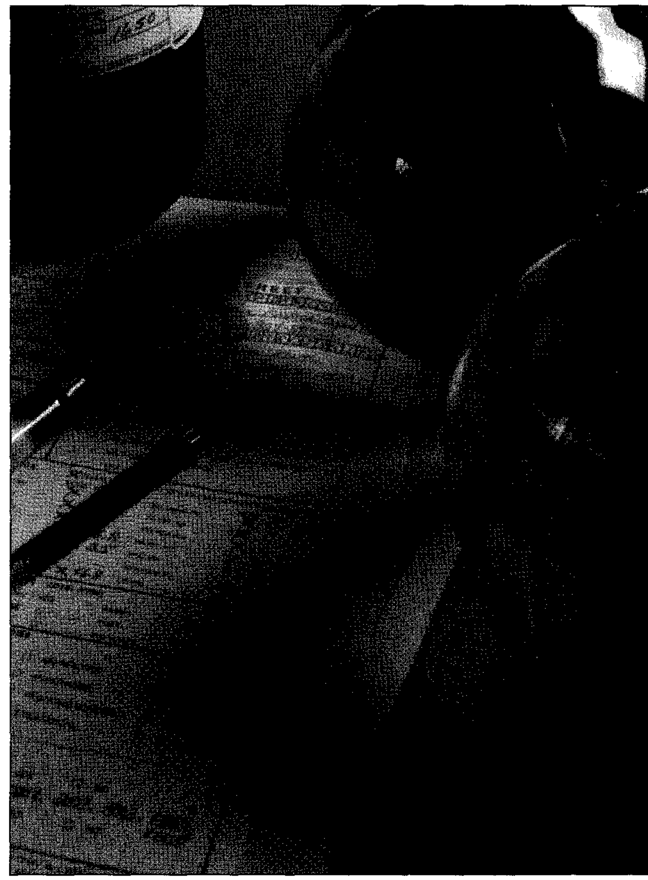
Tips For Keeping Lab Disposal Costs In Line



Courtesy Romic Environmental Technologies Corp.

Environmental testing laboratories face a growing problem of expensive hazardous waste management costs. Two professional organizations offer their regulatory advice and a few "tricks of the trade."

By James T. Dufour, JD, CIH, REA

As the environmental testing laboratory business becomes more competitive, there are growing pressures to minimize expenses — especially those devoted to "unproductive" activities — to improve the bottom line. This need to cut expenses is running headlong into the increasing costs of managing hazardous wastes generated by laboratories.

Ironically, the very factors that produced the laboratory boom of the 1980s, such as the growing concern for proper hazardous waste management and the regulations that ensure such practices, have become a major compliance problem for laboratories in the 1990s.

The problems of hazardous waste management also are due in part to the laboratory industry's success. As the size and visibility of laboratories increase, their potential to pollute cannot be overlooked by regulators. Furthermore, as individual laboratories grow, they exceed thresholds for Conditionally Exempt Small Quantity Generator (CESQG)[1] status under the Resource Conservation and Recovery Act (RCRA), and therefore must comply with the complicated and expensive requirements that have applied to their clients.

Given these regulatory pressures, labs must find cost-effective methods to address hazardous waste regulations and waste management. In many cases, this is difficult because hazardous waste regulations are not particularly appropriate to the laboratory environment and they often must be creatively interpreted, if not re-invented, for "real world" application.

Compliance with the hazardous waste regulations that govern identification, on-site handling, transportation and eventual off-site disposal has been a major effort for the typical business that generates routine hazardous waste streams as a result of its operations. Even when in compliance with regulations, these same businesses are likely to describe the economics of hazardous disposal as a nightmare, having discovered that hazardous waste disposal costs have jumped from an average of $40 per ton in 1980 to more than 10 times this amount in the 1990s.

Regulatory requirements such as the introduction of RCRA's toxicity characteristic leaching procedure (TCLP)[2], landfill disposal bans and associated treatment levels[3] and the volume of wastes subject to them have increased markedly.

In many respects, environmental laboratories have been the beneficiaries of the additional testing required. Many laboratories, especially the relatively small independent labs that perform the bulk of commercial hazardous waste testing, have escaped much of this regulatory pressure and expense.

continued on page 24

This is due primarily to the CESQG provisions that largely exempt from regulatory purview generators that produce less than 100 kilograms of hazardous waste per month. However, as the size of individual laboratories grows, the volume of hazardous wastes generated increases proportionately to the point where fewer laboratories enjoy CESQG status.

Another aspect of laboratory hazardous waste management that has helped labs avoid some of the disposal costs are the provisions that exclude from the definition of a hazardous waste many of the solvents used in extraction procedures.

These provisions generally allow the discharge of solvent-containing wastewater, which is exempt from regulation as a hazardous waste if the resulting concentration in the headworks of the sewage treatment plant does not exceed 1 part per million (in one provision) and 25 parts per million (in another provision), depending on the solvent and wastewater flow from the laboratory.[4] This exemption has permitted low-concentration solvent discharges from laboratories as a routine practice as long as the local sanitation authorities approve of, or are not aware of, the practice.

A problem arises when a sanitation district fails to meet its discharge limitations and enacts general discharge limits through an ordinance or begins to permit laboratories as industrial or commercial users. The result of any of these actions is a relatively low part-per-million total, or solvent specific, discharge limitation measured at the lab's entry into the sewer system. In these cases, the laboratory must either pretreat its wastewater or containerize what is likely to be a hazardous waste for off-site treatment or disposal.

Another significant contributor to the volume of hazardous wastes generated by laboratories is the TCLP testing that has the potential of classifying large volumes of expired sample wastes as hazardous wastes due to relatively low levels of toxic metal and organic compound constituents.[5] Laboratories that aggregate samples without regard to potentially high TCLP concentration samples may be generating a toxicity characteristic waste in significant quantities.

Finally, in some cases, a laboratory's clients may increase the amount of hazardous waste generated by demanding that its samples be disposed of as hazardous waste (irrespective of test results). This may appear prudent from the client's standpoint, but it places a heavy burden on a laboratory trying to cost-effectively manage its hazardous wastes and minimize its liability.

The concerns facing environmental testing laboratories on a national basis are not news to California laboratories that have coped with more stringent state requirements for more than a decade.

California has no small quantity generator exemption in its Health and Safety Code and Title 22 regulations[6] that set forth hazardous waste requirements. These regulations classify four times as many materials as hazardous wastes than the federal rules. The California list actually includes "laboratory wastes" as a state-listed hazardous waste.[7]

In other words, waste from a laboratory is presumed to be hazardous unless the generator can prove otherwise through testing or knowledge of the waste. In addition, since the mid-

1980s, California has had a rigorous toxicity characteristic test for both total and leachable toxic or persistent waste constituents.[8] These state hazardous waste regulatory provisions mean that more wastes are considered hazardous and no laboratory is exempt.

These factors have led to certain attitudes and practices by California labs that may be useful in shaping a national model for laboratory hazardous waste management. These aspects were documented through a survey of the Association of California Testing Laboratories (actLABS) members in June 1992:

- Many laboratories and their clients consider violations of hazardous waste regulations and liability for hazardous wastes as a major concern to their businesses.
- Some laboratories dispose of soil samples and even empty sample containers as hazardous wastes (in many cases through expensive out-of-state incineration) — just to be safe.
- Laboratories have been prosecuted for hazardous waste violations for sewer discharge of wastewaters containing extraction solvents. In some instances, these prosecutions were unwarranted given the RCRA regulatory exemption for solvent-containing wastewater discharges to sewers. Some labs pretreat wastewater to remove solvent contamination and to neutralize the discharge.
- Some labs have found extremely cost-effective treatment options, including services that offer fractional distillation technology to recycle solvent wastes.

Another interesting finding of the survey was that many laboratories (70 percent) considered hazardous waste testing services to be their most important business opportunity. These lab managers believe that expertise in hazardous waste management contributes to business development and the ability to offer value-added services.

In response to this information, the association has sponsored educational material, the *Hazardous Waste Management Practices Guide*, as a member service. actLABS' *Hazardous Waste Management Guide for California Laboratories*[9] was published in April 1993 and the American Council of Independent Laboratories' national manual based on EPA regulations is scheduled for publication in early 1994. These manuals interpret the hazardous waste regulations and apply them to laboratory operations. Based on input from laboratories, hazardous waste management experts and regulators, the manuals offer practical compliance tips and "tricks of the trade." Much of the information in the following discussion is excerpted from the actLABS guide.

Applicable regulations should be reviewed and lab owners are urged to consult with legal counsel prior to making compliance decisions.

Develop waste stream management profiles. This process involves identifying each routinely generated waste and documenting the relevant hazardous characteristics, labeling requirements, manifest information and cost-effective treatment disposal options. The actLABS guide includes a form for documenting this information and can double as training material for employees who handle hazardous wastes.

Establish a policy for client samples and understand the regulatory provisions for samples. Samples are not classified as hazardous wastes under RCRA until

continued on page 26

continued from page 25

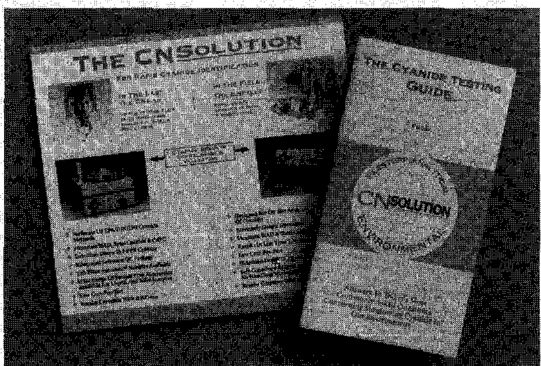
either the client or the laboratory determines that they have no further useful purpose and are to be discarded.[10] At this point, like all other wastes, expired samples must be characterized and then properly managed if determined to be hazardous. Prior to this point, the laboratory has several options, including returning samples to the client and holding samples for a period of time established for the client's or the laboratory's convenience. These procedures should be developed with cost-effective waste management as an objective.

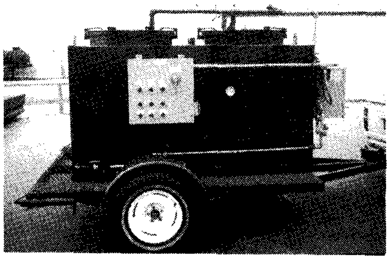
Devise a characterization procedure for "unknowns" such as expired client samples. Given the relatively new toxicity characteristic, lab owners need to assure themselves that expired samples being disposed of as non-hazardous do not exceed the TCLP method regulatory limits and any other hazardous waste characteristic. The large volume of such samples and the need to aggregate them for practical storage and handling dictates the need for a reasonably reliable characterization procedure. The procedure may involve segregation of samples with known TCLP results, in particular, keeping samples with high TCLP results separate from other samples, and a representative sampling protocol for drums of aggregated waste samples.

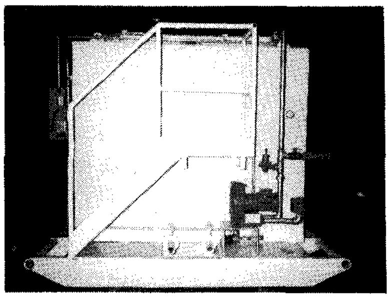
Sewer disposal should be carefully reviewed. Labs that take advantage of the exemption from the definition of hazardous waste for low-concentration discharge of extraction solvents in wastewater need to clearly understand the specific applicability of this relief to the laboratory and sewer system in question. The laboratory should be aware that the solvent discharge provision does not exempt pH levels that would characterize the wastewater as hazardous (less than 2.0 and greater than 12.5) and that sanitation districts usually set pH limits for discharges in the range of 6.0 to 10.0. Also, metals and other constituents may be regulated. Therefore, the requirements of the local sanitation district must be identified and complied with or special permitting requested.

An empty container procedure should be established. Laboratories generate a large number of empty containers. These include reagent bottles, sample containers and other glassware or plastic vessels. As long as empty containers satisfy the regulatory definition of "empty," they will not be considered hazardous wastes.[11] (This is true even in California, although the state has a specific provision in its regulations that governs the management of empty containers.) They should be prudently disposed of as non-hazardous solid waste. A documented procedure will ensure understanding and consistent practice with respect to empty containers.

Apply the "satellite accumulation rule" to extend storage times. Although not designed with laboratories in mind, RCRA's satellite accumulation rule, which generally allows storage of small quantities of hazardous wastes to be extended for up to one year, is very appropriate to the laboratory environment.[12] For example, if the laboratory is







small enough, its hazardous waste storage area is arguably a satellite accumulation point. For larger labs, each room may be a separate satellite accumulation point.

In this way, a laboratory can store more wastes longer and improve the efficiency of hazardous waste management as most service firms charge a premium for small loads. The laboratory must assure that the technical requirements for satellite storage are satisfied, including limiting the volume to 55 gallons of each waste at each accumulation point, and assuring that the wastes are at or near the point of generation and under control of the person whose processes generate the waste. RCRA regulations generally allow longer on-site storage of hazardous waste than California's strict 90-day rule, but the satellite rule is even more generous.

Investigate waste minimization, recovery, treatment and disposal options. One of the striking observations about hazardous waste management is that the generator that finds it must pay unusually high disposal costs finds a way to minimize or eliminate the wastes generated or a cost-effective treatment or disposal method. California laboratories have found on-site recycling of extraction solvents to be extremely beneficial, saving both material costs and disposal expenses. The need for cost-effective treatment and an interest in environmentally productive solutions has increased demands for technologies, such as fractional distillation, to recover usable solvents from spent mixtures and even solvent-containing wastewater.

One firm that serves many northern California labs uses this advanced treatment technology. Prices are based on the ratio of usable solvent that can be recovered from the waste. In cases where incineration is the appropriate method of treatment, consideration of cement kilning for materials with high BTU content often offers a significant cost saving over thermal incineration. This may not be true if the regional incinerator needs the business, which means that treatment costs may be negotiable.

The key to taking advantage of these "tricks of the trade" for hazardous waste management is knowledge: knowledge of the regulations that apply to the laboratory's waste and waste management practices and technical knowledge of the waste itself. Laboratories are in a unique position to be models of cost-effective hazardous waste management given their expertise in chemistry and their in-house testing capability.

The *Hazardous Waste Management Guide for California Laboratories* and its federal counterpart (soon to be published) provide laboratories with the regulatory information and an approach to effectively apply technical data to better manage laboratory hazardous wastes.

The objectives of these associations in sponsoring the publications include: first, to provide a member service; second, to contribute to environmentally sound hazardous waste management knowledge from the unique perspective of environmental testing labs; and third, to raise revenues to support these organizations' educational and government relations programs.

It is expected that high school chemistry labs to major university and government research centers will benefit from the information developed by commercial environmental testing labs that have faced the difficult task of complying with complex regulations while protecting the bottom line. EP

References

1. 40 CFR 261.5.
2. 40 CFR 261.24.
3. 40 CFR 268, generally.
4. 40 CFR 261.3(a)(2).
5. 40 CFR 261.24.
6. California Health & Safety Code, 25100 et seq. and 22 California Code of Regulation (CCR) 66261 et seq.
7. 22 CCR 66261 Appendix X.
8. 22 CCR 66261.24(a).
9. Hazardous Waste Management Guide for California Laboratories, April 1993, published by the Dufour Group, sponsored by actLABS. Available from the Dufour Group, 819 F. St., Sacramento, CA 95814, (916) 553-3111, $195.95.
10. 40 CFR 261.4(d).
11. 40 CFR 261.7, 22 CCR 66261.7 (CA).
12. 40 CFR 262.34(c).

James Dufour serves as The Association of California Testing Laboratories regulatory and legislative council and author of its Hazardous Waste Management Guide. He is an environmental attorney, certified industrial hygienist and registered environmental assessor. Dufour has more than 20 years experience in government and chemical industry regulatory compliance and consulting in environmental and OSHA law and government relations. His firm, The Dufour Group, includes a law firm, Dufour & Associates and a consulting business, Dufour Environmental & Resource Management. Both are based in Sacramento, Calif.

Ted Brewster is director of remediation with Texas Energy and Environmental Inc. in Houston, Texas. Dr. Robert Ellsworth, an independent consultant in Plainview, Texas, assisted with this article.

Probiotics Enhance Remediation Efforts

By performing feasibility studies and maintaining precise standards, probiological technology can be used to clean up soil and aquatic environments.

By Ted Brewster

Probiological remediation technology (PRT) is emerging in the environmental industry with fervent vigor. Its applications are far reaching and offer an affordable means to combat many forms of pollution in soil and water.

This new method of cleanup uses beneficial organic compounds and nutrients that promote the detoxification and repair of troubled environments through biological and abiological means. The science is not fully understood, but is fast becoming a recognized remediation source.

Beneficial Biology

The technology was first named "probiotic" or "probiological agriculture" by an organic fertilizer firm in California during the early 1970s. Probiological is the opposite of anti-biological. Instead of fighting or destroying a biological system, probiological compounds and techniques are used to increase, develop, support and sustain beneficial biological systems to correct problems associated with damaged environments.

Dr. William A. Albrecht, chairman of the department of soils at the University of Missouri College of Agriculture, began research in the area in 1918.[1] PRT was not commonly used by the agricultural industry between 1950 and the mid-1980s because of the rush to produce chemical fertilizers, pesticides and insecticides. Due in part to more than 30 years of petrochemical use and poor farming practices, the agricultural industry is faced with severe soil problems, such as increased erosion, runoff, pesticide and insecticide contamination.

Up until the past few years, science and technology have not readily supported the practice of using probiological techniques even though extensive field studies demonstrated the techniques worked in their respected areas.

A strong factor in the lack of research is insufficient funding to support the science of probiotics. Billions of dollars have been spent to study chemical fertilizers while there is little available for biological research. Agricultural universities in the past have been reluctant to accept organic technologies. Recent advances in analytical science have helped to explain how organic compounds relate and benefit the environment by their unique configurations. The push for bioremediation technology has caused the university system to expand the study of this science.

Most of the environmental organic and microbiological research studies have been completed by the European scientific community. The sphere of organic chemistry and microbiology are predominantly unknown worlds with millions of compounds and organisms yet to be discovered. However, there is a growing mass of technology explaining some of the more simple reactions associated in the realm of the two sciences.

Remediation Applications

Over the last 20 years, probiological technologies have been applied successfully in the cleanup of wastewater treatment facilities; farm waste lagoons; petroleum contamination of soils; pesticide damaged crops and soils; pentachlorophenyl and polychlorinated biphenyl contamination; and arsenic, nitrates, sulfates, polyaromatic hydrocarbons and halogen-based chemicals. In addition, probiotics are being used to correct nutrient deficiencies in crops and livestock, as well as metal contamination and other chemical problems.

PRT projects in the wastewater industry have been highly successful. Studies conducted at a