filter media made of diatomaceous earth. When solids form a layer on this media, each revolution of the drum automatically shaves them off. Filter cake solids are dry and easily handled for landfill disposal. All suspended solids are filtered out of the wastewater stream. Available units come in five sizes—up to 113 square inches—and are all made of carbon or stainless steel. Also equipped with variable speed drive and a precoat mix tank. **Great Lakes Environmental.** *Circle 74 on card.*

Dewatering Filter Press

A new line of lightweight PolyPresses specifically designed to dewater wastewater sludge and process slurries has been introduced by Star Systems Filtration Division.

Standard features include CGR polypropylene plates and inlet pipes; schedule 80 PVC air blowdown manifolds; and heavy-duty carbon steel stands with epoxy coating. Custom fabricating is also available—using any plate configuration—for process applications requiring cake wash, frequent media changes or other special requirements. Other options include feed pumps, automatic pump controls, plate shifters, cake discharge systems and precoat/bodyfeed systems. **Star Systems Filtration Div.** *Circle 75 on card.*

Hollow Fiber Microfiltration

For treatment of emulsified oily wastewater, the Ultimem OWS-500 series of systems use hollow fiber microfiltration. Implementing the most recent developments in cross-flow membrane technology, NWW Acumem has made these systems for such applications as machine coolant effluent, aqueous wash bath wastes and compressor condensate. Standard designs are available for treating 50 to 5000 gallons per day—with benefits that include low maintenance and cleaning procedures; no chemical agent additions; and low operating energy requirements. **NWW Acumem.** *Circle 76 on card.*

Textile Nanofiltration

Offering treatment for the dyeing and finishing processes within the textile industry, the Desal-5 membrane system is an alternative to conventional treatment methods. These

units remove color and other organic substances from a waste stream and allow reuse of salts and up to 90 percent of the process water. Manufactured by Desalination Systems, Inc. of Vista, Calif., the system's thin-film nanofiltration membrane material is constructed to withstand temperatures of up to 90 degrees centigrade. Patented wide feed spacers help optimize hydraulic flow to reduce element fouling, and standard Durasan outerwrap allows for more

well as the capability for expansion to meet future dewatering requirements with minimal expense. These high-capacity midsize presses from Pacific Press Co. are available in volumes from 20 to 50 cu. feet and use 40" x 40" filter plates. Options include membrane "squeeze" plates, automatic or semi-automatic plate shifters and safety light curtains. Also available are automatic feed pump controls, conveyors, sludge carts, platforms and automatic process

ment. Made by Automatic Filters Inc., these units are compact, can handle flow rates from 10 to 5000 gpm and have a programmable digital controller to meet the backwash demand of various applications. Classic uses include cooling water filtration, protection for spray nozzles and filtration of water both entering a plant or after processing. Fine stainless steel screens reduce downtime, system maintenance cost and filter media replacement problems. **Automatic Filters.** *Circle 79 on card.*



Infilco Degremont Inc.

ease in cleaning. Nanofiltration also allows for the recovery of process chemicals and water from a number of different textile process streams. **Desalination Systems.** *Circle 77 on card.*

Filter Press

Key features of the 1000 Series filter presses include computer control and monitoring of all press functions, as

valves for cycling and air blowdown. **Pacific Press Co.** *Circle 78 on card.*

Industrial Water Filters

Tekleen self-cleaning water filters feature filtration efficiency to ten microns, low pressure drop under normal conditions and 50 percent reduction in backwash intervals. Operation is by line pressure alone, with no power require-

ment. A major feature—along with the filtration of the initial water from the bed itself—is the system's use of a sliding valve for removing backwash filtrate contained in previously filtered cells. Sampling is also done from small, discrete areas so that problem spots in the filter can be easily identified. **Infilco Degremont.** *Circle 80 on card.*

ENVIRONMENTAL TRAINING FOR CORPORATE RISK MANAGERS

Addressing a Growing Need

By T. Rick Irvin and Camilo Cruz-Batres

Environmental management issues associated with toxic chemical usage and hazardous waste generation have historically been topics of concern in the chemical, petrochemical, and manufacturing industries. Recent reports, however, have focused attention on the growing environmental problems common to financial and banking industry sectors. In the past, these industries have only been indirectly affected by environmental regulations and associated liabilities. Recent reports have increasingly highlighted the fact that many of these corporations now face growing financial risks and legal liability from federal and state regulatory requirements that assign to them responsibility for environmental problems of the present and the past. Industries financially at risk from these emerging environmental trends include: accounting; auditing; mortgage and institutional banking; financial management; institutional and personal investment; corporate insurance; property development, construction, and management; and residential and commercial real estate sales.

Areas of Concern

Commercial property development. Real estate transactions now require increased scrutiny for the possible presence of and liabilities from hazardous waste contamination. Failure to require environmental examination prior to property transfer has left many lenders and property owners with the cost of addressing conditions of which they were totally unaware and which they did not cause.

Accounting and auditing. Thousands of sites in the U.S. have underground storage tanks, previously containing toxic/hazardous chemical agents, which have leaked toxic residues into surrounding soil and nearby water supplies. Cost estimates to properly remediate and restore these sites must now include the impact of leaking tanks on the value and usability of surrounding commercial properties.

Residential property lending. Federal and state guidelines for acceptable lead levels in painted surfaces of single-family and multi-family residences require that many properties be inspected—and remediated if high levels of lead are discovered—before the property is sold, mort-

gaged, leased, or rented.

Insurance. Claims arising from environmental cleanups are increasingly reported as a major threat to insurance industry earnings and solvency among some companies. Increasingly, pollution claims have caused many major insurers—including Aetna, Cigna, ITT Hartford, and Travelers—to pay out or put into reserves hundreds of millions of dollars. Some insurance industry analysts estimate that insurers could end up paying as much as \$1 trillion for Superfund claims over the next 50 years.

The New Professionals

Financial and banking organizations increasingly need environmentally trained professionals to implement management strategies that minimize institutional exposure to environmental liabilities. In the past, environmental consulting firms have supplied many financial organizations with environmental services to address specific, immediate problems. As environmental risk management has become an integral part of business success, or failure, within financial and banking organizations, indus-

Hazmat Courses Go Online

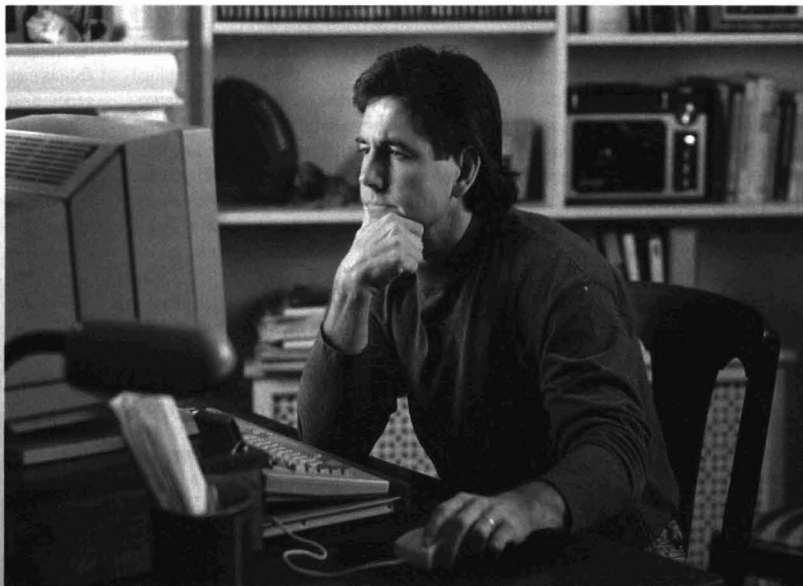
THE UNIVERSITY OF CALIFORNIA IS TRYING A new tack in providing environmental education to busy business executives: online classes.

Developed with a grant from the Alfred P. Sloan Foundation, the *Certificate Program in Hazardous Materials Management*, part of U.C.'s continuing education program, targets a broad national audience with online instruction. Among the first online environmental education programs to award a certificate to graduates, the class allows participants the flexibility to study whenever—and wherever—they want.

"We think that offering these courses online makes them ideal for those plant managers who—through corporate downsizing and/or increased responsibilities—find that they need more areas of expertise," explains Jon Conhaim, project coordinator for the program. "We've offered this certificate program in correspondence course form throughout the eight U.C. campuses since 1983, but other areas of the country don't have easy access to a university or a program like this," he adds.

The program is designed to provide an introduction to principles, regulations, and technologies relating to hazmat management. Consisting of nine specific courses—for a total of 240 hours of instruction—fees range from \$350 to \$380 per class, with the additional expense of texts and the America Online (AOL) subscription. Students gain online access to program instructors, other students, lectures and specific assignments via America Online.

Conhaim stresses the program's practical emphasis. "All of our instructors are currently working in the field. We feel that students need more than the theory," he adds, "they need the practical knowledge that our instructors can bring to this subject." The program has the backing of a strong advisory com-



©Charles Gannon/The Stock Market

mittee, with participants like EPA's Joseph Carra—the current deputy director of EPA's Pollution, Prevention, and Toxics program—providing their assistance in the design and technical content of these courses.

While its appeal to people with demanding work schedules is obvious, the program also targets those looking for a career change, such as the cadre of aerospace and defense workers facing military base closures. In fact, 35 scholarships will be available especially for unemployed workers (or those facing layoffs) in the defense industry.

Another benefit noted by Conhaim: "It's getting harder and harder to keep up with the volume of material coming out in this field . . . that is, unless you know how to access online information," he says. "Since our course materials are presented in an online format, our students get accustomed to it, and they get a chance to learn how to search databases, the World Wide Web, and other electronic resources." Add to this the potential to network with other environmental professionals around the country, and this could be the makings of a valuable resource for environmental professionals. —Beth Cahape

try leaders have recognized the need for cross-trained professionals with backgrounds in the financial or business disciplines augmented with specific training in environmental science, technology, and management.

These new environmental professionals, or environmental risk managers, are rapidly evolving as key members of institutional and corporate management ranks in the 1990s. Environmental risk managers now routinely monitor and review key corpo-

rate procedures, as well as corporate decisions, with authority that often provides direct access to all levels of corporate management. Some examples:

Environmental risk managers in banking institutions. Environmental risk managers now play a role in banking industry decisions in two key areas:

Loan evaluation. Institutions providing loans or other financial services face a number of basic categories of risk resulting from contaminated assets, as identified by

the Federal Home Loan Bank System. Environmental risk managers are increasingly finding positions of loan and investment oversight of companies with assets that may have or contain environmental contamination. Among issues increasingly faced by environmental risk managers in the financial services industry:

- collateral in the form of property or securities may be drastically reduced in value after contamination discovery;
- borrowers may be unable to repay

Environmental Training

loans if they must also pay environmental restoration costs;

- site-associated remediation costs may exceed a lender's encumbrance on property assets;
- creditor costs, in the form of outstanding mortgage loans, may lose priority to remediation liens imposed under laws that require priority for remediation costs;
- lenders who have participated in operating assets containing, generating, or transporting hazardous materials or wastes may be held liable for remediation and restoration costs;
- lenders may be prohibited in pursuing normal foreclosure remedies;
- borrowers may not maintain collateral with a high risk of environmental contamination in an environmentally sound manner;
- assets used to secure loans and other financial transactions may need to be evaluated proactively to quantify the degree of risk from on-site or nearby environmental contamination.

Real property assessment. Property development, construction, and management corporations, in addition to institutions providing loans or other financial underwriting services, face a number of potential costs to properly investigate and evaluate hazardous material contamination on existing property. Environmental liability may be substantial for commercial development organizations who have had or will have any involvement in the ownership, operation, or transfer of ownership of contaminated properties.

Environmental risk managers are increasingly finding positions in corporations that develop commercial properties in which building or property assets may be of concern. Some examples of real property issues increasingly faced by environmental risk managers in these property development industries include:

- identifying the extent of environmental contamination on currently held property assets;
- evaluating short- and long-term financial costs to properly meet all local, state, and federal environmental permit and restoration requirements;
- determining potential or ongoing litigation of sites adjacent to, or near, currently held property assets;

• evaluating the potential for construction and development delays required to mitigate environmentally acceptable real estate;

- ensuring that a complete and appropriate documentation trail is in place to comply with the innocent landowners' defense under SARA. These requirements, as outlined within the ASTM guidelines, include:

These new environmental professionals are rapidly evolving as key members of institutional and corporate management ranks in the 1990s.

• historical evaluation of a property for prior uses indicating possible contamination;

- any public records indicating that a property asset, or an adjacent asset, has had evidence of environmental contamination.

- an on-site evaluation to determine the current presence of environmental contamination or facilities, such as underground or aboveground storage tanks, which might indicate possible contamination.

Corporate Audit Programs

Many financial organizations increasingly require implementation of a detailed—and documented—environmental management system among their client and creditor corporations to monitor compliance with specific groups of environmental regulations and requirements. Environmental risk managers must therefore be adequately trained on all of the key elements common to competent environmental management and auditing oversight programs. Key components of proactive environmental management and auditing programs include:

Emergency Response Planning. A number of environmental regulations (including the Superfund Amendment Reauthorization Act) and federal agencies (includ-

ing OSHA and EPA) have very specific, ongoing training requirements for workers handling, transporting, or managing hazardous materials. Development of a contingency plan in the case of an uncontrolled release of toxic chemical agents at a particular location is also often required, accompanied by documentation of internal reporting procedures as well as competence (via periodic drills).

Site Management. Many historical environmental problems have occurred on small-to-medium manufacturing facilities in which no one professional is given facility-wide oversight responsibility for all environmental requirements. Documentation of the appointment of a site manager who has the proper training for hazardous materials used or stored at the site is often required.

Training. The Resource Conservation and Recovery Act among a number of federal environmental regulations requires staff at facilities

who manage hazardous materials to receive regular, documented training on requirements including labeling and records. RCRA requires regular generator training, and OSHA's Hazard Communication Program requires one-time and update training of all staff handling hazardous chemicals. An environmental management system thus needs to ensure that regulatory training requirements are met and that competence is adequately documented.

Regulation Tracking. At the corporate, regional, or facility level, programs need to be in place to track the development of federal, state, and local regulations and constantly update corporate procedures and policies. Also, local governmental organizations should be in place.

Records Distribution and Retention. Facilities as well as corporate headquarters should have a documented, consistent, and easily auditable program that will enable them to record and disseminate all environmental records that define the level of compliance activity.

Special Purpose Audits. The doctrine of joint and several liability has caused many companies to take a proactive position and extend their audit of environmental management systems to include waste disposal contractors, on-site contractors, acquisitions, and divestitures.

Training Needs and Programs

Training and educational programs for environmental risk managers have not developed at the same rate or in the same manner common to environmental science or engineering professionals. One key reason for the difficulty in developing a core of environmental risk managers has been identified in the field of internal auditing.

"Most internal auditors have background and experience in business operations, accounting and financial systems, and information technology. Few have specific technical training in environmental areas. Most environmental specialists have background and experience in technical areas such as engineering or chemistry. Integrating the skills of these two groups to produce competent environmental auditors is a significant challenge. . . ." [From: Thompson, Simson, and Le Grand. "Environmental Auditing." *Internal Auditor*, The Institute for Internal Auditing Journal, April 1993.]

Finding avenues to "integrate the skills of these two groups" has been a challenge for financial and banking professionals.

Programs are beginning to be developed, however, which have provided incremental environmental training to financial and banking professionals. Some examples:

Professional society courses. A number of the business and finance professional societies, including the American Institute for Certified Public Accountants and the Appraisal Institute, have begun to offer course programs at regional and national conferences on environmental management.

Academic minor programs in environmental disciplines. Increasingly, colleges and universities are creating course programs as well as degree programs in various disciplines of environmental science, technology, and management. Students in degree programs in business, banking, finance, accounting, can take a number of environmental courses that prepare them for environmental risk manager positions.

Professional environmental organizations. A number of professional societies in the environmental disciplines, as well as environmental credentialing organizations, have begun to provide professional

education course programs specifically for business and financial industry professionals in environmental science and environmental management. As an example, the National Registry of Environmental Professionals (NREP) and other professional organizations have recently begun a series of courses for business, finance, and banking professionals on environmental auditing and environmental site assessment.

These and many other needs for environmental risk managers will require in the future intensive training programs for all legal, investment, financial assessment, and appraisal staff members so they can factor potential liabilities into corporate decisions. Internal auditing policies, which include environmental risks as decision factors, will also need to be created to support corporate risk profiles on environmentally sensitive decisions. **EP**

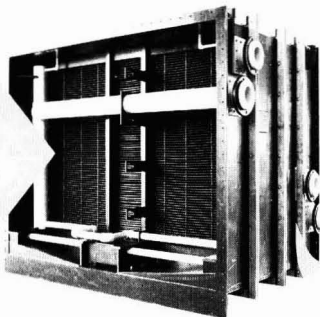
T. Rick Irvin is associate professor at the Institute for Environmental Studies, Louisiana State University, Baton Rouge, La. Camilo Cruz-Batres is a research associate with the Institute.

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Hazmat Storage VENTILATION CODES: THE FINE PRINT

By Fred W. Romig

Ventilation is the most important single feature of hazmat enclosures—and the least understood.

The features and functions of hazmat buildings have been refined to meet requirements of enforcement agencies such as EPA, codes such as National Fire Protection Association (N.F.P.A.), and various testing laboratories such as Factory Mutual Engineering and Research (FM). Considering all the potential liabilities while assembling all the disparate codes often leads to different approaches by hazmat building designers.

What codes apply to hazmat buildings? N.F.P.A.-30, *Flammable and Combustible Liquids Code* under Part 1, Section 4-6, Hazardous Material Storage Lockers, is the place to start. Section 4-6.1 states that if the building is used inside a plant, an earlier section, 4-4, Design Construction and Operation of Inside Storage Areas, applies, and 4-6.2, 4-6.3, and 4-6.4 apply to buildings located outside. This is just the start of a long road of code referrals within a code that in turn references other codes. In the end, the local Authority Having Jurisdiction (AHJ) is the final judge. This person may be federal, state, or regional, a fire chief, a Department of Labor and Health

building inspector, insurance representative, or from a rating bureau.

Today, prefabricated hazmat buildings store virgin chemicals and are used to mix, dispense, and test chemicals for solvent recovery and for other dedicated activities including enclosing certain manufacturing areas utilizing hazardous materials.

Of all the many requirements for a hazmat building, ventilation is the most important single feature, the least understood, and the most likely to be improperly applied. Ventilation in a hazmat building is described as an air conveying system for moving materials from a source to a point of discharge for the prevention of fire, explosion, and removal of toxic fumes or vapors from workers' inhalation. Here is a brief review of the standards, what's been done, and how ventilation should be accomplished in a hazmat building.

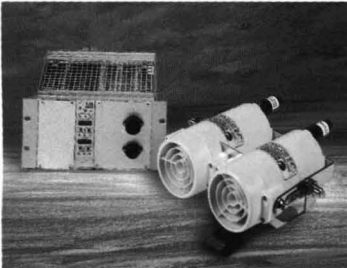
In 1990, N.F.P.A. introduced a new section in its *Flammable and Combustible Liquids Code*, N.F.P.A.-30, Section 4-6, Hazardous Material Storage Lockers, that described requirements for hazmat buildings up to 1,500 square feet in size. In a list of 16 features, Item (c) says, "ventilation

requirements, including mechanical ventilation where dispensing operations are expected." This section also refers to other places in the code, Chapters 5 and 4-4.2.11, where "natural" ventilation is mentioned while mechanical is detailed. There is a problem because about half of the hazmat buildings use "natural" ventilation and many are not properly designed.

"Natural" Ventilation

Most exposed chemical liquids give off heavier-than-air fumes that go to the sump floor and begin to fill the building from the floor up. With natural ventilation, gravity will "pull" the fumes through a "hole" in the wall, out of the building, and onto the ground. When a mechanical ventilation system is required, it has to prevent accumulation of significant quantities of hazmat vapor/air mixtures in concentrations over one-fourth the lower flammable limit. Knowing the size of the opening and the fan speed, there are formulas to control this with mechanical systems, but how can this be done with natural ventilation? The only reference to what appears to be a natural ventilation guideline is in N.F.P.A. 395,

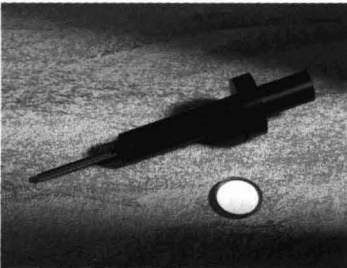
PLMS 4001/PLMS 4002 Gas Detectors



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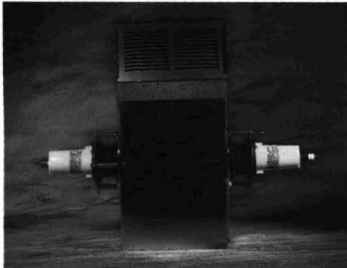
Organic vapor analyzers — trade-in offer



- Up to \$2,000 for any OVA toward TVA 1000 purchase
- Up to \$1,000 for any competitive system
- Used OVAs will be refurbished, donated to fire departments

For more information, circle 46

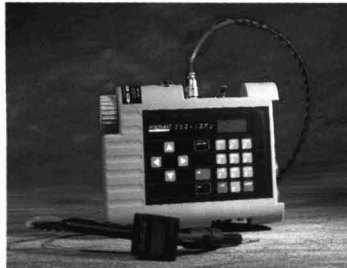
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For more information, circle 43

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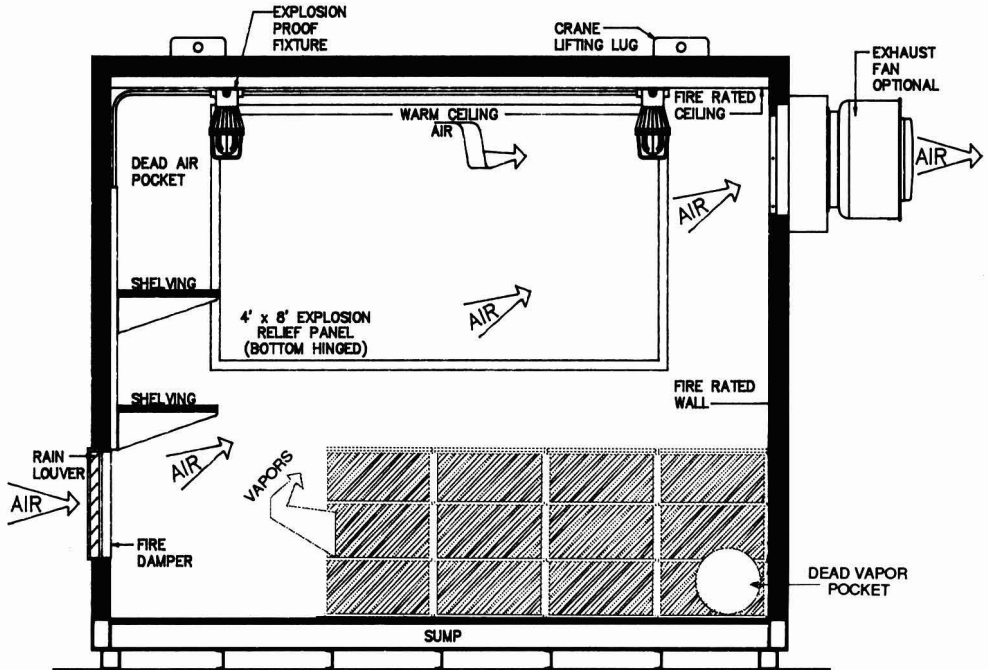
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Hazmat Storage



INTERIOR ELEVATION

Storage of Flammable and Combustible Liquids in Farms and Isolated Construction Projects, para. 2-2.7.1, "The building shall be provided with cross ventilation using at least 2 vents, each having a net open area of 64 in. and each placed at floor level. The vents shall be opposite from each other."

Adding to the confusion is the term "natural" ventilation. Some hazmat building designers will place a vent opening at floor level and the other at ceiling level on the opposite wall (see illustration above). What results is a different "natural" movement of the air. The sun heats the roof and, in turn, air at the ceiling, which expands and flows out the upper vent and is replaced with cool air coming into the building through the low vent. This causes low-level hazmat vapors to be mixed into the upward movement of air past workers' inhalation levels. It also creates trapped vapor pockets that prevent thorough ventilation of the building.

If reducing the air temperature is necessary to improve ventilation, air conditioning must be installed. If this is deemed too costly, a separate upper-level ventilation system can be installed in addition to "natural" or mechanical low-level hazmat ventilation. The upper-level ventilation consists of two motorized louvers in front of two air vents on opposite walls at the ceiling. A fan is installed at one of the upper

louvers, and a thermostat can open both louvers, turn on the fan, and bring cooler outside air. So "natural" hazmat ventilation is at low levels and is not to be confused or mixed with upper-level air temperature reduction ventilation.

Mechanical Ventilation

N.F.P.A.-30, Part 1, para. 4-4.2.11, "... mechanical ventilation shall be used if Class 1 liquids are dispensed within the room... Exhaust air shall be taken from a point near a wall of the room and within 12 in. of the floor with one or more makeup inlets located on the opposite side of the room... equipped with an air flow switch (requires continuous running fan)... to sound an audible alarm upon failure..."

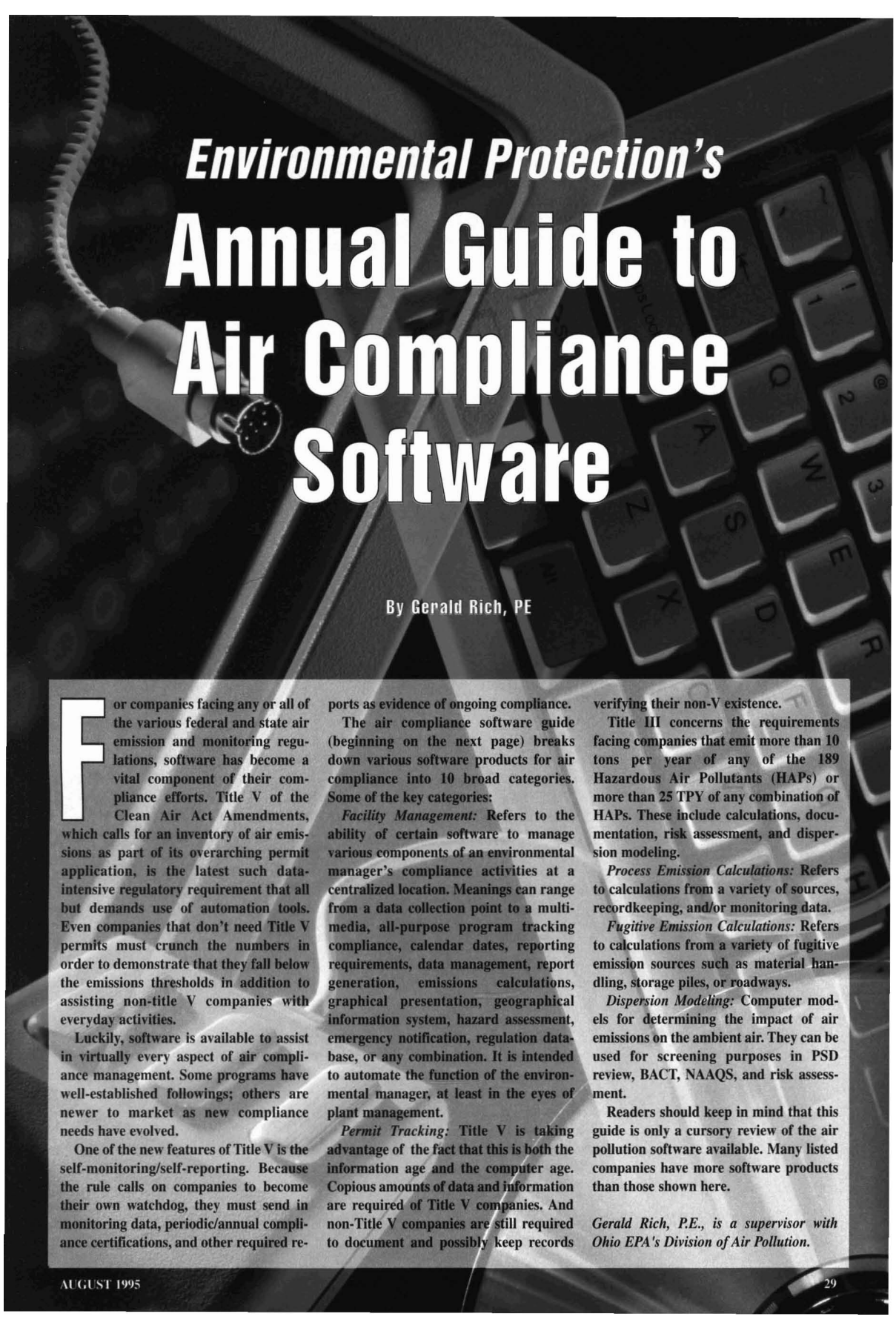
What the code does not specify is where to discharge the hazmat vapors. The result is that some hazmat building designers place the fan at a low level and direct the vapor/air mix down to the ground. This doesn't make sense except if N.F.P.A. is allowing for "natural" gravity vents that also dump the vapors on the ground. If so, is it okay to do the same with mechanical systems? Logic dictates that if you have the power of a fan to overcome gravity, you could dispense at a higher level. It is interesting to note that N.F.P.A.-30, para. 5-5.3.1 and N.F.P.A.-30A, para. 4-5.9 say, "Vents on vapor processing systems shall

not be less than 12 ft. from adjacent ground level...," and the *Standard for Exhaust Systems for Air Conveying of Materials 1995 Edition* N.F.P.A. 91 states in paragraph 2-4.5.1, "... duct systems containing flammable or combustible materials, discharge shall terminate above the roof..."

With true hazmat mechanical ventilation, a low-level gravity vent becomes the building's air intake vent, with a duplicate vent opening on the opposite wall leading to an outside duct that goes up the wall to roof level where an exterior fan is installed on the duct. The local AHJ will have to provide an opinion as to whether the fan can be controlled by the building's light switch. Switched controls are in lieu of a continuously running fan that's specified by code. The reason is to conserve energy with heating and cooling systems.

Usually, a separate switch on the fan is not recommended because a worker will forget to turn it on. It is one thing to design continuous ventilation for a building that houses mixing, handling, or dispensing operations, but it is not an automatic decision for a worker to hit a separate switch for the ventilation fan when entering a hazmat storage building. What if, for example, a leak or spill occurs during off hours and there is a build-up of fumes? At least with

continued on page 36



Environmental Protection's Annual Guide to Air Compliance Software

By Gerald Rich, PE

For companies facing any or all of the various federal and state air emission and monitoring regulations, software has become a vital component of their compliance efforts. Title V of the Clean Air Act Amendments, which calls for an inventory of air emissions as part of its overarching permit application, is the latest such data-intensive regulatory requirement that all but demands use of automation tools. Even companies that don't need Title V permits must crunch the numbers in order to demonstrate that they fall below the emissions thresholds in addition to assisting non-title V companies with everyday activities.

Luckily, software is available to assist in virtually every aspect of air compliance management. Some programs have well-established followings; others are newer to market as new compliance needs have evolved.

One of the new features of Title V is the self-monitoring/self-reporting. Because the rule calls on companies to become their own watchdog, they must send in monitoring data, periodic/annual compliance certifications, and other required re-

ports as evidence of ongoing compliance.

The air compliance software guide (beginning on the next page) breaks down various software products for air compliance into 10 broad categories. Some of the key categories:

Facility Management: Refers to the ability of certain software to manage various components of an environmental manager's compliance activities at a centralized location. Meanings can range from a data collection point to a multimedia, all-purpose program tracking compliance, calendar dates, reporting requirements, data management, report generation, emissions calculations, graphical presentation, geographical information system, hazard assessment, emergency notification, regulation database, or any combination. It is intended to automate the function of the environmental manager, at least in the eyes of plant management.

Permit Tracking: Title V is taking advantage of the fact that this is both the information age and the computer age. Copious amounts of data and information are required of Title V companies. And non-Title V companies are still required to document and possibly keep records

verifying their non-V existence.

Title III concerns the requirements facing companies that emit more than 10 tons per year of any of the 189 Hazardous Air Pollutants (HAPs) or more than 25 TPY of any combination of HAPs. These include calculations, documentation, risk assessment, and dispersion modeling.

Process Emission Calculations: Refers to calculations from a variety of sources, recordkeeping, and/or monitoring data.

Fugitive Emission Calculations: Refers to calculations from a variety of fugitive emission sources such as material handling, storage piles, or roadways.

Dispersion Modeling: Computer models for determining the impact of air emissions on the ambient air. They can be used for screening purposes in PSD review, BACT, NAAQS, and risk assessment.

Readers should keep in mind that this guide is only a cursory review of the air pollution software available. Many listed companies have more software products than those shown here.

Gerald Rich, P.E., is a supervisor with Ohio EPA's Division of Air Pollution.

1995 AIR SOFTWARE GUIDE

| Company | Software | Description | Facility Management | Dispersion Modeling | Permit Tracking | Process Emission Calc. | Fugitive Emission Calc. | SARA Title III | CAA Title V | CAA Title III | Auditing | Regulatory Assistance | DOS | Windows | Cost |
|--|--|--|---------------------|---------------------|-----------------|------------------------|-------------------------|----------------|-------------|---------------|----------|-----------------------|-----|---------|-------------|
| Achieve! Technology, Inc. P.O. Box 668, Amherst, NH 03031-0668 603-595-1414, Fax 603-595-0088 C. Jacobs, Dir., Sales & Marketing | • SARA! | Helps companies comply with EPA SARA Title II regulations. | | | | | ✓ | | | | ✓ | ✓ | | | > \$500 |
| Analytic & Computational Research, Inc. 1931 Stradella Rd., Los Angeles, CA 90077 310-471-3023, Fax 310-471-0797 A.K. Runchal, President | • RADM | Air quality modeling. | ✓ | | | | | | | | ✓ | ✓ | ✓ | | > \$500 |
| AV Systems, Inc. 4657 Platt Road, Ann Arbor, MI 48108-9796 313-973-3000, Fax 313-677-4480 Karen Wilson | • MIRS | Integrated modular environmental safety data management compliance software package. | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | | > \$500 |
| | • MIRS VOC/AIR | Air emissions tracking module. | ✓ | ✓ | ✓ | | | ✓ | ✓ | | | ✓ | ✓ | | > \$500 |
| BEE-Line Software P.O. Box 59916, Dallas, TX 75229 214-BEE-LINE, Fax 214-BEE-FAXX Rod Truesdell, Dir., Technical Services | • BEE-Line BEEST | Enhanced ISCST2 model; allows unlimited number of sources, receptors, groups. | ✓ | | | | | | | | | ✓ | | | > \$500 |
| | • BEE-Line GEP-BPIP | User-friendly program for ISC2 building dimensions; unlimited stacks, buildings. | ✓ | | | | | | | | | | | | \$100-\$500 |
| | • Bee-Line Permitting Package | Air dispersion modeling with EPA models for permitting; user friendly. | ✓ | | | | | | | | | ✓ | | | > \$500 |
| | • Bee-Line SLAB | Approved dense gas model; use for worst-case release scenarios. | ✓ | | | | | | | | | | ✓ | | > \$500 |
| Chemical Safety Corp. 1301 S. 46th, Bldg. 180, Richmond, CA 94804 510-231-9490, Fax 510-233-8926 Joanne S. Levy, Marketing Rep. | • Environmental Management Systems (EMS) | Air management; includes Form R and Air Permits. | ✓ | ✓ | ✓ | | ✓ | ✓ | | | | ✓ | ✓ | | > \$500 |
| CHEMTOX, Div. of Resource Consultants, Inc. P.O. Box 1848, 7121 Cross Roads Blvd. Brentwood, TN 37024-1848 615-373-5040, Fax 615-370-4339 Craig North, Dir. of Business Development | • CHEMTOX Air Management | Environmental Information Management Solution. | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | > \$500 |
| Citation Publishing, Inc. (CPI) formerly Virtual Media Corp. 1435 N. Hayden Road, Scottsdale, AZ 85257 602-994-4560, Fax 602-994-4456 Paul Thor, Sales Mgr. | • FESA | <i>Federal Register</i> and multiple CFR titles integrated on one CD-ROM. | | | | | | ✓ | ✓ | | ✓ | ✓ | ✓ | | \$100-\$500 |
| Coastal Environmental Systems 316 Second Ave. South, Seattle, WA 98104 206-682-6048, Fax 206-682-5658 Patrick Kelly, VP, Sales and Marketing | • CAMEO | Dispersion modeling for hazardous materials response. | ✓ | | | | | | | | | | | | \$100-\$500 |
| | • INTERCEPT | For routine monitoring and long-term analysis of weather conditions. | | | | | | | | | | | ✓ | | \$100-\$500 |
| Dianachart, Inc. 101 Round Hill Drive, Rockaway, NJ 07866 201-625-2299, Fax 201-625-2449 Bill McWilliams, VP, Sales | • Insta-Trend | Data acquisition, calculations, and custom reports. | | ✓ | ✓ | | | | | | | ✓ | ✓ | | > \$500 |

| Company | Software | Description | Facility Management | Dispersion Modeling | Permit Tracking | Process Modeling | Fugitive Emission Calc. | SAFRA Title III | CMA Title V | CMA Title III | Auditing | Regulatory Assistance | Winsways | Cost |
|--|--|--|---------------------|---------------------|-----------------|------------------|-------------------------|-----------------|-------------|---------------|----------|-----------------------|----------|-------------|
| EIS International 1401 Rockville Pike, Suite 500 Rockville, MD 20852 301-738-6900, Fax 301-738-1026 Don McIntyre, National Sales Dir. | • EHS/LifeCycle | Ten integrated modules for tracking chemical inventories, waste manifests, air emissions, calculations, emergency response, and risk management. | ✓ | ✓ | ✓ | ✓ | ✓ | | | | ✓ | ✓ | | > \$500 |
| EnviroMetrics Software 92 Reads Way, New Castle, DE 19726 302-324-9136, Fax 302-324-9138 Thomas Perkowski, Marketing Manager | • F.E.M.S. | Fugitive emissions management system for leak detection and repair programs. | ✓ | ✓ | ✓ | | ✓ | ✓ | | | | ✓ | | > \$500 |
| | • PlantWare/Air | Tracks, calculates and report air emissions to remain in compliance with Title V permits. | ✓ | ✓ | ✓ | | ✓ | ✓ | | | | ✓ | | > \$500 |
| Environmental Software & Systems, Inc. P.O. Box 1182 Bowling Green, OH 43408 419-353-8540, Fax 419-353-8540 Roger Weith, VP | • AP-42 by SIC/SCC | Air pollution emission factors. | | | ✓ | ✓ | ✓ | ✓ | | | ✓ | | | < \$100 |
| | • Methods | EPA, NIOSH, OSHA, ASTM sampling methods. | | | | | ✓ | ✓ | | ✓ | ✓ | | | < \$100 |
| | • Solvent Alternatives • VOC Calculations | Solvent replacements for cleaning, degreasing operations. Coating line calculator with RACT, TE, Baselines | | | | ✓ | | ✓ | | | | ✓ | | < \$100 |
| General Research Corp. 1900 Gallows Road, Vienna, VA 22182 703-506-5166, Fax 703-760-8747 Karen Ward, Product Marketing Mgr. | • Flow GEMINI | Comprehensive EH&S software modules. | ✓ | ✓ | ✓ | | ✓ | ✓ | | | | ✓ | | > \$500 |
| HazMat Control Systems, Inc. 5199 E. Pacific Coast Highway, Suite 500 Long Beach, CA 90804-3307 310-597-7994, Fax 310-597-9904 Carolyn Husemoller, Dir. | • AIRQ | VOC recordkeeping. | | | | | | | | | ✓ | ✓ | | > \$500 |
| | • Tic/Trac | Permit tracking. | ✓ | ✓ | | | | | | | ✓ | ✓ | | \$100-\$500 |
| Homann Associates, Inc. 39831 San Moreno Court Fremont, CA 94539 510-490-6379, Fax 510-490-6379 | • EPIcode | Air dispersion model database of ERPG, TLV, IDLH data. | | ✓ | | | | | | | | ✓ | | \$100-\$500 |
| IHS Regulatory Products 15 Inverness Way East Englewood, CO 80112 800-320-4555, Fax 303-267-1366 Diane Betis, Marketing Specialist | • Earthlaw | Federal and state EPA, OSHA and DOT regulations on CD-ROM. | | | | | ✓ | | | | ✓ | ✓ | ✓ | > \$500 |
| John A. Keane and Associates, Inc. 575 Ewing St., Princeton, NJ 08540 609-924-7904, Fax 609-924-1078 Michael Kane, Dir., Sales/Marketing | • QMS Programs Environmental Software | Captures, summarizes, analyzes, and reports environmental test data; instrumentation interface. | | ✓ | | | | | | | ✓ | ✓ | ✓ | > \$500 |
| Knorr Associates 10 Park Place, P.O. Box 218 Butler, NJ 07405 201-492-8500, Fax 201-492-0453 Peter Singer, Senior Analyst | • Data Pipe | Comprehensive modular program for managing environmental, health, and safety information. | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | > \$500 |

1995 AIR SOFTWARE GUIDE

| Company | Software | Description | Facility Management | Dispersion Modeling | Permit Tracking | Process Emission Calc. | Fugitive Emission Calc. | SARA Title III | SARA Title IV | CAA Title V | CAA Title III | Auditing | Regulatory Assistance | DOS | Windows | Cost |
|---|--------------------------|---|---------------------|---------------------|-----------------|------------------------|-------------------------|----------------|---------------|-------------|---------------|----------|-----------------------|-----|---------|-------------|
| Labelmaster 5724 N. Pulaski, Chicago, IL 60646 312-478-0900, Fax 800-723-4327 Jim Vokurka, Publications Mgr. | • Reg Quest | CD-ROM with 29, 40, and 49 CFR text that's word searchable. | | | | | | | | | | | ✓ | ✓ | | \$100-\$500 |
| Logical Technology, Inc. 5113 N. Executive Drive, Peoria, IL 61614 309-689-2900, Fax 309-689-2911 J.M. Krakowiecki, President | • HAZMIN | Comprehensive environmental tracking and hazardous materials management. | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | ✓ | ✓ | | > \$500 |
| | • LogTrac | Comprehensive environmental tracking, MSDS management, regulated chemical database, upgradable to HAZMIN. | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | ✓ | ✓ | |
| Met One Instruments 1600 Washington Blvd. Grants Pass, OR 97526 503-471-7111, Fax 503-471-7116 Dennis Recla, Systems Engineer | • AIRS Report | Formats meteorological data reports into AIRS format management compliance software package. | | ✓ | | | | ✓ | ✓ | ✓ | ✓ | | | | | \$100-\$500 |
| | • Automet Report | Data collection software for PC. | | ✓ | | | | ✓ | ✓ | ✓ | ✓ | | | | | \$100-\$500 |
| | • Micromet Network | Data collection software for multiple sites for PC. | | ✓ | | | | ✓ | ✓ | ✓ | ✓ | | | | | \$100-\$500 |
| | • Wind Rose | Produces wind rose reports. | | | | | | | | ✓ | ✓ | ✓ | | | | \$100-\$500 |
| Pacific Environmental Services, Inc. P.O. Box 12077 Research Triangle Park, NC 27709-2077 919-941-0333, Fax 919-941-0234 | • i-STEPS | Environmental data management system for air, water, hazwaste. | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | ✓ | > \$500 |
| PACS, Inc. 409 Meade Drive, Coraopolis, PA 15108 412-457-6576, Fax 412-457-1214 Dr. Henry Nowicki, Dir. | • Chemical Inventory | Fast and friendly access to inventory and resources. | ✓ | | | | | | | | | | ✓ | ✓ | | \$100-\$500 |
| | • Environmental Sampling | Well-organized and legally defensible sampling management. | ✓ | | | | | | | | | | ✓ | ✓ | | > \$500 |
| RegScan, Inc. One Executive Plaza, Suite 300 330 Pine Street, Williamsport, PA 17701 717-323-1010, 800-734-7226 Fax 717-323-8082 Geoff Smith, Sales Manager | • RegScan | Complete text of state and federal regulations with search functions. Updated monthly. | | | | | | | | | | | ✓ | ✓ | ✓ | \$100-\$500 |
| | • Research Assistant | Index to state and federal regulations. Provides a list of regulations where topic is found. | | | | | | | | | | | ✓ | ✓ | | \$100-\$500 |
| SEMCOR, Inc. 208 Route 38 Moorestown, NJ 08057 609-234-6600, Fax 609-778-1639 John Luidens, Environmental Attorney | • CompQuest Pro | EHS audit and self-assessment software for regulatory compliance and management systems. | ✓ | | | | | | | | | | ✓ | ✓ | ✓ | > \$500 |
| SOFTTouch Systems, Inc. 413 S. Michael St., Suite 107 St. Marys, PA 15857 814-834-1092, Fax 814-834-9355 | • Chem Master | SARA compliance software. | | | | | ✓ | | | | | | ✓ | ✓ | | > \$500 |
| Solutions Software Corp. 1795 Turtle Hill Road Enterprise, FL 32725 407-321-7912, Fax 407-323-4898 Mark Wernhoff, Managing Dir. | • All 50 CFRs on CD | Full text of all 50 CFRs on CD-ROM. | | | | | | | | | | | ✓ | ✓ | ✓ | < \$100 |
| | • Innovative Technology | Technology database on CD-ROM. | | | | | | | | | | | ✓ | ✓ | ✓ | < \$100 |

| Company | Software | Description | Facility Management | Dispersion Modeling | Permit Tracking | Process Emission Calc. | Fugitive Emission Calc. | SARA Title III | CAA Title V | CAA Title III | Auditing | Regulatory Assistance | DQS | Windows | Cost |
|--|--|--|---------------------|---------------------|-----------------|------------------------|-------------------------|----------------|-------------|---------------|----------|-----------------------|-----|---------|-------------|
| Technical Database Services, Inc. (TDS) 135 W. 50th St., New York, NY 10020-1201 212-245-0044, Fax 212-247-1587 Chris Durham, Marketing and Sales | • DIPPR | 39 physical properties for 1458 industrial chemicals. | ✓ | ✓ | | | | | | | | ✓ | | | > \$500 |
| | • (CCM) Chemical Compliance Monitor | Chemical regulatory information from federal, state, and international sources. Also online service. | | | ✓ | | | ✓ | ✓ | | | ✓ | | | > \$500 |
| | • Physical Property Data Service (PPDS 2) | Mixture and phase equilibrium data for 1,500 pure components. Also online service. | | ✓ | ✓ | ✓ | | | | | | | ✓ | ✓ | > \$500 |
| Telecation, Inc. 19423 N. Turkey Creek Morrison, CO 80465 303-697-8080, Fax 303-697-8085 Nona Nickel, Sales Rep. | • Conifer Environmental | Provides sample tracking, data import, reporting, QC evaluation. | ✓ | | | | | | | | | | ✓ | | > \$500 |
| Teledyne Brown Engineering/ Central Applications 2929 N. Central Expressway, Suite 101 Richardson, TX 75080 214-437-7779, Fax 214-437-7712 Milem McCurdy, Environmental Products Marketing Mgr. | • VECTOR, Environmental Monitoring & Information Management System (EMIMS) | Real-time environmental data acquisition and management system for ambient and stack monitoring. | ✓ | | ✓ | | | | | | | | ✓ | | > \$500 |
| The ERM Group 855 Springdale Ave., Exton, PA 19341 610-524-3500, Fax 610-524-7335 Ken Weiss, Program Dir., Air Quality | • ENFLEX DATA | Data management and reporting software. | ✓ | ✓ | | ✓ | | | ✓ | | | | | | |
| | • ENFLEX EHS Databases | Current comprehensive coverage of state, federal, and international EHS regulations. | | | | | | | | | ✓ | ✓ | | | |
| | • ERM Air Permit Manager | Manages permit from application through compliance monitoring. | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | | |
| TRC Environmental Corp. 5 Waterside Crossing, Windsor, CT 06095 203-289-8631, Fax 203-298-6399 Rick Love, VP | • TRC Air Expert | Facilitates compliance with all CAAA titles; calculates and reports emissions. | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | ✓ | | > \$500 |
| Trinity Consultants, Inc. 12801 N. Central Expressway Suite 1200 Dallas, TX 75243 214-661-8100, Fax 214-385-9203 Patty Jackson, Marketing Analyst | • BREEZE AIR | Stationary source models for analyzing continuous release emissions. | | ✓ | | | | ✓ | | | | ✓ | ✓ | | |
| | • BREEZE HAZ | Models for analyzing liquid, sudden gaseous, or dense gas emissions. | | ✓ | | | | ✓ | ✓ | | | ✓ | ✓ | | |
| | • BREEZE WAY | Models for modeling mobile source emissions and noise. | | ✓ | | | | ✓ | | | | ✓ | ✓ | | |
| Waid and Associates 14205 Burnet Road, Austin, TX 78728 512-255-9999, Fax 512-255-8780 Tony St. Clair, Principal Engineer | • Storage Tank Emissions Calculator (STEC) | Computer program calculates short-term and long-term emissions from storage tanks. | | | | ✓ | | | | | | ✓ | | | \$100-\$500 |
| Wixel, Inc. 7936 E. Arapahoe Court, S-3200 Englewood, CA 80112 303-796-0045, Fax 303-796-0043 Roy Richeson, VP, Sales | • SARATrax 2.0 for Windows | Monitors incoming materials, tracks process operations, and generates regulatory report information. | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | | | > \$500 |

EVENTS CALENDAR

EDITOR'S NOTE: Registration fees listed are the standard rates. Readers should contact conference sponsors for potential discounts and special rates.

AUGUST 14-18

International Conference on Water Resources Engineering

(Sponsored by the American Society of Civil Engineers)

LOCATION: SAN ANTONIO

The theme of this conference is "Water: A Resource in Crisis." It's held in conjunction with the International Groundwater Management Symposium and the Watershed Management Symposium; 700 attendees; \$490/members \$515/nonmembers. Contact

ASCE at 800/548-2723 for further information.

AUGUST 14-18

10th Annual Toxicology Symposium

(Sponsored by the American Industrial Hygiene Association)

LOCATION: BOSTON

Leaders in the toxicology arena will discuss and analyze a wide range of topics, including international regulatory requirements, data management systems, and risk assessment; 75 attendees; \$995/members, \$1095/nonmembers. Contact AIHA's Continuing Education Department at 703/849-8888.

AUGUST 15-17

International Conference on Managing

Hazardous and Particulate Air Pollutants

(Sponsored by the Canadian Electrical Association and the U.S. EPA)

LOCATION: TORONTO, ONTARIO

A continuing international forum for dialogue and information exchange; combines the Third International Conference on Managing Hazardous Air Pollutants with the Eleventh Particulate Control Symposium; \$500/individual (U.S. currency). Call 415/855-8763.

AUGUST 16-17

International Energy and Environmental Congress

(Sponsored by the Association of Energy Engineers and FMME)

LOCATION: RICHMOND, VA.

Focuses on environmental compliance in commercial, industrial, institutional, and government facilities, along with decisions about energy use and reduction of energy costs. Facilities Management Maintenance Expo held concurrently; 3,000 attendees; \$585/members, \$685/nonmembers. Call AEE at 404/447-5083, ext. 210, for more information.

AUGUST 17-18

Understanding the Clean Air Act Amendments Seminar

(Sponsored by the University of Florida, Treco Center)

LOCATION: TAMPA, FLA.

Provides an overview of the amendments, regulations, and legislative activities and how these will affect businesses; 35 attendees; \$395/individual. For details, call 904/392-9570, ext. 116.

SEPTEMBER 10-13

Sewers of the Future

(Sponsored by Water Environment Federation)

LOCATION: HOUSTON

Collections systems, residuals activities, public policy issues, CSOs and SSOs are some of the topics addressed in this conference for wastewater professionals; 550 attendees; \$500/members, \$590/nonmembers. For details, call 800/666-0206.

SEPTEMBER 11-13

How to Manage Solvents in the Workplace

(Sponsored by Intertech Corp.)

LOCATION: HOUSTON

Information about containing techniques for hazardous solvents, new products, engineering controls, methods for managing emissions, employing recycled solvents and future regulations; 100 attendees; \$695/individual. Contact Intertech's Jennifer Winch at 207/781-9800 for details.

SEPTEMBER 15-17

National Onsite Conference: Marketing Onsite Technology

(Sponsored by the National Onsite Wastewater Recycling Association)

LOCATION: TACOMA, WASH.

An examination of innovative products, technologies, code impediments and training activities for researchers, regulators, manufacturers, etc.; 200 attendees; \$150/members, \$200/nonmembers. Contact 708/559-9233 for details.

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Denver, CO.....Oct 12-13
Myrtle Beach, SC.....Oct 23-24
Pittsburgh, PA.....Nov 15-16
Dallas, TX.....Dec 13-14

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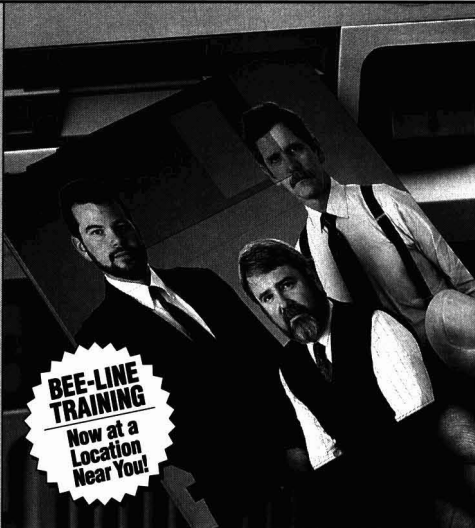
Toxic Emergency Release Course

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St. Louis, MO.....Sept 15
San Francisco, CA.....Oct 6
Denver, CO.....Oct 11
Myrtle Beach, SC.....Oct 27
Pittsburgh, PA.....Nov 17
Dallas, TX.....Dec 15

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SEPTEMBER 17-22

World '95: World Environmental Congress
(Sponsored by Canadian Government and the City of London)

LOCATION: LONDON, ONTARIO

Features noted international speakers in environmental policy, technology, business, and sustainable development; 2,000 attendees; \$550/individual (U.S.). For more information, call Science and Technology Integration, Inc., at 519/858-5055.

SEPTEMBER 19-21

Florida Environmental Expo

(Sponsors include EPA and Department of Commerce)

LOCATION: TAMPA, FLA.

A broad array of regulatory and technical sessions highlight this conference and exposition, now national in scope; 4,500 attendees; \$250/individual. Contact 813/725-8202 for more details.

SEPTEMBER 19-21

SME Finishing '95 Conference and Exposition

(Sponsored by the Society of Manufacturing Engineers)

LOCATION: CINCINNATI, OHIO

Advances scientific knowledge in the field of manufacturing, engineering and management; some environmental emphasis; 6,000 attendees; \$500/members, \$600/nonmembers. For details, call 313/271-1500, ext. 629.

SEPTEMBER 25-27

International Symposium on Optical Remote Sensing for Environmental & Process Monitoring

(Sponsored by the Air & Waste Management Association)

LOCATION: SAN FRANCISCO

Emphasizes the developments and applications for optical sensing techniques used in pollutant emission monitoring in a wide variety of private and public industries; 400 attendees; \$395/members, \$490/nonmembers. Contact AWMA registrar at 412/232-3445 for more information.

SEPTEMBER 28-30

Reclaim '95: Landfill Mining and Reclamation

(Sponsored by Resource Recovery Report and Solid Waste Association of North America)

LOCATION: ALBANY, N.Y.

Focuses on regional demonstration projects that develop reclamation technologies and showcases these waste management techniques; 200 attendees; \$585/industry, \$485/government & nonprofit. Contact Richard Will at 800/627-8913 for more information.

OCTOBER 8-11

International Symposium on Environmental Technologies

(Sponsored by Georgia Institute of Technology and Universite de Bordeaux I, France)

LOCATION: ATLANTA

Recent advances presented in research, development and applications of plasma technology and environmental remediation; 500 attendees; \$500/individual. For further information, contact GIT Dept. of Continuing Education at 404/894-2547.

OCTOBER 8-14

Environmental Training

(Sponsored by International Network for Environmental Training, Inc.)

LOCATION: HILTON HEAD ISLAND, S.C.

Intrinsic remediation, air sparging for site remediation and management of remediation projects top these course offerings, along with a tour of the DOE Savannah River remediation site; 100 attendees; \$475 to \$775 per course. Contact 301/299-1150 for further information.

OCTOBER 10-12

The Border Industrial/Environmental Expo
(Sponsored by Eco-Lands Publishing)

LOCATION: DETROIT

Promotes the products, services and information involved in the management of hazardous materials, environmental waste, plant engineering and industrial maintenance; 5,000 attendees, \$595 for conference and workshops. Contact Richard Maloy at 416/658-7519 for further information.

OCTOBER 15-17

1995 Conference on Transportation Fuel Quality Standards

(Sponsored by Hart Publications, Inc., and Information Resources, Inc.)

LOCATION: WASHINGTON, D.C.

With speakers ranging from EPA's Browner to Congressional leaders, this conference focuses

on current and proposed RFG and air quality standards, future U.S. energy policy, etc.; 700 attendees; \$795/individual. For details, contact Information Resources' Karin Erickson at 800/USA-FUEL.

OCTOBER 16-17

Intrinsic Bioremediation: Strategies for Effective Analysis, Monitoring, and Implementation

(Sponsored by IBC)

LOCATION: ANNAPOLIS, MD.

This symposium analyzes the latest research on this process—including aerobic and anaerobic biodegradation—as well as its acceptance in some regulatory agencies; 150 attendees; \$895/individual. Contact 508/481-6400 for further details.

OCTOBER 17-18

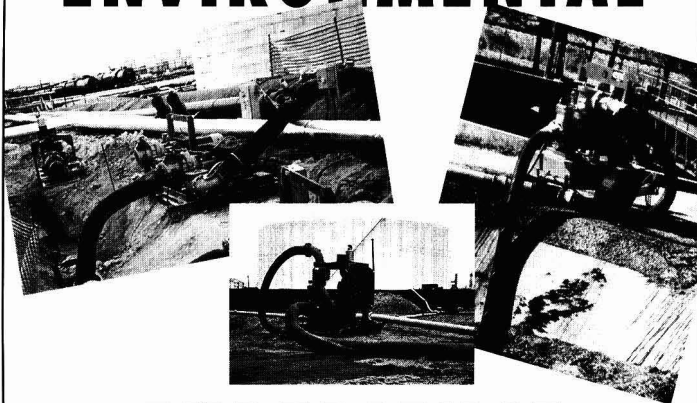
Fundamentals of Groundwater Cleanup

(Sponsored by Governments Institutes, Inc.)

LOCATION: ALEXANDRIA, VA.

A course for the non-technical environmental professional; focuses on principles of groundwater movement, contaminant types, technical and legal requirements; 25 attendees; \$949/individual. Call 301/921-2345.

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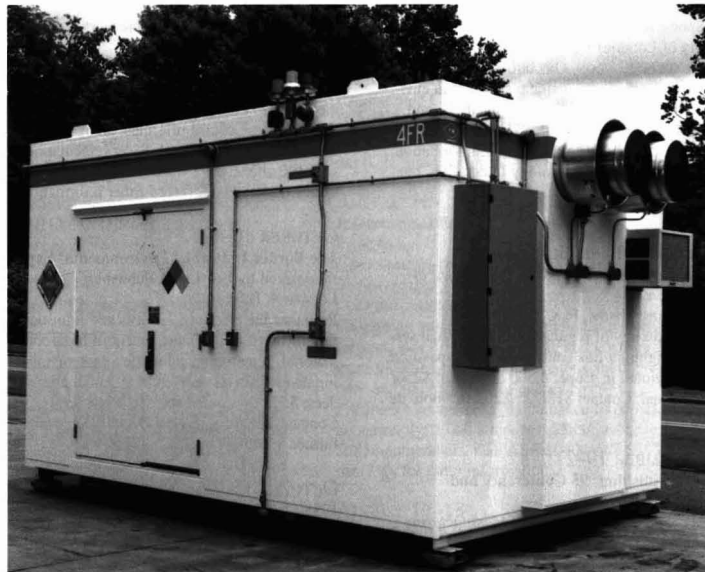


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Hazmat Storage

continued from page 28



Proper ventilation design may include installation of exhaust vents mounted near the top of the storage building wall.

the fan connected to the light switch, the air mix can immediately begin to change upon worker entry, assuming he or she turns on the lights!

Other important safety considerations

Fire rated vents. A fire rated hazmat building has to have all openings fire rated at either 1½ or 3 hours. Each gravity, intake, and exhaust air vent has to be protected with an approved fusible link release folded steel blade damper. When the air temperature melts the link (135-165 degrees Fahrenheit), the blades fall, sealing off the opening to prevent oxygen-laden fresh air from entering through the vent opening to feed the fire.

Explosion protection. N.F.P.A.-68, *Guide for Venting of Deflagrations*, para. 4-2.2.1, "Doors, windows, and ducts and other openings in walls intended to be pressure-resistant should be designed to withstand maximum internal pressure. . . ." A worker should expect to be safe in approaching a hazmat building vent and if there's an internal blast, the vent opening should protect him or her. Mechanically operated blast valves for vent openings are available that close under blast pressure,

preventing whole or parts of fans, louvers, bird screens, and dampers from becoming projectiles.

Dual ventilation. Explosions cannot happen if the vapor and air mix is "too lean," but when vapor concentration is between the lower and upper flammable limits and there is a source of ignition . . . look out! If a building is equipped with a continuously running ventilation system as described earlier and is backed up with a second exhaust fan that kicks on if needed, the risk of explosion is minimal. Such precaution is not unusual and is standard procedure for N.F.P.A.-820, *Fire Protection in Wastewater Treatment and Collection Facilities*, 1992 Edition.

Also considered are supply and exhaust fans to achieve dual ventilation and means to accept alternate power sources. Proper ventilation design can accomplish more to prevent fire and explosion than any other safety feature in a hazmat building. **EP**

Fred Romig is vice president of the Haz-Safe Building division of CID Associates Inc., Leechburg, Pa. Romig holds several patents on hazardous storage facility designs.

ISO 14000: Good Business Sense— Even for Smaller Firms

COMPETITION AMONG BUSINESSES CONTINUES to intensify throughout the world. This reality, coupled with an ever-increasing awareness about the state of our environment and the costs associated with its maintenance, has led businesses to look at environmental performance as a competitive differentiator. An effect of this emerging trend is the development of standards for managing environmental activity within an organization.

Becoming proactive in managing the environmental aspects of an organization makes good business sense. ISO 14000 provides a framework.

Several trade associations have published environmental management standards to meet this need. These voluntary standards were developed with specific audiences in mind and differ greatly. Indeed, it is likely that these standards were developed to create specific business advantages for various interest groups.

Development of ISO 14000

The International Organization for Standardization (ISO), an independent standard-setting body, has responded to the need for an internationally recognized set of environmental management standards. ISO has had great success with ISO 9000, a set of internationally recognized standards for quality management implemented within an organization and third-party certified.

In 1992, ISO introduced a team of international representatives charged with the task of developing the environmental management standards labeled ISO 14000. Today, over 50 countries are participating in the development of the standards, and 300 companies are represented within the U.S. The main elements of the standards are expected to be ratified as international standards in 1996.

The ISO 14000 standards consists of six elements, three of which are organizational standards: Environmental Management Systems, Environmental Auditing, and Environmental Performance Evaluation. The other three are product-oriented: Life Cycle Assessment, Environmental Labeling, and Environmental Aspects in Product Standards.

The ISO 14000 standards are a flexible, performance-oriented framework. While they are intended to provide guidance on how to integrate environmental considera-

tions into your operations and products, they do not dictate performance requirements or specific operating procedures. They are flexible enough for any business, yet specific enough to provide a common level of environmental management understanding for everyone to follow.

Becoming proactive in managing the environmental aspects of an organization makes good business sense. ISO 14000 provides a framework for implementation. The benefits are vast, but can be grouped into three areas: market advantages, compliance performances, and cost savings.

Market Advantages. If it follows the same pattern as ISO 9000 certification, as many expect, customers will soon consider ISO 14000 certification as a condition of doing business. The first organizations to be certified will have a strong differentiating message to deliver to their marketplace: "We are a leading company in our field, and we are proactively improving the environmental performance of our operations and products." Since ISO 14000 will be market-driven, it will also be more likely to transition these initiatives through the supply chain.

Compliance Performances. By implementing policies, programs, and systems called for under ISO 14000, an organization can effectively manage its operations and products to achieve compliance, proactively modify operations and products to exceed compliance, and show regulatory bodies that incidents that may occur are the exception rather than the rule. What's more, regulators' inspections and audits may decrease in frequency once the standard's third-party validation system is in place.

Cost Savings. When an effective environmental management system is in place, resources are properly allocated, trained, and focused; systems are delivering information that stimulates accurate decision-making and decreased report generation time; and planning activities are ensuring that the job gets done right, on time, and within budget. In addition, the life cycle assessment standard within ISO 14000 provides a tool that identifies environmental issues throughout a product's life. Reducing or eliminating these issues means reducing or eliminating the activities associated with them, which translates into cost savings.

Guest Commentary

Value to Smaller Firms

The underlying premise of ISO 14000 is environmental performance improvement through self-regulation and market-driven pressure. Companies of all sizes and types have operations and products that affect the environment.

Reducing a company's environmental impact means increasing the efficiency of its operations and/or reducing the use of raw materials in its products. This inevitably translates into cost savings. ISO 14000 provides a framework for companies of all sizes to reduce costs. Case studies have shown that initial investments to implement environmental management systems are recovered in one to two years. Environmental awareness can also yield new products and services that use environmental performance as differentiators.

The level of effort required to implement ISO 14000 depends in large part on the state of a company's existing environmental management system. If a company has systems in place to achieve environmental compliance and foster quality management, initial investments will be minimal.

In contrast, if environmental and/or quality management system elements are not in place, this effort can be extensive—in excess of eighteen months of dedicated effort requiring significant resources. Even in the worst-case scenario, however, investments can be recouped in approximately three years. How can a company not take advantage of this opportunity to decrease its cost and improve its market competitiveness?

Where to Start?

Implementing environmental management systems that truly work is, in fact, easier within a small- to medium-sized company because decision-makers and responsible managers are closer to the workings of operations and product design. There is less need for sophisticated documentation, training, and communications systems, and decisions to change current practices and implement system enhancements are easier to execute.

In addition, the stakeholders (interested parties in ISO 14000 terms) are not as broad and diverse for a smaller company.

That homogeneity allows the company to have more simplified characteristics in its environmental management systems.

Barring unexpected delays, ISO 14000 international environmental management standards will begin appearing next year. As these standards are ratified, implementation models, templates, and tools will become more readily available, as will the expertise to put those tools to use. But as they become accepted, the opportunity to harness ISO 14000 for competitive advantage dissipates. So the question is: Do you start now and maximize your opportunity or wait until your competition or your customer demands it of you? **EP**

Glenn Nestel, Director of Environmental Management Systems with Roy F. Weston, West Chester, Pa., has 25 years of environmental and business management experience, including work with corporations in applying several international environmental standards. Business Development Manager Joseph DelRossi has ten years of experience in management systems, sales and marketing.

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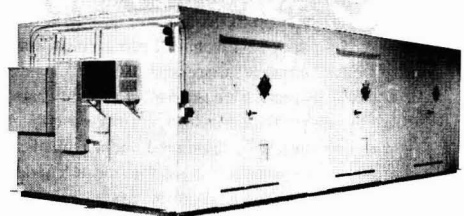
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The success of an environmental management program depends in large part on how well it measures environmental performance. Companies that know how to manage their environmental and safety risks cost-effectively recognize that setting goals and using performance measures are crucial to maintaining continuous improvement.

More companies are realizing that they need to go beyond compliance in order to effectively manage environmental and safety risks. Most rely on data that OSHA or EPA requires them to collect as a starting point in developing a performance measurement program. More sophisticated programs go far beyond these required metrics. In Procter & Gamble's words, "You are what you measure," or, as Chevron states, "What gets measured, must get done."

Setting the Environmental Vision

More than 80 percent of Fortune 500 firms have written environmental policies that articulate broad principles or commitments. However, these mission statements are not readily translated into concrete objectives to guide company operations. The environmental vision must be tied to specific goals that can be integrated into a firm's business strategy. The goals must be challenging enough to stretch the organization, yet achievable and measurable so employees remain motivated and the process can be managed. The typical process for translating corporate policies into manageable goals is a top-down approach in which corporate policy is broken up into increasingly specific elements until measurable performance parameters are developed.

For example, at Northrop, producer of the Stealth fighter and B-2 bomber, CEO Kent Kresa champions the company's vision of becoming "the environmental leader in the aerospace industry." To achieve that goal, Northrop established eight principles of environmental

stewardship, many of which have specific numerical goals assigned to them. One such principle was "No Pollution," which carried with it an associated goal of reducing air emissions by 90 percent, using 1991 as a baseline. The company's operating facilities each developed specific air emissions reduction targets and strategies tailored to their particular operations. Through this process, Northrop was able to translate general corporate philosophy into specific measurable goals for its operating facilities.

Continuous Improvement

Performance measures are the critical link among goals, strategy, and effective implementation. In several Booz, Allen & Hamilton surveys of environmental managers and senior executives, the five key success factors for environmental management programs were: support from senior management; operating company involvement; clear goals; effective performance measures; and linking results to reward and recognition. These barriers to implementing strategy included lack of incentive, ineffective monitoring, and no clear accountability.

Despite their value, developing and assigning performance measures is usually a controversial affair. For one thing, performance measures make corporate goals or policies concrete and assign responsibility and accountability to specific individuals or organizations. When incorporated into individual or group appraisals or compensation schemes, they have real financial consequences for the affected parties. Environmental performance measures are often seen as an extension of an environmental manager's authority into the company's operations.

Principles of Performance Measurement

The literature on total quality management includes numerous systems for developing measures of performance. In Booz, Allen's experience, there are six key principles that provide useful guidelines for developing effective EHS performance measures.

The first principle is to *measure improvement based on results*. Many companies confuse activities with results. If the desired result is improved compliance posture, then an appropriate measure is the number and severity of violations in a specific time period. However,

Performance measures make corporate goals or policies concrete and assign responsibility and accountability to specific individuals or organizations.

Management Trends

most environmental departments are process-driven and tend to measure the means rather than the ends. Activity-oriented measures, such as the number of audits performed or number of employees trained, tell little about performance gains. It is always better to measure the result directly.

Doing so is no easy task. It's important to measure real improvements in performance efficiency, rather than simple measures of output. For example, many companies are members of EPA's 33/50 program, which calls for a 50 percent voluntary re-

duction in emissions of 17 highly toxic chemicals by 1995. A commonly used measure in this effort is TRI emissions reported in the current year versus the 1990 baseline. But during the 1990-1992 economic downturn, emissions often decreased because of a drop in production, only to increase as the economy recovered. A more appropriate measure is the percent reduction in TRI emissions per unit of production, since this measures real improvements in environmental efficiency of production rather than simple output of emissions.

The second principle is to *set specific numeric expectations*. Human performance experts have found that people are more motivated when they can see tangible results measured in quantitative terms. Many EHS managers believe it is impossible to define clear numeric measures for EHS activities. However, Booz, Allen's experience is that virtually any activity can be measured in time, units, money or customer satisfaction. Quantitative performance measures can be used to optimize environmental, health, and safety processes by, for example, applying statistical process control to injury rate statistics.

The third principle is to *balance incentives through offsetting measures*. When environmental performance measures are established, employees will respond, but often with unintended consequences.

For example, a major petroleum company used the number of sites closed as the performance measure for its underground storage tank remediation program. In response, the field engineers finished the low-risk, easy cleanups first, then spent significant sums trying to close the remaining sites through active remediation. They had no incentive to control contractor costs or to lower costs by using innovative technologies. The result was that after an initial spurt, the number of closed cases flattened out, but costs accelerated exponentially. Sound environmental management requires measures that balance cost and risk, since this is the fundamental management trade-off.

The fourth principle is to *foster cooperation between organizations through joint measures*. Successful environmental management requires teamwork between multiple organizations. Joint measures are often necessary to provide the incentive between organizational elements to use team-based approaches. For example, when the EHS department is measured by the firm's environmental performance, but the operations group is not, operations will lack the incentive to address the root cause of compliance problems, while the EHS department will lack the resources and authority to resolve them.

The fifth principle is to *promote equity through fair measures*. Achieving equity across different business units and operating facilities is one of the most difficult issues in establishing effective performance measures. Differences in facility operations, output, products, and the current level of environmental performance are confounding factors. For instance, if per-

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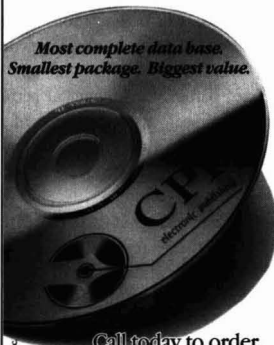
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cent improvement in current environmental performance is used as a performance measure, then facilities with the worst current performance may show the best improvement, unfairly penalizing those plant managers who had already established environmentally sound operations. To promote equity, companies must take into account differences in operations or products when setting goals and targets for individual facilities and business units. To ensure that they buy into the process, facility or business unit personnel should be included in the process of creating the performance measures.

The final principle is to *keep it simple*. Simple, action-oriented measures concentrate on one finite result. Overly complex measures often result from combining more than one finite result into an index. There is an inherent tension between simple and more complex measures. While simple measures are more understandable, complex ones are more comprehensive, take into account normalization between facilities, and can be fine-tuned to changing conditions.

Implementation Issues

Environmental managers must determine which set of measures is right for their company. Environmental performance measures tend to evolve with the maturity of the firm's EHS program. Emerging programs generally use program and compliance measures to determine how the company is progressing in establishing its environmental management system.

As the program develops, total emission measures are established. More mature programs include measures of production efficiency to determine if real improvements have been made in reducing the environmental impact of the company's products. Leading programs use cost-effectiveness measures, recognizing the essential trade-off between environmental and safety risks and costs that must be managed through offsetting measures of EHS performance.

Measures should be calibrated and tested to ensure that they provide enough information to manage the EHS business process. Management needs to consider how the measures will be used to determine whether the cost of gathering the information will justify the benefits. This also drives the frequency of measurement. Measuring too frequently places undue pressure on employees and raises costs, while infrequent measurement reduces the usefulness of EHS

measures as an early warning mechanism to manage and control EHS processes.

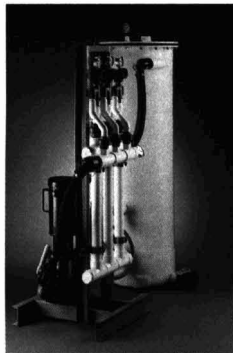
During implementation planning, management needs to set boundaries on what information should be available to which levels and departments. Management must also determine who will be responsible for tracking, gathering, reporting, and keeping the measurement system up to date. Effective performance measures can close the gap between management's expectation that EHS risks be incorporated into operations and the ability of the firm to do

so. As responsibility and accountability for EHS processes get pushed further down into line operating units, the need for an effective measurement system to monitor performance improvements and align incentives increases. **ED**

Kyle Datta, a principal with Booz, Allen & Hamilton in McLean, Va., works with clients in the energy and chemicals industry on corporate environmental management, compliance strategies, organizational design, and performance measures.

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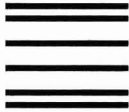
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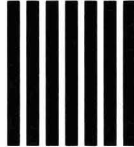
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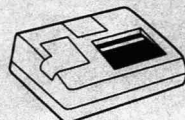
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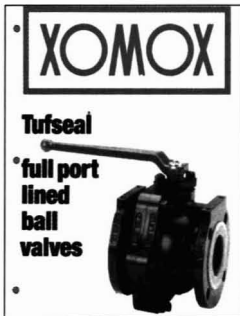
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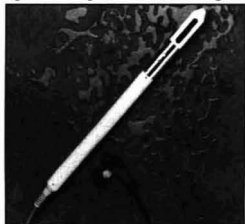
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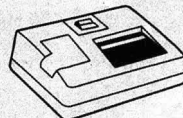
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PRODUCTS

Spectroscopic Gas Measurement

BOVAR Western Research has introduced a tunable diode laser-based system for perimeter monitoring of toxic and hazardous gases. The Spectra Scan is a spectroscopic technique for measuring minute gas concentrations of hydrogen fluoride and hydrogen sulfide in refining and industrial applications. Designed for high precision measurement of



Broken Bag Locator System

A new system from Auburn International detects and locates leaking or torn filter media in dust collection systems, reducing dust collector maintenance time and cost. By pinpointing problematic sections of the dust collector and locating them by row or compartment, the "Trobotrac Broken Bag Locator" system incorporates an alarm relay output that is activated when a leak is detected. Also has a 0-100 percent analog bar graph and a high emission alarm. Will accommodate up to 32 rows or compartments and enunciate any zone, as well as display the most recent zone cleaned. Housed in a NEMA 4X enclosure with a clear cover and a module that mounts in the existing cleaning cycle pulse controller, the product reduces the need to send field maintenance technicians into dangerous baghouse environments, according to the company.



single or multiple gas species, it uses near infrared lasers and a diode laser tuned to specific wavelengths. Allows for measurement of gases along an open path up to 200 meters, with no interference from particulate or other gas species. Also aids in process optimization in nitrogen oxide emission reduction.

BOVAR Inc.

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HazMat Reference Library

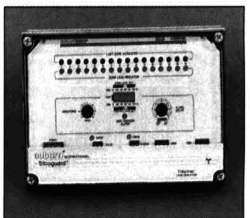
A CD-ROM collection of government publications and interpretive materials from IHS Regulatory is now available. The HazMat Library is prepared by an advisory group of industry experts and is presented in a magazine format. Included along with regulations are all relevant portion of the CFR, *Federal Register*, statutes and manuals and related publications from industry magazines. Expert interpretations and summaries, along with newsletters and Q&A sections, allow for specific answers to user queries. Monthly discs posted for updates.

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Portable Emission Analyzer

Ecom America has upgraded its ECOMAC portable emission analyzer to include up to five or six gas measurements, including O₂, CO, NO, NO₂, NO_x, SO₂, and combustibles. Other combustion parameters include stack temperature, pressure, ambient temperature,



ENVIRONMENTAL PROTECTION

PRODUCTS & SERVICES



and Lamda. Includes a full parameter backlit display, rechargeable batteries, ten-foot sample line and probe, RS-232 interface, and graphic software for complete data management capabilities. Includes 12-month warranties on all components, and a 24-month warranty on the O₂ cell.

Ecom America Ltd.

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Stormwater System

Vortechnics' new stormwater treatment system is a precast concrete structure designed to address the resuspension and wash-out problems that plague conventional oil and grit separators. The Vortechs System removes silt, sand, hydrocarbon-laden sediment, metals, petroleum-based liquids, and other floating contaminants from impervious surface runoff. Laboratory tests show removal rates of more than 80 percent during first flush period. The custom-designed baffle and internal flow controls and extra tank capacity makes



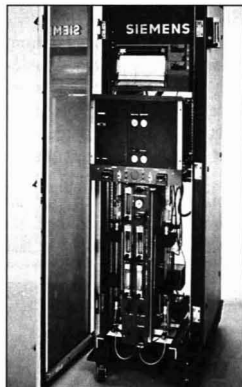
the system highly resistant to flow surges. Typically installed below grade, these are designed for a variety of applications, including streets and roadways, businesses, and watershed protection. Individual systems are available for treatment requirements ranging from 3 to 25 CFS.

Vortechnics Inc.

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VOC Water Analyzer

Offering continuous analysis of EPA 601/602 chemicals, the Siemens VOC Water Analyzer is made for unattended monitoring of any water stream. Designed to precisely detect and identify leaks and surges, this product eliminates "grab sampling" inconsistencies and provides plant personnel with documentation and validation that MCLs have not been exceeded. A microprocessor-controlled GC and a



sample enrichment system detects volatile hydrocarbons down to 100 parts per trillion and can be programmed using a PC on-site or from a remote location. An explosion-proof water analyzer is available for safe operation and maintenance in hazardous operations.

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por•ta•ble \pōrt-ə-bəl adj (15c)

- 1 : capable of being carried or moved : < though it offers the precision of a laboratory instrument, the 2100P Turbidimeter is lightweight and portable >
- 2 : something portable : < the Hach 2100P portable Turbidimeter is ideal for a wide range of applications > *syn* see Hach 2100P Turbidimeter



2100P Portable Turbidimeter



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For more information on Hach turbidimeters, call 1-800-227-4224. Please request literature number 3218.

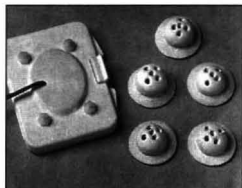
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Circle 31 on card.

PRODUCTS & SERVICES

Surface Oil Detector

A surface oil detector from Retawmatic is designed to detect oil on floor surfaces. Measuring 3.75" by 3" by 1", it contains an expendable disc that swells when it contacts oil, ultimately pressing an internal switch to trigger an alarm. Discs are nontoxic, do not react to water, and will last



for ten years, the company says. A fortified waterproof

switch provides a dry contact, and the detector can be connected into existing alarm systems of any voltage. Useful for detecting any flammable oil leakage before it becomes a fire hazard.

Retawmatic Corp.

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Electrochemical Transmitters

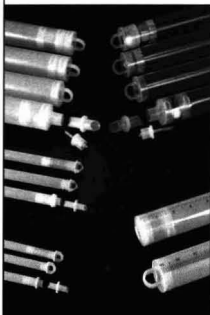
A new line of electrochemical-based transmitters from Bacharach feature large, two-inch, high-contrast local LCD displays. Displays are offered in direct reading in PPMs for toxics or percent by volume for oxygen. These units can interface with any Bacharach 130 system, or they can stand alone, reporting to a PLC, DCS, or configurable receiver. Choose from models for H₂S, O₂, CO, NO₂, and SO₂ for continuous monitoring of confined spaces and processes where dangerous concentrations of toxic gases or oxygen deficiency can be present.

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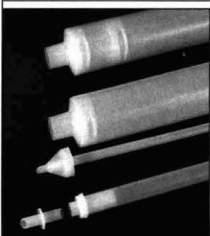
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PRODUCT LITERATURE

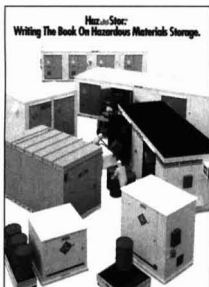


Instruments Catalog

The free 1995-96 instruments catalog contains over 1,700 full-color pages and features more than 40,000 products covering scientific instruments, equipment and supplies. It includes a detailed 40-page product index, informative introductory pages for several sections, "Hot Tips" and an eight-page section of late-breaking products.

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PRODUCTS



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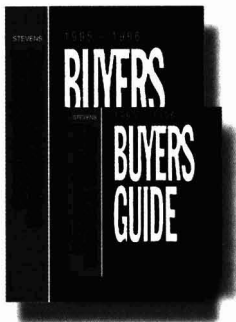
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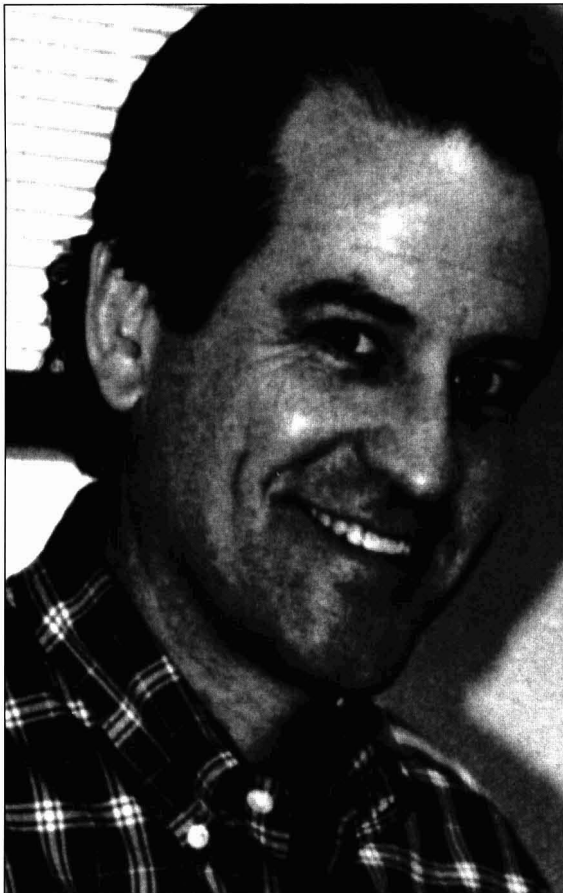
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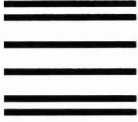
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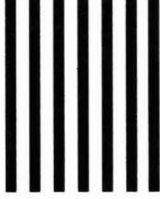
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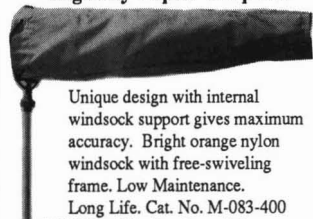
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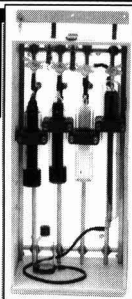


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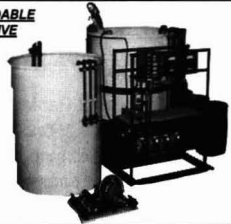
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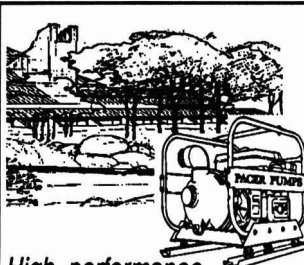
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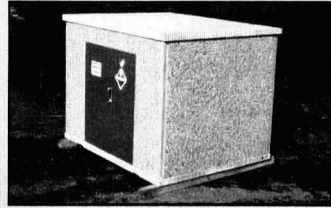
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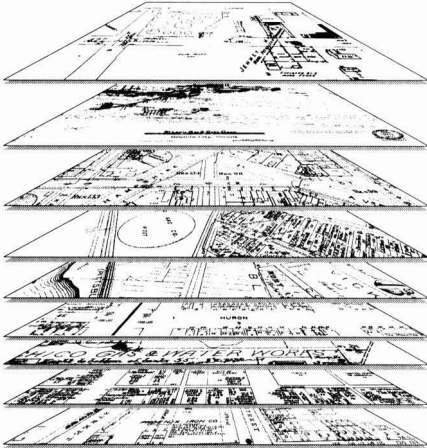
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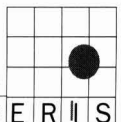
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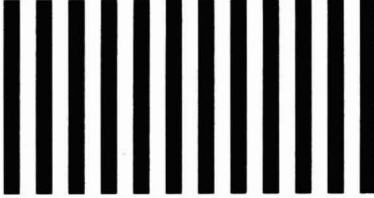
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1. Function which best describes your activity in Pollution Control

(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) _____

2. Type of Business (check only one):

A Manufacturing. If manufacturing, please check the appropriate SIC

(check only one):

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

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Date _____

3. Approximate number of employees at this address

(check only one):

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

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
- B Water
- C Noise
- D Solid waste disposal
- E Industrial hygiene
- F Toxic & hazardous material
- G Energy control/energy conservation
- H None of the above _____

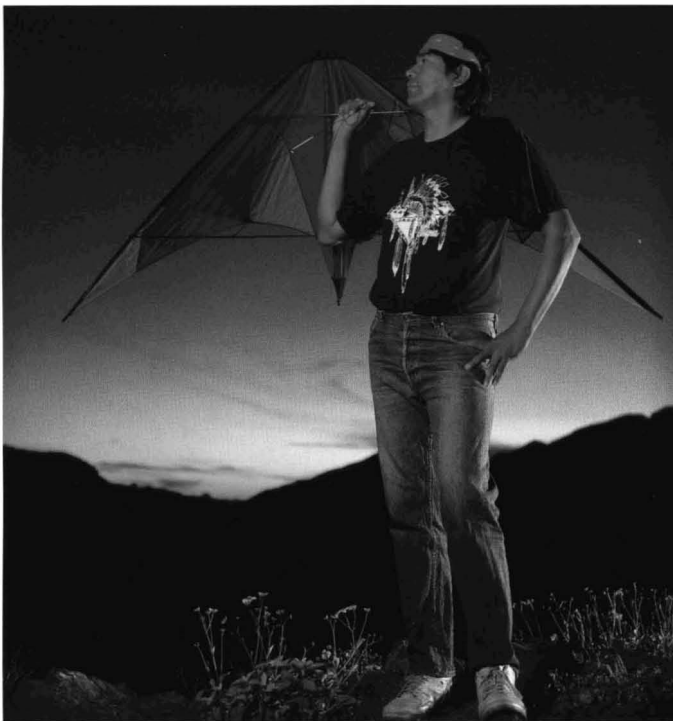
(please specify)

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

- A Pollution Engineering
- B Environment Today
- C Hazmat World
- D Pollution Equipment News
- E The National Environmental Journal
- F Water Environment & Technology
- G None of the above _____

(please specify)

Sky King.



Frank McCowan, a Mohave, keeps an eye on the sky, as well as on operations at Westates Carbon reactivation facility built on Colorado River Indian Tribes land, Parker, Arizona.

"Trust the sky to tell you when something is wrong. The sky is beautiful and very clear here. Except when the smoke blows in from the fires at Santa Ana, some 400 miles away." Frank McCowan, a full Mohave Indian, lives once again in his ancestral home, the Colorado River Indian Tribes reservation. "I came back here from a big city because the sky was polluted." It is only natural that Frank feels as much at home in the sky as he does on the ground. An ardent basketball player and kite flier, he is always striving to get airborne, to reach a little higher. Frank is also the head operator for our Westates Carbon reactivation facility, located entirely on the reservation. "The plant recycles used carbon, making sure that impurities are safely removed. Getting approval for this plant was not easy. We are very protective of the land here and 'Avil Asquil', our sacred mountain, stands only a few miles from this spot. So the plant had to meet our strict tribal guidelines as well as pass all federal and state restrictions. I know everything is right with this plant because I also helped to build it. As a Mohave, I have a sense of being part of a great scheme. It is in my blood memory. The sky, the water, the land belong to us only as long as we belong to them. Many things are different today, but these universal truths remain the same."

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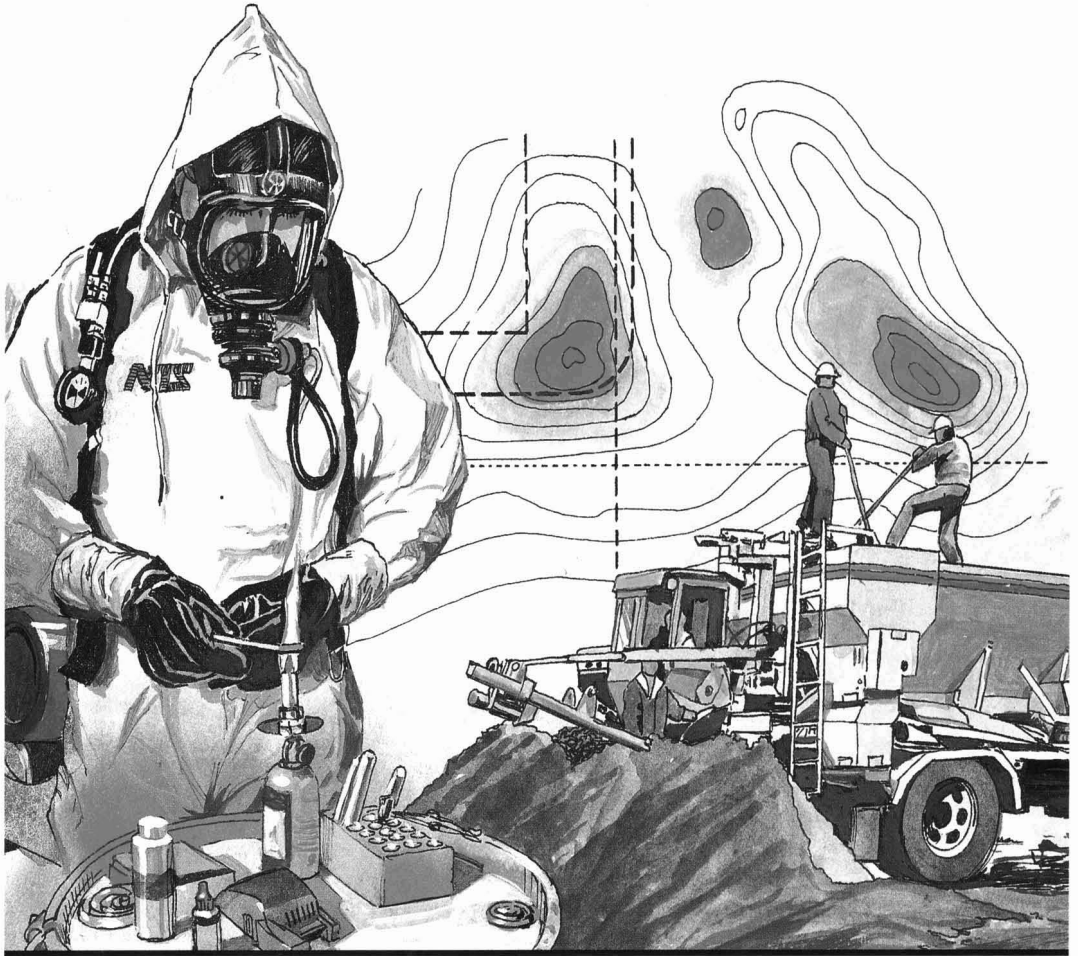
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