

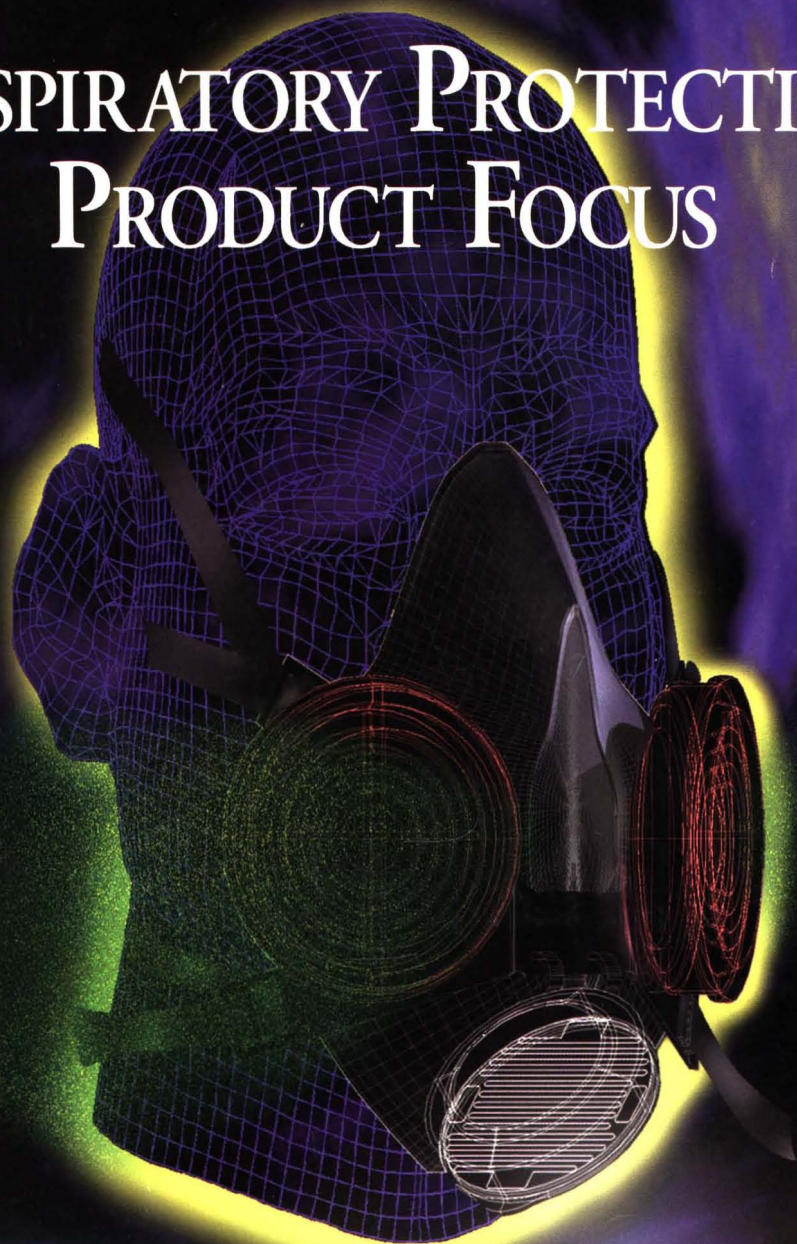
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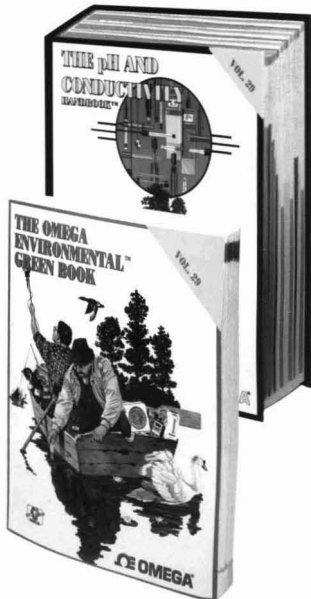
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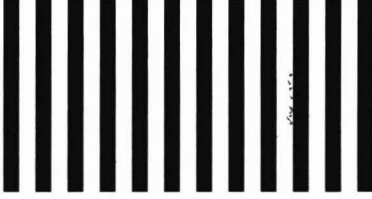
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Cover:

The variety of styles and options in respiratory protection equipment allows almost any worker in any situation to be protected properly.

Illustration: Dale Glasgow & Associates

Environmental PROTECTION

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Breathe Easy



"I'm back!"

Whirling around in my squeaking old chair, I expected to see Bulls' basketball-star Michael Jordan. Instead, there was my youngest son Chris announcing his return from goodness knows where. He has this uncanny knack for being able to disappear faster and more cleverly than most comic book heroes.

Magically though, he always reappears whenever I'm taking my wallet out or writing checks. He starts by humoring me and asking, "Remember me?"

"How can I remember who you are, when you are never home," is my stock parental comeback to his

question. "And why aren't you wearing socks, and when was the last time you got a haircut?" Deep in my heart I know the answers to those questions. My dad asked similar ones of me.

Next, a sheepish grin slowly emerges, starting at one corner of his mouth, and like a tiny ribbon, uncoils all the way to the other corner. Then in a flash, he's all teeth, with the widest smile humanly possible. The finishing touch in tearing down my wall of resistance is when he blows gently at me and whispers, "You still love me, don't you dad?"

Speaking of refreshing breaths of air, be sure to take a long look at the special report in this issue on respirators. Frankly, I'm doing a lot of smiling, because the information has been pulled together by a team of educators, consultants, manufacturers, government officials and our editorial staff. It provides answers to why you need respirators, what is available, who says you have got to use them, and how you should care for them. That's what the "new" *Environmental Protection* magazine is all about – **we are going to be your problem-solving reference.** During the past few months, we have been making a number of significant changes and phasing them in slowly.

But I don't intend to use this editorial column merely to preview the contents of the magazine. Given the opportunity to express my opinion, I never let the chance go by – and what I've learned about respirators in the past few months has opened my eyes.

Sign on to America Online, CompuServe or the Internet. Search for one of the bulletin boards dealing with OSHA or safety. There are people like you and me trading stories about respirators.

You will see the "good, bad and the ugly" from professionals who use these devices daily – such as the rescuers in Oklahoma City digging through building rubble. One of their fears was being trapped and suffocating in a certain type of face mask.

Special Note to EPA Administrator Carol Browner: Soon *EP* will be announcing an on-line computer service. How about joining in to close the information loop between government, manufacturers and users?

Dick Young
EP Publisher

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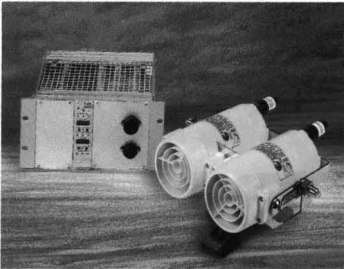
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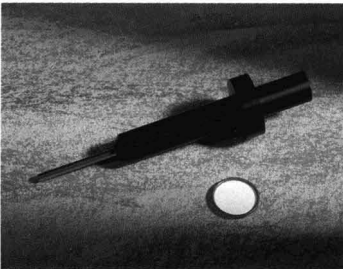
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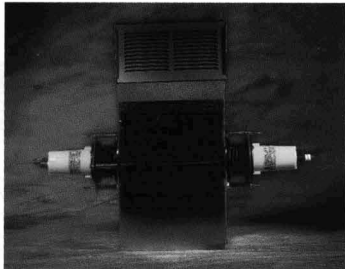
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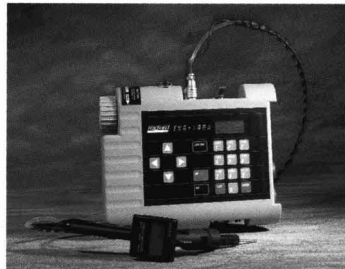
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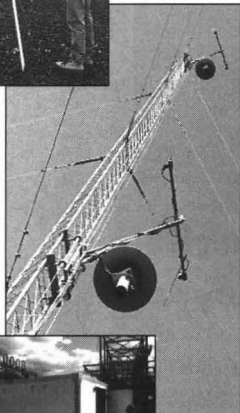
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NEWS UPDATE

Agency Announces Final Rule on Infectious Substances

The Department of Transportation's Research and Special Programs Administration announced a final rule in the Sept. 20 *Federal Register* on transportation requirements for regulated medical wastes (RMW) that contain infectious substances. According to DOT, the rule is part of a continuing effort by RSPA to avoid inconsistencies, gaps and duplication in the regulation of such wastes.

"Because of problems we identified, RSPA called for a series of meetings with other agencies to assure that medical wastes that contain infectious substances are transported in a consistent manner that assures the safety of transport workers and the general public," said D.K. Sharma, RSPA administrator. "This final rule achieves that goal and makes the regulations easier to comply with, and reduces compliance costs for health care providers and research facilities."

The rule attempts to achieve consistency among the Hazardous Materials Regulations, Occupational Safety and Health Administration regulations, and other federal agency regulations. Some of the new provisions include a narrowed definition of RMW; nonbulk, nonspecification packaging and labeling; exceptions for laundry, medical equipment and discarded cultures; and use of air transport for certain quantities of RMW. A proposal to amend the definitions of biological products and diagnostic specimens was rejected to avoid inconsistency, the agency said.

RSPA plans to monitor incident reports to ensure that these requirements achieve acceptable levels of safety. If they do not, the agency will make adjustments in future rulemaking action, RSPA said.

The rule took effect Oct. 1. Mandatory compliance begins Jan. 1, 1996, but voluntary compliance is authorized immediately.

EPA Should Provide Cement Kiln Dust Data to States: GAO

The General Accounting Office said EPA ought to provide state environmental agencies and EPA's own regional officials with risk-screening and site-specific risk modeling information developed during EPA's study of cement kiln dust (CKD) in order to enlist their aid in determining whether interim actions are needed to protect human health and the environment from CKD.

GAO, the investigative arm of Congress, studied the information and concluded it

could be several years before EPA completes its management control program for CKD, regardless of whether EPA decides to issue new regulations or adopt the use of an enforceable agreement to control CKD.

Sen. William Roth, R-Del., asked GAO to investigate what priorities EPA has set in its CKD work, whether EPA is authorized to modify hazwaste management requirements, whether EPA believes that hazwaste CKD should be regulated like non-hazwaste CKD, and whether interim actions can be taken to control CKD. The report was a summary of EPA actions on CKD over the past 15 years.

In August, the cement kiln industry offered a revised enforceable agreement to EPA that would allow for public comment, a demand made by the hazwaste treatment industry. Also, the cement industry offered a plan that would keep CKD exempt from RCRA Subtitle C requirements if it were placed in a monofill. Site-specific comments could be offered at each monofill site. EPA and cement industry officials said they are trying to reach an agreement by the end of 1995.

Ohio Company Reduces Emissions From Its Plants

Ashland Chemical said it managed to reduce its 1994 toxic chemical emissions to land, water and air from 14 domestic manufacturing facilities. The Dublin, Ohio, company recently reported to EPA that since 1993 it cut its emissions in half.

The reductions were managed through an aggressive pollution prevention program. Ashland said it has cut total emissions from the facilities 67 percent since 1987. The company is required by EPA to report the volumes of its emissions through SARA Title III regulations.

Ashland's foundry resin plant in Cleveland was the most significant contributor to the emissions drop in the 1994 reporting period. A team of employees that included research scientists, engineers and other plant personnel were able to cut emissions by 93 percent, Ashland said. This was accomplished by eliminating the need for off-site disposal of a major waste stream and by reformulating products to reduce waste generation.

In addition to cutbacks at the company's Cleveland plant, nine other facilities noted emissions reductions of more than 10 percent, Ashland added. Emissions reduction and waste elimination at Ashland is part of an initiative from the Chemical Manufacturers Association to help companies

improve environmental, health and safety performance, the company said.

Permits Proposed for Alaskan Oil, Gas Wells

EPA Region 10 announced a proposal in the Sept. 20 *Federal Register* to issue a draft NPDES general permit for oil and gas stratigraphic test and exploration wells on the Alaskan Outer Continental Shelf. The permit would also apply to exploration, production and development wells in the offshore and coastal waters of Alaska. The permit would establish effluent limitations, standards, prohibitions and other conditions on discharges in the permit area. Public hearings on the proposed permit are tentatively scheduled for Nov. 28 in Anchorage and Nov. 29 in Soldotna. Comments, due by Nov. 30, should be sent to EPA Region 10, Attn.: Ocean Programs Section, WD-137, 1200 Sixth Ave., Seattle, WA 98101. Call Kris Flint at (206) 553-8155.

EPA Denies Petition to Drop Zinc Oxide from EPCRA Listing

EPA denied a petition to delist zinc oxide from the zinc compounds category of the Emergency Planning and Community Right-to-Know Act (EPCRA) and from the Pollution Prevention Act, the agency announced in the Sept. 12 *Federal Register*.

The American Zinc Association first requested that EPA consider zinc oxide for removal from the EPCRA list in a March 28 letter. EPCRA requires companies to report environmental releases of any substance listed under Section 313 of the act. The agency said it turned down the petition based on the potentially adverse impacts of zinc ion on the aquatic environment. EPA determined that zinc oxide and hydroxide dissolve in acids to form salts and in alkalis to form zincates.

EPA said the conversion of zinc oxide to zinc salts is beneficial because many of the salts are highly soluble in water, which would result in the release of the zinc ion. Zinc ion exhibits high chronic toxicity to the aquatic environment and a high potential to bioaccumulate. Zinc can inhibit growth in marine algae and impair reproduction in invertebrates.

In a letter to EPA Assistant Administrator Lynn Goldman, George Vary, executive director of AZA, wrote: "Zinc oxide is [g]enerally [r]ecognized as [s]afe by the Food and Drug Administration as: a dietary supplement; a nutrient; and a resinous/polymeric coating. In addition, zinc oxide has

been used for decades as a skin ointment. In short, we do not believe it is the type of material for which there should be large and costly reports required."

AZA expressed confusion over EPA's denial of the request. "We thought EPA was looking to delist things that are not a threat to community health," Vary said. In writing to EPA March 28, Vary said he had not meant to file a petition but to ask for more information and suggest zinc oxide as a potential delisting candidate.

Tamara Irbin, acting coordinator of petitions at EPA, said, "The letter was worded in such a way that we had to treat it as a petition. People are often confused over what a petition to delist means." EPA cannot remove a substance from the Section 313 list unless there is evidence that it does not pose a threat to either human health or the environment, Irbin said. EPA's policy on metal compound delisting of May 23, 1991, requires the agency to evaluate both the toxicity of the intact compound and the availability of the metal ion. Irbin added that while AZA was correct that zinc oxide does not pose a human health threat, EPA must consider the potential for adverse impacts on the environment as well.

Population Growth Threatens Water and Fish, Analysts Say

Current levels of population growth are contributing to environmental crises, according to speakers at the Sept. 15 meeting of the Consortium of Affiliates for International Programs, sponsored by the American Association for the Advancement of Science.

Peter Gleick, director of the Pacific Institute for Studies in Development, Environment and Security, said current population growth rates are unsustainable, not least in terms of water supply. "Unless some sort of framework is developed in the water area, we're not going to have long-term solutions," he said. However, Gleick cautioned that solving population problems is not sufficient. "[It] won't guarantee sustainable and equitable use of water."

Lisa Speer, policy analyst for the Natural Resources Defense Council, agreed. "We must solve population issues, but there are other issues to be resolved to safeguard the environment," she said. Specifically, Speer targeted the global demand for fish and the resulting depletion of global waters. To reduce fishing capacity, she recommended eliminating use of sonar and satellites to locate fish, retiring fishing boats and reducing subsidies to marine fisheries. **EP**



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Environmental Systems Managers and Auditors: Building Professionalism

AN ENVIRONMENTAL MANAGEMENT system (EMS) is a comprehensive, integrated and systematic approach to managing an organization's interaction with the environment. The biggest challenge to professionals charged with this responsibility is not technical, but rather the management skills and underlying principles needed to strike a balance between environmental quality

and economic growth. Armed with certain knowledge and skills, and guided by strategic principles, individuals who can successfully strike this balance are emerging from the ranks of corporate environmental and health and safety professionals, and they can carry a great deal of leverage.

This balance has an interpretation in industry that means "good business stays in business," unambiguously creating wealth or sustainable development for itself and for society as a whole. The competitive stakes are high, and the opportunity for the environmental professional to move into

this new era is here now.

Environmental Management Training—Putting Principles First

Dedicated time for education and training will range from academic specialization to professional coursework. Providing a foundation for professional coursework and registration, the National Registry of Environmental Professionals has developed new registrations and approved syllabuses for accredited training courses in this area. This NREP action represents the greatest advance to date by an accrediting professional organization in the United States to ensure consistently high standards for these professional disciplines: environmental systems managers and environmental systems auditors.

By designating the "International Chamber of Commerce Business Charter for Sustainable Development: Principles for Environmental Management" into its code for this registration level, NREP's principles for environmental management serve as a framework of reference for environmental management

activities. By using these principles, environmental systems managers and auditors align themselves with the international community and business leaders, all with one goal: protection of the environment and economic growth.

The Principles for Environmental Management

1. Corporate Priority. To recognize environmental management as among the highest corporate priorities and as a key determinant to sustainable development; to establish policies, programs and practices for conducting operations in an environmentally sound manner.

2. Integrated Management. To integrate these policies, programs and practices fully into each business as an essential element of management in all its functions.

3. Process of Improvement. To continue to improve corporate policies, programs and environmental performance, taking into account technical developments, scientific understanding, consumer needs, and community expectations, with legal regulations as a starting point; and to apply the same environmental criteria internationally.

4. Employee Education. To educate, train and motivate employees to conduct their activities in an environmentally responsible manner.

5. Prior Assessment. To assess environmental impacts before starting a new activity or project and before decommissioning a facility or leaving a site.

6. Products and Services. To develop and provide products and services that have no undue environmental impact and are safe in their intended use, that are efficient in their consumption of energy and natural resources, and that can be recycled, reused or disposed of safely.

7. Customer Advice. To advise, and where relevant, educate customers, distributors and the public in the safe use, transportation, storage and disposal of products provided; and to apply similar considerations to the provision of services.

8. Facilities and Operations. To develop, design and operate facilities and conduct activities, taking into consideration the efficient use of energy and materials, the sustainable use of renewable resources, the minimization of adverse environmental impact and waste



generation, and the safe and responsible disposal of residual wastes.

9. Research. To conduct or support research on the environmental impacts of raw materials, products, processes, emissions and wastes associated with the enterprise, and on the means of minimizing such adverse impacts.

10. Precautionary Approach. To modify the manufacture, marketing or use of products or services, or the conduct of activities, consistent with scientific and technical understanding; to prevent serious or irreversible environmental degradation.

11. Contractors and Suppliers. To promote the adoption of these principles by contractors acting on behalf of the enterprise, encouraging and, where appropriate, requiring improvements in their practices to make them consistent with those of the enterprise; and to encourage the wider adoption of these principles by suppliers.

12. Emergency Preparedness. To develop and maintain, where significant hazards exist, emergency preparedness plans in conjunction with the emergency services, relevant authorities, and the local commu-

nity, recognizing potential transboundary impacts.

13. Transfer of Technology. To contribute to the transfer of environmentally sound technology and management methods throughout the industrial and public sectors.

14. Contributing to the Common Effort. To contribute to the development of public policy and to business, governmental and intergovernmental programs and educational initiatives that will enhance environmental awareness and protection.


15. Openness to Concerns. To foster openness and dialogue with employers and the public, anticipating and responding to their concerns about the potential hazards and impacts of operations, products, wastes or services, including those of transboundary or global significance.

16. Compliance and Reporting. To measure environmental performance; to conduct regular environmental audits and assessments of compliance with company requirements, legal requirements, and these principles; and periodically to provide appropriate information to the Board

of Directors, shareholders, employees, the authorities and the public.

Future

In the future, these principles (a roadmap for environmental management), will provide the foundation by which environmental management strategies, as an integrated system, will be judged. Building a foundation of professionalism around these principles provides the most effective approach to strategic management, improvements in environmental performance, and standards such as the ISO 14000 series.

This map of the major aspects of environmental management establishes the registered environmental systems manager (RESM) and the registered environmental systems auditor (RESA) as key figures in a business's success. 

Margaret Takaki is a principal with Business And The Environment, in Phoenix. Business And The Environment has developed the first accredited training courses for RESM and RESA, based on the principles outlined in this article.

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THE RIGHT RESPIRATOR: AN OVERVIEW

A guide to employers' environmental and safety responsibilities

By **T. RICK IRVIN**
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Recent advances in environmental technology, as well as the changing nature of environmental regulations, have greatly expanded the areas of responsibility of corporate environmental, health, and safety officers. New environmental monitoring requirements, the increasing use of risk assessment in hazardous materials regulations, new methods for hazardous waste clean-up—these and other recent developments have focused industry and government attention on how to manage cost-effectively the use, transport, and disposal of toxic agents.

Environmental managers are increasingly required to implement detailed—and documented—environmental management programs among their operating units to monitor compliance with specific groups of environmental regulations and requirements. Environmental risk managers must be trained in the key elements of environmental management and auditing oversight programs. One such component, often overlooked in the past, is emergency response planning. A number of environmental regulations (including the Superfund Amendment Reauthorization Act) and federal agencies (including EPA and OSHA) have very specific ongoing training requirements for workers who handle, transport, or manage hazardous materials. In addition, they often require that a contingency plan be developed in case of an uncontrolled release of toxic chemical agents at a particular location. This plan must be supplemented by documented internal reporting procedures and competence (via periodic drills).

OSHA regulation 1910.134 states that when it is not possible through engineering controls to control human exposure to toxic chemical agents in the workplace or during emergency response actions, appropriate respiratory protection must be used. A good respiratory protection program can also reduce worker accidents and illness, regulatory compliance costs, on-site

compliance oversight by regulatory authorities, and production operations costs and downtime.

OSHA REQUIREMENTS

Under OSHA regulation 1910.134, employers are responsible for the following:

- Providing respirators when such equipment is necessary to protect an employee's health.
- Providing respirators that are applicable and suitable for the purpose intended.
- Establishing and maintaining a respiratory protection program.

OSHA's respiratory protection program prescribes certain components to establish a "minimum acceptable program." Among the specific elements required:

- A set of written standard operating procedures governing the selection and use of respirators to ensure that all respirators are approved and certified.
- Established respirator selection criteria based on the hazards to which workers will be exposed.
- Documented employee instruction and training in the proper use and limitations of respirators.
- Assignment of respirators to individual workers for their exclusive use.
- Regular respirator cleaning and disinfection.
- Respirator storage in a convenient, clean, and sanitary location.
- Respirator inspection after use and after cleaning, with

particular attention to replacing worn or deteriorated parts. Respirators should be inspected at least once a month.

- Industrial hygiene surveillance of work area conditions where respirators might be used.
- Regular inspections and program evaluations to ascertain program effectiveness.
- Periodic reviews of users' medical and physical ability to wear the provided respiratory equipment.

ADMINISTERING A RESPIRATOR PROGRAM

Corporate management and employees must make diligent and dedicated efforts to ensure corporate respiratory protection programs meet their stated goals. Staff and management responsible for respirator assignment must receive appropriate training. Assignment of improper respirators to employees has resulted in employee injury and death. Staff must therefore have the appropriate technical and professional background to administer a respiratory protection program and make sound respirator selections based on proper evaluation of workplace hazards. It is important that one member of management have final responsibility—and the necessary management support—for company respiratory protection programs, with appropriate staff specialized in all needed areas of respirator maintenance and use.

One key responsibility of corporate health and safety

management is purchasing respirators. The program administrator should have a strong voice in this decision, if not complete control over it. Respirators cannot be selected on the basis of price alone. The large variety of styles and options in respiratory equipment allows almost any worker in any situation to be properly protected. A number of workplace situations and applica-

tions require specialized respiratory protection equipment. These applications include firefighting, confined space entry, and immediately dangerous to life and health (IDLH) environments. Other factors important in purchase decisions for respirator equipment include sizing of masks, job duration, and type of chemical protective clothing to be worn.

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associate with the Institute for Environmental Studies. Gerald J. Kettler, PE, REM, is president of Air Engineering and Testing, Dallas, Texas. Philip T. Underhill, NRRPT, is manager of environmental services for WRT Energy Corporation of The Woodlands, Texas. Clyde B. Strong, Jr., REP, is president of Clyde Strong and Associates, College Station, Texas.

Refer to ...

American National Standard for Respiratory Protection
ANSI Z88.2-1992

American National Standards Institute
11 West 42nd St.
New York, NY 10036

Final Rule for Respiratory Protection
29 CFR Part 1910.134
Occupational Safety and Health Administration

Respiratory Protection
(guide booklet)
OSHA Publication 3079

Occupational Safety and Health Administration
200 Constitution Ave., NW
Washington, DC 20210

Testing and Certification of Respiratory Protective Devices
30 CFR Part 11

Department of the Interior
Order through
Government Printing Office
Superintendent of Documents
P.O. Box 371954
Pittsburgh, PA 15250-7954

Testing and Certification of Respiratory Protective Devices
42 CFR Part 84

National Institute for Occupational Safety and Health
Order through
Government Printing Office
Superintendent of Documents
P.O. Box 371954
Pittsburgh, PA 15250-7954

SELF-CONTAINED BREATHING APPARATUS

For dangerous atmospheres where other breathing devices cannot go

A self-contained breathing apparatus is an atmosphere-supplying respirator in which the respirable gas source is designed to be carried by the wearer. The advantages are obvious: An SCBA can be used in oxygen-deficient atmospheres and environments that are immediately dangerous to life and health, where an air-purifying respirator cannot be used.

The user of an SCBA is not dependent on the quality of the ambient air. The tanks on the SCBA are filled with air which, at a minimum, meets the requirements for Grade D breathable air, as set forth in Compressed Gas Association Commodity Specification G-7.1-1966.

While the self-contained unit does offer the user greater protection and mobility than an air-line device, the trade-offs are significant. First is the weight of the SCBA. Second is work duration. Most SCBA systems offer just 30 or 60 minutes of air. Heavy work that causes the user's breathing rate to increase may significantly reduce useful wear time.

SCBA are among the most complex and expensive types of respiratory protective devices, and most come with special whistles and bells (literally), which are an important part of the function. Features to consider when selecting SCBA include weight, type of harness system, communication features, location of regulators and alarms, and type of alarm.

SELF-CONTAINED BREATHING APPARATUS (SCBA)

COMPANY	BRAND/MODEL	MASK MATERIAL AVAILABLE	TANK PRESSURE	TANK DURATION	TANK CONSTRUCTION			ALARM TYPE			ALARM LOCATION		OTHER OPTIONS
					Aluminum	Hoopwrap	Composite	Whistle	Bell/Other	Face	Chest/waist/back	Shoulder	
Cairns Air	Pioneer	(EPDM)	2216, 4500	30, 45, 60	*	*	*	*	*			Air line compatible	
Interspiro	Spiromatic 4515	Natural Rubber/Neoprene, Silicon Rubber	2216	30				*			*	Radio interface, Air line compatible	
	Spiromatic 9030	Natural Rubber/Neoprene, Silicon Rubber	4500	60				*			*	Radio interface, Air line compatible	
	Spirolite 6630	Natural Rubber/Neoprene, Silicon Rubber	4500	45				*			*	Radio interface, Air line compatible	
ISI, Inc.	Vanguard 2	Natural Rubber/Neoprene, Silicon Rubber	2216	30	*			*			*	Radio interface, Air line compatible	
	Vanguard 14	Natural Rubber/Neoprene, Silicon Rubber	4500	60	*			*			*	Radio interface, Air line compatible	
	Magnum T	Natural Rubber/Neoprene, Silicon Rubber	2216, 4500	30, 45, 60			*	*			*	Radio interface, Air line compatible	
MSA	Ultralite II	Silicon Rubber, HyCar	2216, 3000	30	*	*	*	*			*	Radio interface, Air line compatible	
	Ultralite MMR	Silicon Rubber, HyCar	2216,3000	30	*	*	*	*			*	Radio interface, Air line compatible	
	Custom 4500 II	Silicon Rubber, HyCar	4500	30, 45, 60			*	*			*	Radio interface, Air line compatible	
	Custom 4500 MMR	Silicon Rubber, HyCar	4500	30, 45, 60			*	*			*	Radio interface, Air line compatible	
	Work Mask II	Silicon Rubber, HyCar	2216, 3000	30	*	*	*	*			*	Radio interface, Air line compatible	
National Dräger	PA-80 Plus (NFPA certified)	EPDM, Silicon Rubber	2216	30	*	*	*	*			*	Radio interface, Air line compatible	
			4500	60		*	*		*		*	Air line compatible	
			4500	30, 45		*	*		*		*	Air line compatible	
	Air Boss (NFPA certified)	EPDM, Silicon Rubber	4500	60		*	*	*			*	Radio interface, Air line compatible	
			4500	30, 45		*	*	*			*	Radio interface, Air line compatible	
			2216	30		*	*	*			*	Radio interface, Air line compatible	
	Pro Air	EPDM, Silicon Rubber	4500	60		*	*	*			*	Radio interface, Air line compatible	
			4500	30, 45		*	*	*			*	Radio interface, Air line compatible	
2216			30	*	*	*	*			*	Radio interface, Air line compatible		
North	800 series	Silicon Rubber	2216	30	*	*	*	*			*	Air line compatible	
			4500	30, 50	*	*	*	*			*	Air line compatible	
Pro-Tech	2800-AL Pro-Pack		2216	30	*			*			*		
	2800-FW Pro-Pack		2216	30		*	*	*			*		
	2800-HW Pro-Pack		2216	30		*	*	*			*		
Racal	Racal 2000	Silicon Rubber	2216	30	*	*	*	*			*	Air line compatible	
	SCBAG	Silicon Rubber	4500	30	*	*	*	*			*	Air line compatible	
Scott Aviation	2.2/4.5	Natural Rubber/Neoprene, EPDM, HyCar	2216, 4500	30	*	*	*	*	*		*	Air line compatible	
	Air-Pak Fifty	Natural Rubber/Neoprene, EPDM, HyCar	2216, 4500	30, 45, 60	*	*	*	*	*		*	Air line compatible	
Survivalr	LoPro	Silicon Rubber	4500	30		*	*	*			*	Radio interface, Air line compatible	
	Omega	Silicon Rubber	2216, 4500	30, 45, 60	*	*	*	*	*		*	Radio interface, Air line compatible	
	Sigma	Silicon Rubber	2216, 4500	30, 45, 60	*	*	*	*	*	*	*	Radio interface, Air line compatible	
	Mark 2	Silicon Rubber	2216, 4500	30, 45, 60	*	*	*	*	*	*	*	Radio interface, Air line compatible	
Willson	Simplex	Silicon Rubber	2216	30	*	*	*	*			*	Air line compatible	
			4500	30, 60		*	*	*			*	Air line compatible	

For information on how to contact manufacturers, see page 26.

SUPPLIED-AIR RESPIRATORS

More protection, more time

ANSI now calls it an air-line respirator. OSHA still calls it a supplied-air respirator. Some call it an atmosphere-supplying respirator. Whatever the name, the function is the same: respirable air is carried to the user through an air line from a remote source.

The air supply on an air-line respirator may be either continuous-flow or pressure-demand. A continuous-flow device provides a constant rate of air, regardless of the user's breathing pattern. A pressure-demand device introduces more air into the facepiece as a result of a pressure drop when the wearer takes a breath.

One advantage of a supplied-air respirator is that it can be used for longer durations than can a self-contained breathing apparatus, which has a limited supply of air carried by the user. The supplied-air respirator also provides significantly greater protection than an air-purifying respirator, and

continued on page 26

SUPPLIED AIR																			
COMPANY	BRAND	MODEL	MASK MATERIAL AVAILABLE	ADAPTABLE TO	APR	PAPR	AIR SUPPLY	Continuous flow	Pressure demand	STYLE	Full face	Half face	Helmet or hood	OTHER OPTIONS	HEPA ingress	Escape SCBA capability	Air supply apparatus	SPECIAL FEATURES	
3M	3M	7800S	Silicon Rubber		*	*	*	*	*					*	*	*			
		7000	Silicon Rubber		*	*	*	*	*					*	*	*			
		W-8000, W-8200B	Natural Rubber/Neoprene, Silicon Rubber, PVC				*	*	*	*		*							
		W-2860, W-3021	Natural Rubber/Neoprene, Silicon Rubber, PVC				*	*	*	*		*							
Allegro	Allegro	9900	Thermoplastic				*	*	*									Available in systems	
		9910					*	*	*									Available in systems	
Bilsom	Glendale	GR 5000	Silicon Rubber				*	*	*		*								
		GPT	Silicon Rubber		*	*	*	*	*										
Cabot	Omni Star	52002-53002	Natural Rubber/Neoprene, Silicon Rubber		*	*	*	*	*		*		*						
		AO 7 Star	Natural Rubber/Neoprene, Silicon Rubber		*	*	*	*	*		*		*						HE; neoprene facepiece available
		AO 5 Star	Natural Rubber/Neoprene, Silicon Rubber		*	*	*	*	*		*		*						
		Omni Air	Natural Rubber/Neoprene, Silicon Rubber				*	*	*	*		*		*					
Dynamation	Carry Air	922, 952									*								
ISI	SAFEF	707.141.00	Natural Rubber/Neoprene				*	*	*										
MSA	Duo-Flo Constant-Pressure	471218, 457126, 471230, 480251, 480247, 480255	Natural Rubber/Neoprene, Silicon Rubber				*	*	*		*		*					Available in welder's half-face	
		483837, 483819, 483855, 483851, 483833, 483869	Natural Rubber/Neoprene, Silicon Rubber		*	*	*	*	*		*		*						
	Duo-Flo Pressure-Demand	484579, 484562, 484596, 484592, 484575, 484609	Natural Rubber/Neoprene, Silicon Rubber				*	*	*	*		*		*					Available in welder's half-face
		484240, 484502, 484538, 484534, 484516, 484522	Natural Rubber/Neoprene, Silicon Rubber				*	*	*	*		*		*					
	Blastoef II	463980, 463981, 463979, 463939, 463982, 463924					*	*	*	*		*		*					
		485751, 485755					*	*	*	*		*		*					Various hood materials available
	Abrasi-Blast Pressure-Demand	468716, 468718, 474263, 468720, 468722, 474264					*	*	*	*		*		*					Various hood materials available
		Various					*	*	*	*		*		*					Welder's version available. PVC hood

AIR-PURIFYING RESPIRATORS

Protection
from a wide
range of hazards

An air-purifying respirator is a respirator in which ambient air is passed, by means of the user's breathing action or by a blower, through an air-purify-

ing element that removes the contaminant or contaminants. The matrix here addresses half-face and full-face air-purifying respirators (APRs).

The respiratory protection devices in this section rely on filters to remove solid or liq-

uid aerosols from the air the user breathes in. The user must first determine whether the atmosphere is suitable for an APR. If the work environment is oxygen deficient, or if the concentration of the contaminant exceeds the protection

AIR-PURIFYING RESPIRATORS

COMPANY	BRAND	MODEL	MASK MATERIAL AVAILABLE	ADAPTABLE TO					OTHER OPTIONS	SPECIAL FEATURES
				Air line	PAPR	STYLE	Full face	Half face		
								Interchangeable filters	Disposable	
3M	3M	5101-5105, 5201-5205, 5301-5305, 5111-5211, 5311-5141, 5241-5341, 5243, 5343, 5143								
		6100, 6200, 6300								
		7100, 700S, 7200, 7200S, 7300, 7300S, 7001S, 7002S, 7003S	Natural Rubber/Neoprene, Silicon Rubber							
		7800SS, 7800SM, 7800SL	Silicon Rubber							• Can be used with HEPA & replaceable prefilters.
Bilsom	Glendale	MX/PF F950	Silicon Rubber							
		F710	Silicon Rubber						Available in two sizes	
Cabot	AO 5 Star	50400, 50089, 50615, 50445 50099, 50640	Natural Rubber/Neoprene, Silicon Rubber							
		50330-50332	Natural Rubber/Neoprene						• Can be re-used.	
		50275-50276	Silicon Rubber, Other						• Available with neoprene facepiece	
		52002-53002	Natural Rubber/Neoprene, Silicon Rubber						• Dual or single cartridge available	
Gerson	Gerson Signature	9100, 9200, 9300								
		8100-8105, 8201-8205, 8301-8305, 8111, 8211, 8311							• Low profile, wide field of vision	
ISI	Sundström	702.101.01	Thermoplastic Elastomer, Silicon Rubber						• Protective hood, pre-filters available	
Moldex	8000 series	(Model categorized by hazard)	Thermoplastic							
MSA	Advantage100	Various	Natural Rubber/Neoprene							
		805407-805424	Natural Rubber/Neoprene						• Choice of 17 cartridges, including HEPA; three sizes	
		Various	Natural Rubber/Neoprene, Silicon Rubber						• Speaking diaphragm available. Choice of 17 cartridges; three sizes	
		490491-490493	Silicon Rubber							
		Various	Natural Rubber/Neoprene, Silicon Rubber							
National Dräger	Combitox Nova	R53301, R53302	Silicon Rubber							
		Various	EPDM, Natural Rubber/Neoprene							
		Various	EPDM, Natural Rubber/Neoprene							
Neoterik	Technirama	TK2, TK2S	Natural Rubber/Neoprene, Silicon Rubber, Other							

capability of the APR, then a higher level of respiratory protection must be used.

A filter or combination of filters must be selected based on the nature of the air contaminants present. Most of the devices presented in this section can be used with a wide range of interchangeable filter types, depending on the contaminant.

In selecting an APR, the user will want to consider weight, the design of the face-piece and the materials used,

and the level of protection needed. According to ANSI, full-face APRs offer 10 times as much protection as half-mask APRs.

The respiratory protective devices presented here are approved by NIOSH under 30 CFR Part 11. Some air-purifying respirators approved under the new 42 CFR Part 84 are now available. Those are not discussed here. The regulation permits the use of devices approved under the old Part 11 until July 1998.

EXPERT ADVICE

RON KING

Regulatory Affairs Manager, 3M, St. Paul, Minn.

We have to think about respirator selection differently than we have in the past. We have to look at what the filter does, what kind of contaminant, and at what level. Then we should make the selection based on the new filters, not based on what we used in the past.

If you go by the logic in the [NIOSH guidance] document, you may end up selecting—and paying for—more protection than you need. The higher you drive efficiency, the higher you drive breathing resistance and discomfort.

We basically support the ANSI position that any respirator—quarter-mask, half-mask, disposable, non-disposable—that is properly fit-tested, whether that fit test be qualitative or quantitative, should have a protective factor of 10.

AIR-PURIFYING RESPIRATORS								
COMPANY	BRAND	MODEL	MASK MATERIAL AVAILABLE	ADAPTABLE TO	STYLE	OTHER OPTIONS	SPECIAL FEATURES	
				Air line				
North	North	7700 Series	Silicon Rubber					
	North	77 BP	Silicon Rubber					Air-purifying elements suspended on worker's back for easy use with hoods & shields
	North	7800	Silicon Rubber					
Pro-Tech	Pro-Tech	1490	PVC					
		1590	Silicon Rubber					
		1694	PVC					
Survivair	Series 86	860101-860103, 860201-860203, 860301-860303, 860401-860403, 862101-862103, 869001-869003, 869091-869093	Silicon Rubber					
		Survivair	350000, 360000, 370000	Silicon Rubber				
		Blue 1	210000, 220000, 230000, 210010, 220010, 230010	Silicon Rubber				
		Blue 2000	260000, 270000, 280000	Silicon Rubber				
		Series 4000	410010, 410090, 420010, 420090	Silicon Rubber				Speaking diaphragm
U.S. Safety	U.S. Safety	100	Silicon Rubber					
		200	Natural Rubber/Neoprene					
		300	Natural Rubber/Neoprene, Silicon Rubber, Thermo-plastic					
		400	Natural Rubber/Neoprene, Silicon Rubber, Elastomeric compound					Re-usable
		120	Silicon Rubber					
		520	Natural Rubber/Neoprene					
Willson	Premier	6100S, 6100M, 6100L, 6100SR, 6100MR, 6100LR	Silicon Rubber					
		6200S, 6200M, 6200L	Silicon Rubber				Single cartridge	
		6400, W6400, 6500, W6500	Natural Rubber/Neoprene, Silicon Rubber					
	VALUAIR	5000						
		1600, 1700	Natural Rubber/Neoprene					
	Freedom	2000						

For information on how to contact manufacturers, see page 26.

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Jardine Insurance Brokers Inc.
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Los Angeles, CA 90017
Contact
Lisa K. Murdoch

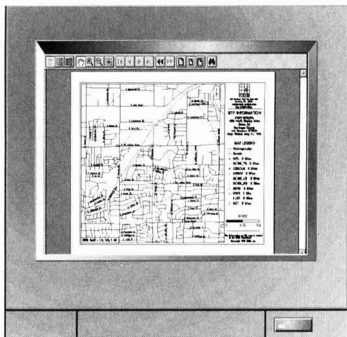
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POWERED AIR-PURIFYING RESPIRATORS

A little power for heavy-duty work

A powered air-purifying respirator uses a blower to force ambient air through air-purifying elements. Like non-powered air-purifying devices, PAPRs may be used with a variety of filter

types, depending on the type of air contaminant present.

PAPRs are significantly heavier than APRs, and they are often significantly more expensive, but they have their advantages. First, they offer a greater level of protection against airborne contami-

nants. Second, PAPRs are more effective than APRs in situations involving a high work rate.

The higher breathing resistance of an air-purifying respirator, during heavy work, may result in distressed breathing. With a PAPR, because the air

POWERED AIR-PURIFYING RESPIRATORS (PAPR)													
COMPANY	BRAND	MODEL	MASK MATERIAL AVAILABLE	BLOWER		HAZARDS			FACEPIECE ADAPTATIONS		STYLE	NOTES	
				M	B	Organic vapor	Ammonia	Acid gas	Air line	APR			Helmet
3M	3M	8000, 8200			*	*	*	*	*		*		
		W-3259, W-3260			*	*	*	*	*		*		
		7800S	Silicon Rubber	*	*	*	*	*	*		*		
		7000	Silicon Rubber	*	*	*	*	*	*		*		
		32655		*	*	*	*	*	*		*		
		3275S-L W-3205		*	*								
Cabot	Omnistar	52002, 23002	Natural Rubber/Neoprene, Silicon Rubber	*	*	*	*				*		
		AO 5 Star	50311-50316	Natural Rubber/Neoprene, Silicon Rubber	*	*	*					*	
ISI	Typhoon	703.005.01	Natural Rubber/Neoprene, Silicon Rubber	*								* Single filter	
MSA	OptimAir MM	Various	Natural Rubber/Neoprene, Silicon Rubber	*					*		*		
		Optimair 6A	Various	Natural Rubber/Neoprene, Silicon Rubber	*	*	*	*	*		*	*	Hood for particulate only. 1500-hour motor
Neoterik	Puriflo	SR 14	Natural Rubber/Neoprene, Silicon Rubber	*					*	*		*	
		Techniflo	TF3	Natural Rubber/Neoprene, Silicon Rubber, PVC	*	*	*	*	*	*	*	*	*
		Techniflo	TF3-72	PVC	*	*	*	*	*	*	*	*	*
		Techniflo	TF3-78	Natural Rubber/Neoprene, PVC	*	*	*	*	*	*	*	*	*
		Techniflo	TF3-59	PVC	*	*	*	*	*	*	*	*	*
		Techniflo	TF3-77	Natural Rubber/Neoprene, Silicon Rubber	*	*	*	*	*	*	*	*	*
		Techniflo	TF3-61	Natural Rubber/Neoprene, Silicon Rubber	*	*	*	*	*	*	*	*	*
		Techniflo	TF3-62	Natural Rubber/Neoprene, Silicon Rubber, PVC	*	*	*	*	*	*	*	*	*
		Mini-Breezer	MB14	Natural Rubber/Neoprene, Silicon Rubber, PVC	*	*	*	*	*	*	*	*	*
		Careflo	CF60		*						*		

is mechanically drawn through the filter, breathing resistance is not a problem. This may be important in some types of construction and renovation work, such as asbestos abatement.

As with non-powered APRs, the user must first determine whether the atmosphere is suitable for a PAPR. If the work environment is oxygen deficient, or if the concentration of the contaminant exceeds the protection capability of the PAPR, then a higher level of respiratory protection must be used.

Issues to consider when selecting a powered air-purifying respirator include the type of facepiece. Most respirator manufacturers offer half and/or full facepieces, and many also make hoods and helmets for specific applications. The user may want to consider where the motor and battery for the PAPR are carried. Some models have the blower on the facepiece, which means more weight at the face as a trade-off for greater mobility. Many models have the blower on the belt, which means an air line must span from the belt to the facepiece.

EXPERT ADVICE

BEN MATRANGA

Marketing Manager, Allegro Industries, Paramount, Calif.

More than anything else, the purchasers of respiratory protective equipment really need to do an adequate hazard evaluation. There are a lot of applications where any of the various product types—APR, PAPR, Supplied Air, and SCBA—might be suitable, depending on the contaminant level.

What happens so often is that the people who have been put in charge of safety are not adequately educated or don't have the experience to do a proper hazard evaluation. They don't necessarily use the right respirator in the right application. For example, in some cases you'll see a constant flow respirator being used for an improper application. You see them in confined spaces and IDLH environments, where that isn't the proper means of protection.

Any time you use any type of respiratory protection, a proper hazard evaluation is a must.

POWERED AIR-PURIFYING RESPIRATORS (PAPR)													
COMPANY	BRAND	MODEL	MASK MATERIAL AVAILABLE	BLOWER			HAZARDS			FACEPIECE ADAPTATIONS		STYLE	NOTES
				M	B		Organic vapor	Ammunition	Acid gas	Air line	APR		
North	North	9880	Silicon Rubber	*									*
Pro-Tech	Pro-Tech	3601	PVC	*									*
Racal	Powerflow	240-01-00	Natural Rubber/Neoprene	*									*
	Powerflow Super Cartridge	240-01-02 through 240-01-07	Natural Rubber/Neoprene	*	*	*	*	*	*				*
	Air Mate HEPA	231-01-19 through 231-01-25		*									*
	Breathe-Easy	520-01-98, 520-01-99	Natural Rubber/Neoprene	*	*	*	*	*	*	*	*	*	*
		520-01-88, 520-01-89, 520-01-05, 520-01-06		*	*	*	*	*	*	*	*	*	*
		520-01-92, 520-01-93		*	*	*	*	*	*	*	*	*	*
	(Crown headpiece)	520-01-94, 520-01-97		*	*	*	*	*	*	*	*	*	No HEPA
		520-03-04 through 520-03-07		*	*	*	*	*	*	*	*	*	*
		520-02-74, 520-02-97		*	*	*	*	*	*	*	*	*	*
	(Welder's helmet)	520-02-13, 520-02-14		*	*	*	*	*	*	*	*	*	*
	Power-Plus	241-01-00 through 241-01-08	Natural Rubber/Neoprene	*	*	*	*	*	*	*	*	*	*
Survivair	PAPR	520000, 510000	Silicon Rubber	*	*	*	*	*	*	*	*	*	*
	PAPR	560000	Silicon Rubber	*	*	*	*	*	*	*	*	*	*
The St. George Co. Ltd.		K80E-T5A		*							*		Single filter
		K80E-T8A		*							*		Dual filters
		Kompat 88		*							*		Battery, motor, and filters built into helmet
		K80S-T8N		*	*	*	*	*	*	*	*	*	Dual filters
		K90W-T8N		*	*	*	*	*	*	*	*	*	For welding
		K90W-T8A		*	*	*	*	*	*	*	*	*	For welding
Wilson	Marathon	W6653, 6753	Silicon Rubber	*				*	*	*	*	*	
	6000 Series	6383S-6, 6383M-6, 6838L-6, 6783-6, W6783-6, W6683-6, 6383S-8, 6383M-8, 6383L-8, 6783-8, W6683-8, W6783-8	Natural Rubber/Neoprene	*	*	*	*	*	*	*	*	*	*

All PAPRs listed here have HEPA unless otherwise noted.

For information on how to contact manufacturers, see page 26.

FOR MORE INFORMATION

Contact the respirator manufacturers whose products are listed within this section at these addresses and telephone numbers, or circle the appropriate number on the reader service card at page 3.

3M Occupational Health & Environmental Safety

3M Center,
Bldg. 275-6W-01
P.O. Box 33275
St. Paul, MN 55133-3275
Tel. 800 896 4223 or
800-243-4360
Circle number 110

Allegro Industries

6403 E. Alondra Blvd.
Paramount, CA 90723
Tel. 800-622-3530
Fax 310-633-2224
Circle number 111

Bilsom Group

5300 Region Court
Lakeland, FL 33081
Tel. 800-733-1177
Circle number 112

Cabot Corp.

90 Mechanic Street
Southbridge, MA 01550
Tel. 800-327-3431
Fax 800-488-8007
Circle number 113

Cairns Air

11 Parkway Cir.
New Castle, DE 19720
Tel. 302-325-1190
Fax 302-325-1198
Circle number 114

Dynamation (supplied air)

3784 Plaza Dr.
Ann Arbor, MI 48108
Tel. 313-769-0573
Fax 313-769-1888
Circle number 115

Louis M. Gerson Co., Inc.

15 Sproat St.
Middleboro, MA 02346
Tel. 508-947-4000 or
800-225-8623
Fax 508-947-5442
Circle number 116

Interspiro

31 Business Park Dr.
Branford, CT 06405
Tel. 203-481-3899
Fax 203-483-1879
Circle number 117

ISI Inc.

922 Hurricane Shoals Rd.
Lawrenceville, GA 30243
Tel. 404-962-2522
Circle number 118

Mine Safety Appliances (MSA)

P.O. Box 426
Pittsburgh, PA 15230
Tel. 800-MSA-2222
Fax 800-967-0398
Circle number 119

Moldex-Metric, Inc.

10111 W. Jefferson Blvd.
Culver City, CA 90232
Tel. 310-837-6500 or
800-421-0668
Fax 310-837-9563
Circle number 120

National Dräger

101 Technology Dr.
Pittsburgh, PA 15275
Tel. 412-787-8383
Fax 412-787-2207
Circle number 121

Neoterik Health Technologies, Inc.

Neoterik Center
Woodsboro, MD 21798
Tel. 301-845-2777
Fax. 301-845-2213
Circle number 122

North Safety Products

200 Plainfield Pike
Cranston, RI 02921
Tel. 401-943-4400
Fax 401-942-9360
Circle number 123

Pro-Tech Respirators

P.O. Drawer 339
107 E. Alexander St.
Buchanan, MI 49107
Tel. 616-695-9663
Fax 616-695-1415
Circle number 124

Racal Health and Safety, Inc.

7305 Executive Way
Frederick, MD 21701
Tel. 301-695-8200 or
800-682-9500
Fax 301-695-4413
Circle number 125

Respiratory Systems, Inc.

16912 Von Karman Ave.
Irvine, CA 92714
Tel. 714-250-9000
Fax 714-250-9200
Circle number 126

Scott Aviation

309 West Crowell St.
Monroe, N.C. 28110
Tel. 704-282-8400
Fax 704-282-8424
Circle number 127

The St. George Co. Ltd.

P.O. Box 430
Paris, Ontario N3L 3T5
Tel. 800-461-4299
Fax 519-442-7191
Circle number 128

Survivair

3001 S. Susan St.
Santa Ana, CA 92704
Tel. 714-545-0410
Fax 714-850-0299
Circle number 129

U.S. Safety

8101 Lenexa Dr.
P.O. Box 15965
Lenexa, IA 66285-5965
Tel. 913-599-5555
Fax 800-252-5002
Circle number 131

Willson Safety Products

P.O. Box 622
Reading, PA 19603-0622
Tel. 610-376-6161
Fax 610-371-7725
Circle number 132

continued from page 18

the wearer need not overcome the breathing resistance encountered in using a non-powered APR.

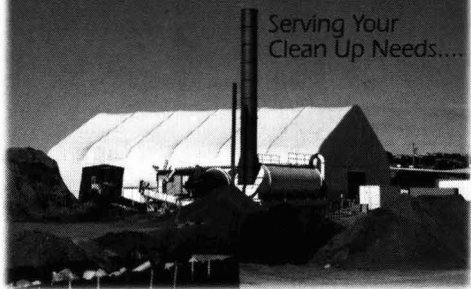
Air-line respirators can be used in some atmospheres where other respiratory protective devices cannot, including oxygen-deficient environments. An atmosphere-supplying respirator can also be used in an environment that is immediately dangerous to life and health, provided it is used in conjunction with an auxiliary self-contained air supply.

Supplied-air respirators, however, restrict the movement of the user to the length of the air-line hose. In addition, a hazard exists anywhere the trailing air-line hose may come in contact with machinery or vehicles that could sever the line or restrict the flow of air.

Features to consider when selecting a supplied-air device include the type of facepiece, including half- and full-face masks, as well as hoods and helmets for specific applications. Some air-line systems have special features, such as compatibility with a high-efficiency particulate air-filtration system for movement in environments that do not require a remote air source, and escape SCBA capability for atmospheres that are immediately dangerous to life and health.



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Good Neighbor Monitoring

Using state-of-the-art instruments, air quality in the neighborhood around a Unocal refinery is continually monitored.

By Donald F. Schukraft

In 1896, the rolling green hills overlooking the blue waters of San Pablo Bay, some 25 miles northwest of San Francisco, was an ideal site for the Unocal 76 Products oil refinery. Surrounded by wildlife and far removed from the bustling urban areas of the San Francisco Bay area, the refinery's neighbors included seagulls, coyotes and farm animals.

This scene has changed drastically. Urban sprawl has crept up on the refinery, and its new neighbors now include housing projects, shopping centers and schools.

Hillcrest Elementary School, one of Unocal's neighbors, is concerned with the local air quality. So to ensure that the area is a safe and enjoyable place for all to live and work, Unocal is working with local community groups, the John Swett Unified School District, East Bay Regional Park District and the Carquinez Strait Preservation Trust.

The refinery has recently installed a sophisticated air quality and meteorological monitoring system. The monitoring station is designed to provide an early warning should sulfur compounds or hydrocarbons begin to reach unhealthful levels. When completed, data from the monitoring site will be shared with school administrators.

In October 1994, Unocal installed a temporary monitoring station at Hillcrest

School to detect hydrogen sulfide. A permanent and more sophisticated meteorological and air quality monitoring station was installed in August 1995 using state-of-the-art instrumentation. Parameters being measured at the site include sulfur dioxide (SO₂), hydrogen sulfide (H₂S), volatile organic compounds (VOC), wind speed, wind direction and air temperature. The monitoring station is programmed to notify selected personnel, by making a telephone call, should any measured air quality parameter exceed a given threshold. Those given access to the monitoring station can also call the station over any standard telephone, enter their security code and listen to the current measurements in order to decide a course of action. Data from the station is also monitored through strip chart recorders at the school and through a computer and modem connection.

Siting of the air quality and meteorological monitoring station was a joint effort by Hillcrest School administrators and the Bay Area Air Quality Management District (BAAQMD). By strategically locating the station adjacent to the school, emission levels coming from the refinery or other local sources can be effectively monitored. A unique part of this program is how closely Unocal, Hillcrest School and the BAAQMD work together. All three groups have access to the data.

The Components

Weather Network, Inc., a Chico, Calif.-based meteorological consulting firm, and Thermo Environmental Instruments, Inc., in Franklin Mass., provided the instrumentation, software and installation of the monitoring station. The monitors at the station will detect emissions at levels far below those causing known health impacts. As a result, the monitoring station can help refinery employees correct any emission problems before unsafe levels are reached.

A Campbell Scientific CR10 measurement and control system (provided by Weather Network) is the central processing unit of the station. The CR10 is a rugged, research-grade instrument that combines a microcomputer, clock, multimeter, calibrator, scanner, timer, frequency counter and controller into one unit. The unit is expandable and has available a number of different communication options, making it very flexible for air quality and meteorological monitoring systems. An SDM-CD16 control port module was added to the CR10 to provide 16 additional digital control ports for controlling automatic calibration of the gas samplers. For remote readout of the data at the school office, an SDM-A04 four-channel, continuous analog output module provides four independent channels to drive strip chart recorders. A series of multiplexers, offered

by Campbell Scientific, allow users to increase the number of analog and pulse-counting sensors that can be interfaced to one CR10 datalogger.

An R.M. Young Wind Monitor AQ is located atop the 10-meter observation tower for measuring wind speed and direction. Data from the Wind Monitor AQ is stored in the CR10 datalogger as well as displayed on site using the R.M. Young Wind Tracker enclosed in a secured windowed box. In critical situations, where people at the school site or local community are threatened by emissions exceeding air quality standards, instantaneous readout of the wind speed and direction will be available to provide a local area warning.

An air temperature sensor, which is to be added to the monitoring station, will be located at a 1.5 to 2.0 meter height on the tower. This instrument will provide additional information for site impact studies.

The Thermo Environmental Instruments model 43B Pulsed Fluorescent Sulfur Dioxide SO₂ Analyzer, the model 45 Fluorescence H₂S to SO₂ Analyzer and the model 52 Continuous Organic Vapor Meter

will take air quality measurements at the station. Readings from each of these instruments are stored in the CR10 datalogger for later retrieval. A solid-state storage module will be interfaced to the CR10 to provide a backup to data stored in the datalogger.

The Thermo Environmental Instruments Model 146 Multigas Calibration System is used to calibrate each gas monitoring instrument. The entire calibration process is performed automatically through control ports on the CR10 datalogger. Each calibration is performed at user-specified intervals and all calibration functions are performed automatically. The calibration data is recorded by the datalogger for later retrieval.

An important aspect of the entire monitoring system is its ability to provide access to continuous monitoring of air quality for both school and refinery personnel. Built-in alarms inform personnel before unhealthy levels are reached. Attached to the CR10 datalogger is a Campbell Scientific VSI voice synthesizer modem, programmed according to criteria established by the refinery. Authorized

users at the refinery and school can call the monitoring station using any touch-tone telephone, enter a security code and listen to the current readings of SO₂, H₂S, VOC, wind speed, wind direction and air temperature.

The VSI voice modem is also used as an early warning system. Should sulfur compounds, hydrocarbons or organic materials exceed user defined levels, the monitoring station will initiate a call to the environmental section at the refinery so appropriate action can be taken immediately. The battery-backed datalogger and voice modem will also initiate a call to specified personnel if the door to the secured monitoring site is opened or if AC power is lost at the monitoring station.

To keep school administrators informed of the air quality within the school area, real-time display units will be placed in the school office and a direct readout from measurements at the monitoring site will be available. **EP**

Donald F. Schukraft is the general manager of Weather Network, Inc., Chico, Calif.

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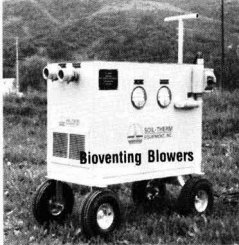
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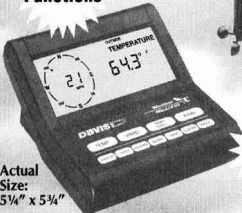
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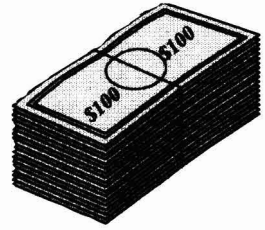
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Do you expect your 1996 environmental budget to:
 Increase? Decrease? Remain the same?

Please estimate the percent of your environmental budget devoted to:

(Fill in percents)

- ___% Purchases of Capital Equipment?
 ___% Purchases of Consumable Products?
 ___% Purchases of Environmental Services?
 ___% Salaries?
 ___% Other Items?

100% Total

Which of the following intervals corresponds to your environmental budget for 1996?

- 1 - Under \$10,000 5 - \$100,000 - \$249,999
 2 - \$10,000 - \$24,999 6 - \$250,000 - \$499,999
 3 - \$25,000 - \$49,999 7 - \$500,000 - \$999,999
 4 - \$50,000 - \$99,999 8 - \$1 million or more

Which of the following best describes your organization?

- 1 - Manufacturing
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OVA READINGS: *Useful Tool or Misleading Information?*

Organic vapor analyzers (OVA) are available in all shapes and sizes. They are expected to deliver a fast and accurate assessment of field conditions at the time of the reading. Many times, however, these readings are not a true assessment of the conditions at the site, or alternatively, too much information is inferred when interpreting the data provided by these instruments. Varying field conditions may render results inaccurate and create a false sense of security in workers when they deal with health and safety monitoring. Such conditions may also result in unnecessary and ineffective safety precautions.

Although health and safety monitoring is the primary function for these instruments, other applications for this equipment are being tested. The use of OVA instruments to screen potentially contaminated material (groundwater and soil) is becoming more popular. Although this use is a low-cost alternative to complete analytical testing procedures, it is not without problems and limitations.

Trained and experienced analysts can eliminate many of the problems associated with field screening operations. The seasoned analyst will be aware of instrument malfunctions, and can ensure that the instrument is properly calibrated.

Instrumentation

The two basic types of OVAs discussed here are differentiated by the type of detectors utilized in the instrument: the photoionization detector (PID) and the flame ionization detector (FID).

Each type of detector has its own advantages and disadvantages (See "Comparison of the PID and FID," page 32). In many cases, either type of instrument would give the desired results, but in other instances, one type would be preferred. Moreover, using both types in tandem can provide extra information that could not be obtained using either instrument alone. The choice of which type of instrument to use could make or break a monitoring program, depending

on a variety of factors such as target compounds, field conditions and operator training.

Photoionization Detectors. OVAs that utilize PIDs are the most popular type in use today. The basic premise behind the PID is to pass the sample past a lamp that produces ultraviolet light of a certain energy. If the energy of the lamp is greater than or equal to the ionization potential (IP) of the compound in the sample, free electrons are generated that produce a current proportional to the number of ions present. This resulting signal is translated as a total organic vapor concentration. The IP of some common contami-

nants are above the energy level of most photoionization lamps used in OVAs; the instrument will not detect this. It is imperative to check the IP of the compounds for each site monitored to ensure that the instrument can detect all target compounds.

Some instruments offer interchangeable lamps in order to vary the ionization energy available and possibly identify a wider range of compounds. Lamps with higher energies tend to have more problems associated with them and are only routinely used in the most ideal working conditions.

One of the main problems associated with PIDs is the effect of relative humidity on the capability of the detector to give accurate readings. High humidity in the sampling environment will decrease the readings obtained. This is of particular concern when monitoring for health and safety, since actual concentrations are higher than those obtained by the instrument. Workers may be exceeding exposure levels even though the meter indicates compliance. The higher the ionization energy of the lamp, the greater the effect of high humidity on both the reading and the life of the bulb. Manufacturers suggest that the highest available voltage bulb (11.7 eV) should be stored in a desiccator between uses to extend the bulb's useful life.


A lesser-known problem with PIDs is the effect of high ambient methane concentrations on the measurement of organic vapors. The presence of methane has been proven to decrease detector sensitivity by as much as 90 percent in a 5-percent methane environment.

With the variety of instruments available today, the OVA chosen must be well suited to the conditions expected in the field.


By Michael J. Capacci and Mark S. Wilcove



Comparison of the PID and FID

Parameter	PID	FID
Response	Responds to many organic and some inorganic gases and vapors.	Responds to many organic gases and vapors.
Application	Detects total concentrations of gases and vapors. Some identification of compounds possible if more than one probe is used.	In survey mode, detects total concentrations of gases and vapors.
Limitations	High methane concentrations decrease signal of other organic concentrations of interest. Does not detect a compound if lamp has a lower energy than compound's ionization potential. Humidity dependence. Interferences from AC or DC lines and high-voltage radios and transmitters.	Does not respond to inorganic gases and vapors. Very low humidity dependence. Hydrogen gas required for operation. Presence of methane will give higher readings.
Calibration Gas	Isobutylene	Methane
Ease of Operation	Fairly easy to use and interpret.	Fairly easy to use; some problems may occur with flame remaining lit.
Detection Limits	0.1 ppm (Isobutylene)	0.1 ppm (Methane)
Response Time	3 seconds for 90% of total concentration.	2-3 seconds (survey mode)
Maintenance	Clean UV lamp frequently. Check calibration regularly. Recharge battery after each use.	Periodically clean and inspect particle filters, valve rings, burner chamber. Check calibration and pumping system for leaks. Recharge battery after each use.
Useful Range	0-2,000 ppm	0-1,000 ppm




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Flame Ionization Detectors. Instruments that use an FID tend to be slightly more complex than those with a PID. The FID has the added complication of requiring hydrogen to keep the flame burning. This hydrogen fuel is supplied to the detector via a small cylinder, which requires periodic refilling. This limits the portability of the instrument. Also, since the flame is not visible, care must be taken to ensure that the flame remains lit throughout the sampling time. False negative readings could be obtained if monitoring is performed while the flame is out.

The FID is not greatly affected by changes in relative humidity, which makes instruments using this type of detector more consistent than instruments using a PID in changing field conditions. Also, the FID has a relatively universal organic compound response with approximately the same sensitivity for all of the detected compounds.

The main disadvantage of these instruments is related to the universal detection. The FID creates sufficient energy to ionize methane. Since only total organics are measured, a high concentration of naturally occurring methane can bias the readings. There are methods to compensate for this bias, but they require more expensive instrumentation and technical expertise.

There have also been attempts to attach charcoal filters to the probes to try to measure only methane and ethane. With this information, a correction factor could be determined to apply to the readings in an attempt to get more meaningful results. This technique has shown only limited success in the field and would require frequent checks to update the determined correction factors due to ever-changing field conditions.

Field Test

A comparison of OVA readings and laboratory-analyzed samples from the same material was made with readings and results obtained from various industrial sites in New York state. The OVA readings were obtained either at the surface of freshly excavated soil or from "within" the soil. The latter readings were taken by creating a small tunnel in the soil and inserting the probe of the OVA past the surface of the soil while being careful not to clog the probe, thus inhibiting sample collection.

Little if any correlation was found between the actual analytical obtained and the field OVA readings. The information obtained from field readings is important, but the discrepancies could involve the

presence of methane. Methane is not routinely included in a soil analysis by gas chromatography/mass spectrometry, and was therefore not included in the total volatile organic concentration for samples analyzed using that method.

Conclusions

The OVA is a useful tool for health and safety monitoring and can provide beneficial information on possible "hot spots" of contamination when used as a screening instrument. The problems seem to arise

when data interpreters put too much credibility in the results obtained when using the instruments as a screening tool.

Experienced operators should be involved in the solution process before selections are made. These operators will be able to foresee problems that could lead to nonproductive time spent in the field and to the collection of nonuseable data. **EP**

Michael J. Capacci is a senior project chemist and Mark S. Wilcove is a project geologist with IT Corp., Rochester, N.Y.

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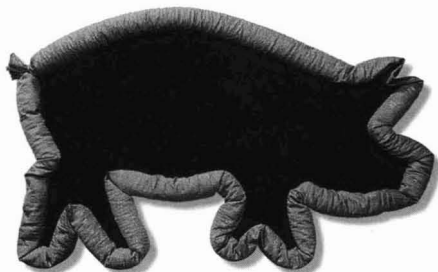
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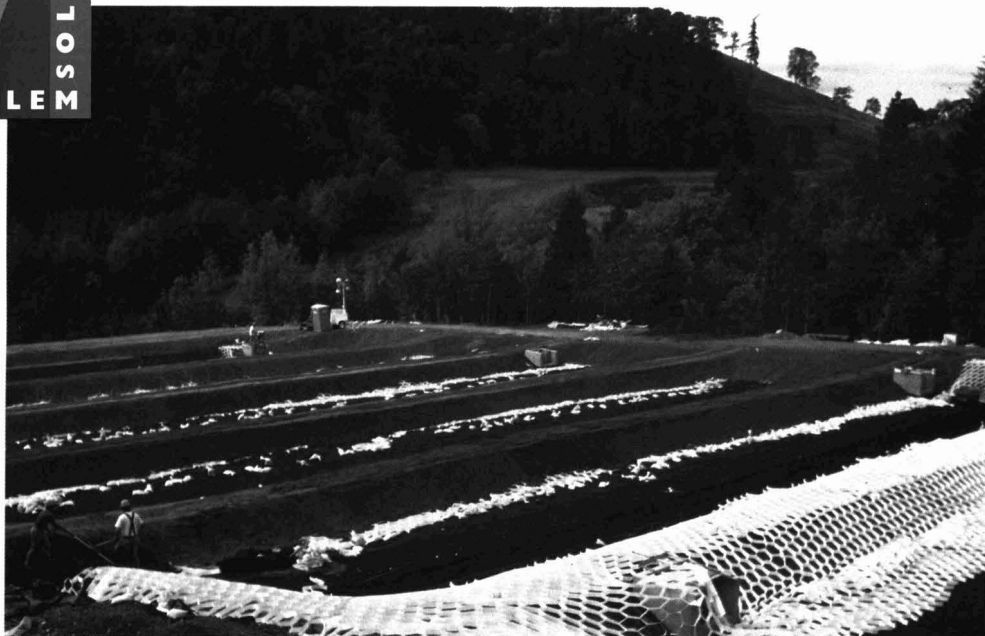


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Wetlands vegetation in eight terraced ponds will purify leachate at Roseburg, Ore.

Cattails Treat Leachate and Save Thousands

Oregon's wetlands benefit from a leachate treatment system that uses the wetlands' own vegetation.

By Ellen Carnevale

Wetlands vegetation such as bulrushes and cattails carry the lion's share of the purification workload

in the only leachate treatment system of its kind in Oregon, and one of only a few nationwide. The system pumps landfill leachate through a series of eight ponds ranging from 130 to 200 feet in length, each one about 18 inches deep. The ponds are terraced on a 10:1 slope with 2:1 side slopes and a variety of wetlands vegetation, planted in each pond, acting as a filter for raw leachate. This design allows plants to be fertilized and leachate detoxified before entering the watershed.

Larry Spielbusch, design engineer with the Douglas County (Ore.) Public Works Department, said Armater, an erosion con-

trol material, was chosen to protect the 60 mm plastic liner that will line the ponds, and to secure the 4-inch layer of soil that will hold side slope vegetation.

Spielbusch said much faith has been invested in the new system since it will not be replaced by more conventional systems. The wetlands process was selected after Douglas County officials submitted a leachate treatment plan to the Oregon Department of Environmental Quality. The county's study found the wetlands system to be a viable and cost-effective alternative for the Roseburg landfill. Pumping leachate to a public treatment plant would have represented an annual cost of \$500,000, which is the approximate one-time cost of the wetlands facility construction.

"This is being done in lieu of a package treatment plant, or publicly owned treatment works," Spielbusch said. "It's cheaper in the long run because you won't have



Akzo Nobel Geosynthetics

*A geomembrane
liner and a layer
of Armater will
protect the
leachate ponds.*

a wastewater treatment facility since you're using a natural process."

The county is monitoring leachate quality as well as the health of the plants that detoxify the wastewater runoff. While modifications may be needed over time as leachate volume and strength varies, Spielbusch said the basic design will remain.

"We're banking on having this system be a part of any additional treatment process that may be required due to a change in our leachate quality in the future," he said, adding that the new system should be relatively easy to maintain.

Engineer Buff Winn, with the firm of Emcon Northwest, in Portland, Ore., designed the Roseburg facility. Two leachate treatment systems in New York use this technology, which was developed at Cornell University, though "there's nothing specifically like this in Oregon," he said.

Erosion control is crucial around the terraced ponds. A three-dimensional, semi-rigid geocell containment system was constructed from a permeable nonwoven

polyester fabric. It can be filled with sand, clay, gravel or other aggregates to assure stabilization. "We selected a geocell containment system because we have some steep side slopes for the ponds and we

***This method of installation eliminates
the need for any penetration of the
liner within the pond basins.***

needed something that would protect the liner," said Winn, who specified the product. "I'm really sold on using geosynthetic erosion control products." Erosion Control Systems supplied the 10,400 square yards of geocell specified by Emcon Northwest.

"The Armater panels will be installed to permanently hold a minimum of four inches of soil over a lined surface," said Mike Anson, construction products representative with Erosion Control Systems. "The product must not require any penetration

of the liner. The panels must be permanent, and the material must allow water to flow through it. It is the only product we know of that meets all three criteria."

Anson said the panels will be joined and anchored at the upper perimeter of each pond, which are separated by 6-foot soil berms. This method eliminates the need for any penetration of the liner within the pond basins.

No state or federal grant money has been sought for the project, which is being paid out of the Douglas County general fund. "It's not been done on

this scale before, but the consultants are enthused about it and I think the ODEQ [Oregon Department of Environmental Quality] is enthused," Spielbusch said. "They have been very cooperative." **EP**

Ellen Carnevale is editor of Environmental Protection.

Armater erosion control system is produced by Akzo Nobel Geosynthetics. Circle 111 for more information.

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pH Neutralization Systems...

with examples cutting across many industries, this article describes pH Neutralization Systems, not just pumps. The systems include the tank, sump pump, valve, piping, controls and instruments.

Oil Recovery...

to be prepared for a range of oil spills, response organizations must have an arsenal of powerful and adaptable equipment. The Lundin Oil Recovery Inc. skimming system is featured, and the story highlights the clean up effort for a spill on the Delaware River.

In-Situ Remediation...

in the integration approach presented in this article, a sequence of processes has been used successfully as an individual remediation process in its own right. Furthermore, the range of contaminants that can be treated is extended.

VOC Emissions...

with the number of VOC technologies available, the environmental professional may have a difficult task choosing the most strategic environmental solution. This article describes different incineration technologies and details the technical selection factors.

Low Flow Purging of Monitoring Wells...

the low flow purging approach can effectively reduce the volume of contaminated water generated during purging and the time spent performing the task by purging at low flow rate, only ground water that enters through the well screen is purged from the well.

Air Pollution Control Technology...

a balance of both pollution prevention and pollution control technologies is necessary for clean air and a healthy economy. As with all environmental policy, a holistic approach is important.

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New Cost Recovery Cases

AS ANYONE WHO HAS BEEN INVOLVED in an environmental cost recovery case over the last few years can attest, the owner of a contaminated facility can spend large amounts of time and money in an effort to recover environmental cleanup costs from other responsible parties. Frequently, the desired recovery is not obtained because of the statutory "roadblocks" imposed upon private parties under the Superfund law. On the other side, a company involved as a defendant in a contribution action can spend an equal amount in attorneys' and consultants' fees to sort through the liability scheme to determine whether it is responsible for any payment at all, and if so, how much and to whom.

The Superfund law was enacted to permit both governmental agencies and private parties to recover the cost of cleaning up a contaminated site. In order to limit the number of sites eligible for reimbursement from the Superfund, and to otherwise limit to some extent the exposure of responsible parties for cleanup expenses, a number of procedural requirements were built into the statute to limit recovery whenever these requirements are not met. Exemptions from liability also exist. For example, costs to clean up petroleum products are not recoverable under the Superfund law. Because many uncertainties are involved in bringing an action under the Superfund law, attorneys representing parties seeking reimbursement of cleanup costs have begun to use other grounds to bring their lawsuits, grounds that do not involve the complexities of the Superfund law.

There have been a number of recent cases where parties have sought recovery under the Resource Conservation and Recovery Act for cleanup costs. Although Congress intended private parties to recover cleanup costs from others under the Superfund law, no such so-called "private right of action" was written into RCRA. This is because RCRA was not seen as a "contribution" type of law. When RCRA was enacted into law, its purpose was to prevent the creation of hazardous waste sites rather than to promote the cleanup of existing sites. But RCRA regulates the disposal of petroleum products as a hazardous waste and therefore is applicable to regulate a wider number of contaminated

sites than the Superfund law. Under RCRA, the government can order parties to take actions necessary to further the purposes of the statute, which can involve cleaning up the hazardous wastes that were disposed of at the site. It is therefore not unusual for a company that is a RCRA disposal site to receive an order from a governmental agency issued under RCRA to clean up the hazardous wastes that were disposed of at the site, even if the wastes contain petroleum.

By stretching the intent of RCRA, a number of federal district courts in recent years have allowed private parties to bring suits under RCRA against other responsible parties to force them to pay for or at least contribute to the cost of the cleanup. By bringing the suits under RCRA instead of the Superfund, the parties do not have to meet the rigorous procedural and other requirements of the Superfund, and they can recover cleanup costs from the other parties even where the waste involved is a petroleum product.

In March of this year, the 9th U.S. Circuit Court of Appeals in California allowed a company that had acquired a former gasoline station to bring an action under RCRA against the prior owner of the station to recover the cost of cleaning up the contaminated soil from the site. In August, the 8th U.S. Circuit Court of Appeals in Missouri disagreed, holding that remedies under RCRA are limited, and dismissed the lawsuit that had been brought against the prior owner and tenant to recover the cost of cleaning up petroleum-contaminated soil.

The practical impact of this split in the courts means that remedies for cost recovery are now broader if the suit is brought in California than if it is brought in Missouri, and that, for the time being, courts in other parts of the country may follow one or the other of these decisions. This will lead to confusion for companies and their lawyers, particularly those who operate on a nationwide basis, as to their choice of remedies if they intend to bring a cost recovery action. **EP**

Carol R. Boman, founding principal of the San Francisco Law Offices of Carol R. Boman, specializes in regulatory issues affecting real estate and business owners. An active member of the American Bar Association, Boman serves as co-chair of the Annual Conference on Environmental Law.

**Superfund and RCRA
are both involved in
cleanup costs.**

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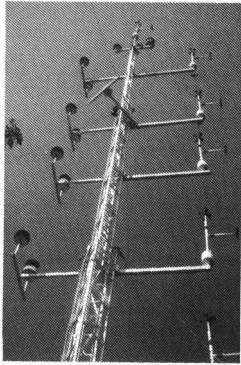
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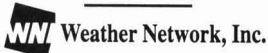
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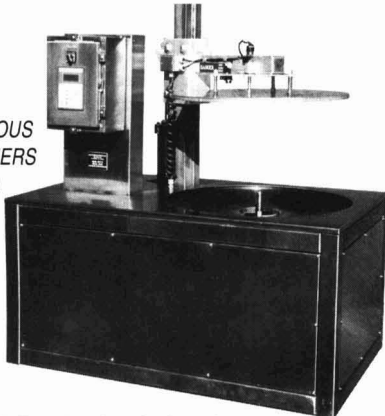
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The Elements of Training

CREATING AN EFFECTIVE EHS TRAINING presentation, whether for regulatory-driven required training or for nonrequired training, is similar to preparing a gourmet meal. There are numerous courses, each having individual ingredients and a sequence of preparation. This article identifies seven elements involved in developing EHS training, as well as the steps within the elements required to prepare a full and satisfying experience, not only for those who create the materials but for those who partake of them as well.

Following this sequence of seven steps will make your regulatory-driven training more effective.

Conducting a Training Needs Analysis

The most common forms of EHS training are those dealing with the technical issues presented by various federal, state and local regulatory requirements. Virtually all training results from some causal factor identifying a need for training; in this case, it is the regulatory statutes. While statutes or regulations may identify that training must be conducted, they rarely provide the specificity needed to design and implement the program. This is left to the trainer's ingenuity and resources.

Mandated or not, all training requires an in-depth needs analysis. This involves examining why training is needed, the subject of the training, and how the training will be delivered. The analysis phase of training looks closely at participant *knowledge, skills and abilities*. Most regulatory-driven programs outline what must be covered in training, but the outline usually is generic. EHS trainers should keep these requirements in mind, but they should not be the basis for the needs assessment. Rather, the trainer must look at the needs of the organization and participants.

The trainer begins by asking questions such as these: What is the existing knowledge level of participants? What skills are required to perform the required tasks safely and correctly? What decision-making abilities must the participants possess, and how does this all interact with the organization's culture and management's goals? Each of these items entails close examination not just by the trainer but by members of

management, safety committee members, trainees and other responsible parties within the organization.

Having identified these components, the trainer must further analyze each piece in terms of what participants must know, need to know and would like to know. This helps pinpoint where emphasis should be placed in the program design and aids in the training format selection. Analysis can be done in various ways. New employees can take a skills test for the specific skills required. This is sometimes referred to as pretesting. The pretest can also be used after training as a posttest. Pretesting helps identify trainees' current level of knowledge and helps determine the starting level for training. To identify the overall levels of awareness, surveys can be conducted either individually or in groups. Based upon the survey results, the trainer may then place additional emphasis on those areas where awareness appears to be weakest, therefore avoiding the common trap of treating all persons as having the same level of awareness.

The final outcome of the training needs analysis is the establishment of specific and measurable training objectives. Consider the following statement: "Following the completion of training, participants will understand RCRA." Sounds simple enough, doesn't it? What it doesn't tell you is to what extent the participants will understand RCRA. A more effective and measurable means of stating this objective would be to say, "Following the completion of training, participants will be able to explain the history of the Resource Conservation Recovery Act (RCRA); be able to identify the key elements within RCRA waste handling requirements; and be able to correctly answer 20 written questions pertaining to RCRA with at least an 85 percent success rate." These statements are specific and measurable, and set the tone for establishing the overall training design and format.

Creating a Training Design

Based on the needs analysis and training objectives, the trainer next designs the program. Even an off-the-shelf training program requires customization. Whether purchased or designed in-house, the training design must address the identified learning objectives. At the same time, if the trainer is truly interested in developing the

participants, the design will accommodate individual learning styles. Some individuals learn best through observation, others by listening and some by doing. Still others learn best through a combination of these approaches.

The trainer must consider what presentation styles will be effective. Based on the trainees involved, the best approach to achieving the training objectives may be to use a mixture of approaches, such as classroom lecture and small group interaction, media presentations, hands-on activities or some form of self-paced instruction.

There is little point in attempting to instruct participants on the importance and applications of RCRA if no hands-on training is provided. A classroom presentation may be used to explain the theory, but it doesn't prepare workers for the real-life experience of completing shipping manifests or conducting weekly waste accumulation site inspections.

Course Materials Design

Course materials need to catch the attention of participants. Materials need to be visually appealing and involve at least the participants' senses of hearing, sight and touch. Sometimes, it is not possible to create visually appealing materials, especially when dealing with some technical material. What can be done? First of all, handouts of technical documents or diagrams should be made from original documents, not from seventh-generation copies. If need be, make new originals.

Text must capture the trainee's interest and attention within the first few lines. Materials need to be written in an easy-to-read typeface, and all material should be gender-neutral. Keep one message to a page and arrange materials in an orderly and sequential fashion.

Use graphics or cartoons appropriately to emphasize key issues, but only use cartoons that are in good taste and related to the subject matter.

Using different techniques can help reduce some of the classroom boredom that accompanies recurrent training.

Presenting Material

In many training settings, the preferred presentation style involves some form of classroom activity. If you've ever sat through some of these sessions, you know just how boring a poorly designed and presented session can be. Take that into consideration in presenting your own material. Ask yourself: How can I involve participants in

what is being presented? In most instances, the trainees will be at least as knowledgeable as the trainer (if not more knowledgeable) in some aspect of the course. When training adults, think of yourself as a facilitator rather than a teacher.

One useful technique for refresher training is to have the participants break into smaller groups, and based on assigned topics, design the training themselves. Then let them present the material to their peers. Once they are finished, have them get additional information or feedback from the group. That leaves the trainer with simply having to fill in any blanks that the group left open. It eliminates lecturing, and involves the participants. This technique really doesn't take that much more time, and participants find it more stimulating than listening to the trainer saying the same thing for the 10th year in a row.

The presentation of material goes beyond just getting up in front of a group and talking. Room setup and rest break accommodations are important also. What format will best meet your needs? For large groups, it may be best to use a traditional classroom style; with others, a horseshoe arrangement of the tables may suffice.

Providing Reinforcement

The single biggest barrier to effective training is a lack of management and supervisory follow-up or reinforcement. If an organization is truly serious about its environmental and safety training effort, management and supervisory personnel will be heavily involved in all aspects. Before people attend training, they should know what they are expected to learn. Following the training, they should be asked to demonstrate what they have learned.

The reinforcement effort should begin as a part of the overall training design. By getting area managers and supervisors involved in the training analysis, using them as subject matter experts, and applying real-life situations based on actual operations events, management and supervisors will feel that they possess a much greater stake in the training program's success and application.

Tracking Training

We recommend a two-tiered approach for recordkeeping. One set of training records – the master – should be kept by the department responsible for conducting the training. A second set should be maintained at the operating department level. This second set also aids area management in identifying those who still need to attend

training. Clear and concise recordkeeping will eliminate many potential difficulties should the organization ever be subject to an audit by a regulatory agency.

Although we encourage a broad approach to training design, it is important that part of the curriculum description demonstrate how a course meets or exceeds regulatory requirements. This could be a very important issue during a regulatory agency audit.

Evaluating the Training Process

Training conducted simply for the sake of meeting regulatory requirements is a waste of time in many ways. There are just so many basics that can be reviewed on an annual basis. When the intent of training is to develop further the skills of the workers, trainers should pay close attention to the extent to which this objective has been met. As mentioned earlier, one means of identifying the degree of knowledge change is through posttesting. Another is through a behavior modification observation system. Using a BMOS, the trainer or area manager identifies critical behaviors and their performance on a sliding scale based on the degree of individual compliance. For example, the desired behavior for workers is to complete the hazardous waste shipping manifest within 10 minutes of receiving the material from the operating department. The ideal behavior is that this is always done within the 10-minute timeframe. This would score five points on the BMOS. Individuals who usually do so within 10 minutes would receive four points. The scale continues down to those persons who never perform the desired behavior – they receive zero points.

When more than one type of behavior is being considered, the BMOS becomes a useful tool for providing direct reinforcement. It provides for a specific behavioral measurement that can be used to demonstrate performance improvements; it also provides the basis for conducting further training with nonperformers.

By taking the time to build these factors into the training, training can add value and reinforce the corporate culture. **ED**

Carol Kefford Eshelman is a Certified Environmental Trainer and independent consultant in Baltimore, Md. Craig A. Woodacre is a Certified Environmental Trainer with Bristol-Myers Squibb at its Syracuse, N.Y. facility. Both are active members of the National Environmental Training Association.

Enforceable Agreements: Has Their Time Come?

IMAGINE THAT INSTEAD OF READING about a new rule after it has been proposed, you had an opportunity to work with EPA beforehand to fashion regulations.

That's part of the attraction of the enforceable consent agreement idea now being discussed by the agency and the cement kiln industry. Essentially, regulators and industry are working to come up with a document they can sign that would govern disposal of cement kiln dust.

EPA officials say it's too early to tell whether ECAs represent the wave of the future. But their potential extends beyond the cement kiln industry, especially when dealing with Resource Conservation and Recovery Act listing determinations. "With RCRA, we have a situation where we regulate or we don't," says EPA's Jim Berlow, referring to the listing decisions that put wastes in the Subtitle C (hazardous) or Subtitle D (nonhazardous) categories.

Berlow is acting director of the Office of Solid Waste's waste management division.

ECAs "might be a very useful tool for us," Berlow says. "In some cases the risks are such that the regulatory option is the appropriate option." But, he adds, "we have to be a little creative about how to do things smarter and cheaper. Maybe it won't work out. At least so far we've been encouraged about this particular process."

Discussions Continue

It is not a simple process. In fact, at this point there really is no "agreement," just a series of proposals from the American Portland Cement Alliance. And EPA has to figure out whether it has the authority to enter into an ECA, the concept of which was first broached in a proposal to list wastes from the production of certain dyes and pigments as hazardous.

"The agency is interested in innovative ways of conducting listing determinations that could assure environmental protection with less cost than full regulation as a hazardous waste," EPA said in its Dec. 22, 1994 proposal on dyes and pigments.

Discussing enforceable consent agreements, EPA continued, "A decision not to list [wastes as hazardous]

based on such enforceable agreements could be based on the view that management practices that are prohibited in an enforceable agreement are not 'plausible' because facilities within an industry covered by an [ECA] are unlikely to violate that agreement."

The dye and pigment industry has not come up with any ECA language, preferring instead to fight the proposal as it stands. But the cement kiln industry decided that an ECA might work, and drafted a document for EPA's review.

"We're trying to improve or refine the management standards to address EPA's concerns," says Andy O'Hare, vice president for environmental affairs at the American Portland Cement Alliance. "We're closing in on resolving most of those issues."

Those issues include management standards for the dust, such as lining for monofills, as well as public comment and judicial review requirements. The ECA also would specify penalties, but the enforcement aspects have not been worked out yet. "We haven't had any detailed discussions with the enforcement folks," O'Hare says, adding that the EPA-industry meetings are "discussions," not "negotiations."

"There's an important distinction," O'Hare says.

In fact, the two sides are farther apart than articles in the trade press make them appear, says Dave Lennett, counsel to the Environmental Defense Fund. Lennett, who has met with EPA a couple of times since the process began, says there should be open meetings to discuss the ECA that include all interested parties. He also says "there are serious questions" about whether EPA has the authority to sign off on an ECA.

EPA officials acknowledge that they're not sure yet where they will get the authority for the ECA. "There certainly are some questions about whether we have the authority to enter into such a contract with industry or whether our contract authority is limited to procuring goods," says Berlow. "Originally, the idea was that this would be a matter of straight contract law." Now, EPA is thinking more of using RCRA Section 7003, the imminent and substantial endangerment provision. But of the industry, Berlow says, "They would prefer not to acknowledge that there's substantial endangerment."

EPA hopes to have a notice out for comment by next spring. **EP**

While not a simple decision, discussions are continuing on EPA's authority for the ECA.

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Testo, Inc.

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Portable Decontamination System

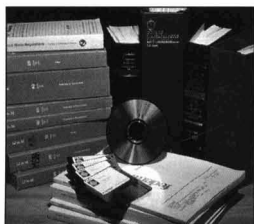
Exploration Products now has a portable Decon System for



temporary or semi-permanent field applications. It has a Series 8 Shop shelter, chemical impervious containment liner, and a variety of pumping/reclamation systems.

Exploration Products

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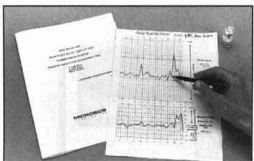


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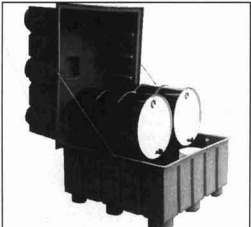


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Citation Publishing

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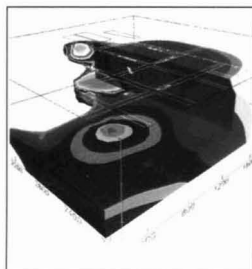
ceiling are R-30 insulated and two-hour fire related. The elevated grated floor over a built-in sump is strong enough for pallets to be packed in two high.

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Chemical Care Program

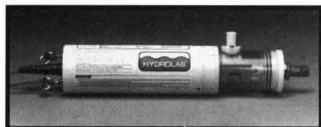
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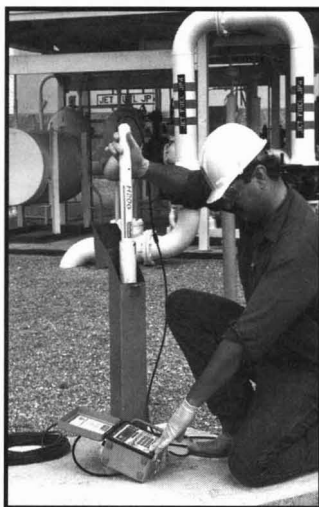
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Containment Pallets

Lab Safety Supply's SpillSkid containment pallets are now available in three newly designed sizes and platform materials. New sizes hold multiple drum configurations, and new platform materials in fiberglass and polyethylene are available in addition to the original, low-cost plywood platform. SpillSkid secondary containment pallets are chemically resistant and will withstand the elements when used for outdoor drum storage.

Lab Safety Supply Inc.

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Mine Safety Appliances has a new series of air-purifying respirator cartridges. The cartridges are designed to provide protection for workers exposed to multiple contaminants in industries such as agriculture, chemical/petrochemical, Haz-Mat, and pulp and paper. The GME Super Cartridge is NIOSH-approved specifically

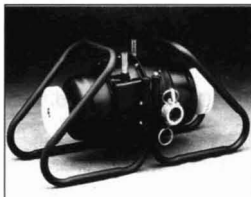
for 10 compounds. With the addition of a paint/pesticide prefilter, the GME Cartridge is also NIOSH-approved for paint, lacquers and enamels, pesticides, dusts, mists and fumes.

MSA

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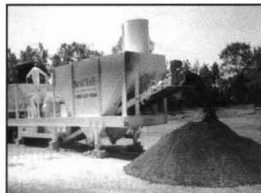
PE Photovac has introduced a miniature photoionization detector that weighs 1.75 pounds. The 20/20 I/S detects VOCs in air, groundwater and soil in Class I, Division I, and Groups A, B, C, and D hazardous loca-

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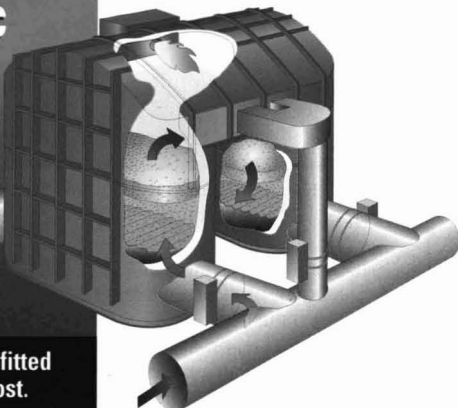
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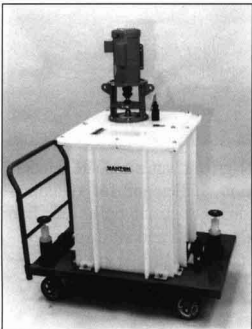
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companies cited and publications in which the articles appeared. **Vanton Pump and Equipment Corp.**

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Beco Engineering has a new two-stage flue gas treatment process, the "Alka/Sorb" process, that has demonstrated full compliance with stringent EU emission standards for dioxin and mercury emissions from medical waste incinerators. The process has been installed on several regional incinerator facilities in southern Britain. It uses a new approach that involves prevention of dioxin formation.

Beco Engineering Co.

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The Tank Trap provides instant containment for spill sit-

uations such as leaking saddle tanks, broken crossover lines, cargo damage, leaking drums and transformers. Expanding to 20 times its stored size, it requires no assembly, inflation or setup. Completely reusable, it is available in 50-, 100-, and 150-gallon capacities, and can be mounted outdoors or on the back of a truck cab with an operational molded hard case. **Andax Environmental Corp.**

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4. Issue Frequency Monthly		5. No. of Issues Published Annually 12		6. Annual Subscription Price \$46.00	
7. Complete Mailing Address of Known Office of Publication (Street, City, County, State, and ZIP+4) (Not Printer)					
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a. Total No. Copies (Net Press Run)	100599	97651
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g. Total Distribution (Sum of 15c and 15f)	96231	96041
h. Copies Not Distributed (1) Office Use, Leftovers, Spoiled	4368	1610
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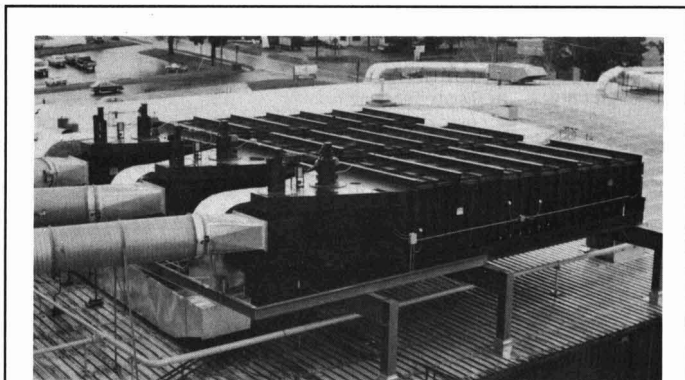
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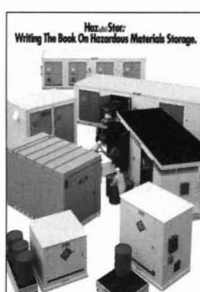
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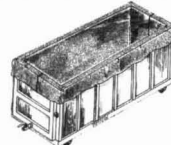
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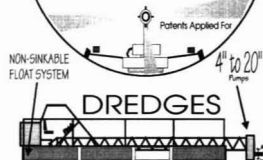


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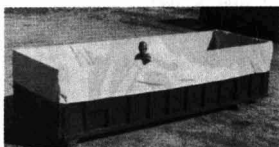
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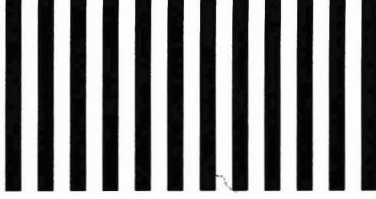
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