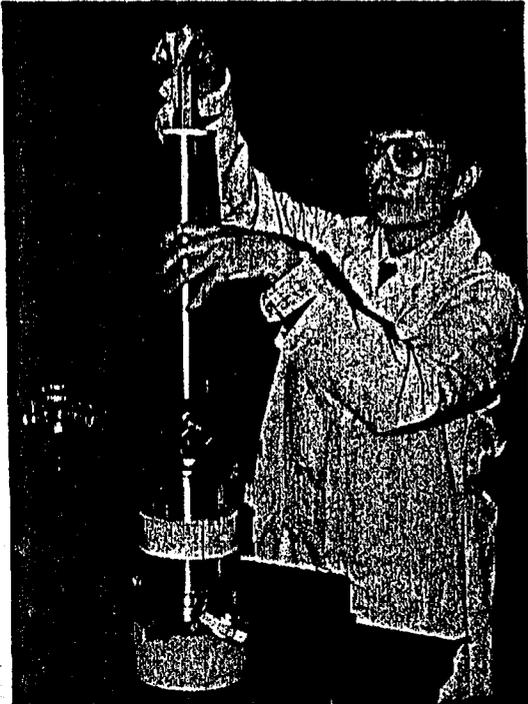


Chas. Hillace  
12/2/90

# Revised Toxicity Characteristics



Steven Ferguson/Associated Design & Manufacturing Co.

*Updated toxicity characteristics carry potentially significant implications for industries and laboratories as EPA expands its definition of hazardous waste*

By Kimberly A. Roy

Technician loads extractor fluid into a zero-headspace extractor.

**E**PA recently promulgated revised toxicity characteristics (TC), adopting the Toxicity Characteristic Leaching Procedure (TCLP) and adding 25 organics to the list of chemicals regulated under RCRA. The revisions also establish regulatory levels for the organics, using health-based concentration thresholds and a dilution/attenuation factor (DAF) generated by a groundwater fate and transport model.

EPA Administrator William K. Reilly signed the revisions March 5 (*55 Fed. Reg., No. 61, March 29, 1990, pp. 11798-11877*) — almost four years after the Agency's initial proposal in June 1986. The revisions, experts say, have significant implications for generators and laboratories alike.

Generators, many previously unregulated under RCRA, must test solid waste and wastewater suspected of containing any of the 25 organics, as well as 14 toxic constituents already regulated (eight metals, four pesticides and two herbicides). To determine whether a waste contains any of these chemicals, generators must perform the newly mandated TCLP, which replaces the Extraction Procedure (EP) leach test.

Large-quantity generators, those producing more than 1,000 kilograms of hazardous waste per month, must comply with the new rule by Sept. 29; small-

quantity generators (SQGs) producing between 100 kilograms and 1,000 kilograms per month must comply by March 29, 1991.

After the effective dates, currently unregulated facilities that generate any of the newly regulated wastes must obtain a hazardous waste generator identification number and comply with all RCRA Subtitle C requirements. For example, facilities planning to treat or store any of these wastes for more than 90 days, or manage them in surface impoundments or other land-based management units, must obtain interim status and a Part B permit. These facilities also are subject to groundwater monitoring requirements, minimum technology requirements within four years, closure and post-closure requirements, and land disposal restrictions.

"The 1984 amendments to RCRA (HSWA) require EPA to promulgate land disposal restrictions for any newly identified hazardous wastes within six months," notes Janet Matey, senior scientist at Radian Corp. (Austin, Texas). At press time, however, the Agency had not specified land disposal treatment standards for TC wastes.

The rule's biggest impact will be on surface impoundments, Matey predicts. As a result, "we'll see a lot more treatment," because the surface impoundments will be replaced by above-ground

storage tanks," she adds.

The rule also may affect wastewater mixtures companies previously discharged to publicly owned treatment works (POTWs) or under National Pollution Discharge Elimination System (NPDES) permits, as well as Superfund cleanups, she says. Many Superfund sites contain the newly listed constituents, she adds.

According to EPA, the rule will regulate an additional 1.8 million metric tons of non-wastewaters and more than 700 million metric tons of wastewater, and affect 17,000 additional generators, but "that's probably a conservative estimate," says Christopher Bryant, regulatory analyst with Fox, Weinberg & Bennett (Washington, D.C.). EPA estimates 200 surface impoundments will be affected, a number disputed by several industry groups as too low. The Chemical Manufacturers Association (CMA; Washington, D.C.), for example, estimates that as many as 1,000 impoundments operated by the chemical industry will be affected, says Joseph Mayhew, CMA's director of environmental programs. EPA's underestimation of the number of impoundments affected makes its cost projections unrealistically low, he asserts.

Despite the fact that EPA responded to several of CMA's comments, the final rule will "still have a major impact on this

industry," Mayhew says. Some of the impoundments, he continues, are impossible to retrofit, so companies will have to move the waste to above-ground storage tanks or remove listed constituents before sending wastes to them.

Industry will pay between \$130 million and \$400 million to comply, and between \$90 million and \$130 million in social costs, according to EPA. (Social costs include such activities as re-training employees.) "It's really hard to say if that's an accurate number or not," Bryant says. "Historically, EPA has been pretty close. But the Agency lacks data on waste that previously was considered nonhazardous" and the industries generating it. Industry estimates of waste volume and compliance costs associated with the new rule generally are higher than the Agency's.

Industries EPA expects to be hit hardest include organic chemical manufacturers, petroleum refiners, pharmaceuticals, pulp and paper, synthetic rubber, miscellaneous petroleum and coal products, synthetic fibers and textile mills.

"We're still trying to sort out how it will affect us," says Pat Hill, director of water quality and waste disposal programs for

the American Paper Institute (API; New York). Although the association had not evaluated the rule's full implications at press time, "we're not as impacted as we first thought in 1986," Hill says. Many more companies would have been affected by the 1986 proposal, she continues, but the final rule includes a higher regulatory level for chloroform and changes in the test model that make it "less traumatic." According to EPA, 36 mills will be affected by the final rule, Hill relates, but "at this point, we don't know which ones."

For the paper industry, surface impoundments at many facilities pose the biggest potential problems, Hill says. These impoundments often cover hundreds of acres, she explains, and it would be costly to transfer contents to above-ground storage tanks.

A representative from the American Petroleum Institute (API; Washington, D.C.) could not be reached for comment, but a statement issued March 9 states, "The API is disappointed to see that the EPA has elected to use extreme scientific assumptions to define a hazardous waste.

"As we previously commented to the

**Toxicants and Regulatory Levels (mg/L)**

Benzene	0.5
Carbon tetrachloride	1.0
Chlordane	0.03
Chlorobenzene	100.0
Chloroform	6.0
o-Cresol	200.0
m-Cresol	200.0
p-Cresol	200.0
1,4-Dichlorobenzene	7.5
1,2-Dichloroethane	0.5
1,1-Dichloroethylene	0.7
2,4-Dinitrotoluene	0.13
Heptachlor (and its hydroxide)	0.008
Hexachlorobenzene	0.13
Hexachlorobutadiene	0.5
Hexachloroethane	3.0
Methyl Ethyl Ketone	200.0
Nitrobenzene	2.0
Pentachlorophenol	100.00
Pyridine	5.0
Tetrachloroethylene	0.7
Trichloroethylene	0.5
2,4,5-Trichlorophenol	400.0
2,4,6-Trichlorophenol	2.0
Vinyl Chloride	0.2

# ENVIRONMENTAL PROFESSIONALS

No Cost To You —

*We Put People and Positions Together!!*

Seeking Virtually All Positions Including Air, Soil, Water, Waste Management, Hazardous Materials, Toxicology, Excavation, and Remedial Clean-Up.

**Tom Slippy**

Mid-Atlantic Power Services  
7808 Wildwood Drive  
Norfolk, Va. 23518  
(800) 476-7697

**Mark Juergensen**

Power & Electronics Personnel  
411 Camino Del Rio South, Ste 205  
San Diego, Ca. 92108  
(800) 227-8775

**Dick Berg**

Technical Careers of San Diego  
10150 Sorrento Valley Rd, Ste 314  
San Diego, Ca 92121  
(619) 458-1323

**Tom Charis**

Power Industry Personnel  
255 Route 12, Ste 201  
Groton, Ct. 06340-4268  
(800) 243-0812

**Dan Heagerty**

Power Services  
2175 Credit Union Ln, Ste 504  
North Charleston, SC 29418  
(800) 845-0436

**Cary Tobolka**

Technical Careers of Texas  
940 Providence Tower West LB5  
5001 Spring Valley Road  
Dallas, Texas 75244-3910  
(214) 991-9424

## REDUCE OZONE DESTROYING EMISSIONS

**40% GUARANTEED**

CFC / CHLORINATED SOLVENT REDUCTION  
..... SAVING TO 80%

**RETRO FIT CONVERSIONS**

ZER-R-COIL™ LOW TEMPERATURE NO DEFROST REFRIGERATION INSTALLED ON EXISTING VAPOR DEGREASERS REGARDLESS OF MANUFACTURE

**NEW DEGREASING EQUIPMENT**

DESIGNED WITH ZER-O-COIL™ / VAP-R-CAP™ VAR-R-TROL™ SOLVENT CONTROL SYSTEMS, EASE OF CHANGING TO NEXT GENERATION CHEMICALS

**SOLVENT RECOVERY STILLS**

EFFICIENT CONTINUOUS DISTILLATION WITH AUTOMATIC BLOW DOWN, MAXIMUM RECYCLING OF SOLVENTS

ENGINEERING SURVEY AVAILABLE



**ULTRONIX**  
RD2 BOX 100D  
COOPERSBURG PA 18036 215.965.8009

Circle No. 378 on Reader Service Card

# Think SAFE-T-WAY for hazardous chemical containment and storage

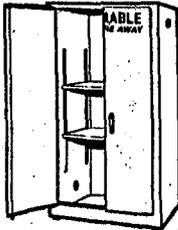
## SAFETY CANS



- Type I and Type II safety cans are unmatched for meeting FM and UL specifications
- One-hand pour control
- Exclusive patented fire combatant spray deflector cap
- Full-flow flash arrestor
- High-tech PRC<sup>®</sup> coating for superior solvent resistance

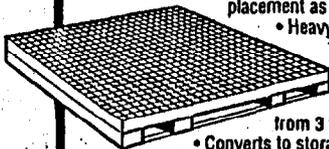
## STORAGE CABINETS

- Styles to store acids/corrosives, safety cans, drums or gas cylinders
- Hollow double wall or exclusive insulated double wall for maximum protection
- Chemical-resistant high-tech coating
- Meets fire codes



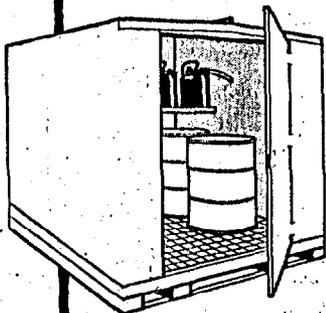
## CONTAINMENT PALLETS

- Pallet design allows easy portability for placement as needed
- Heavy-duty 10 gage structural sump
- Capacities from 3 to 26 drums
- Converts to storage building



## STORAGE BUILDINGS

- Storage for cans and drums
- Secondary containment sump catches spills
- Heavy-duty 10 gage structural sump and 12 gage walls for maximum security
- Chemical resistant high-tech coatings
- Capacities from 3 to 26 drums



Higher quality - lower cost  
EPA and safety products

**SAFE-T-WAY**  
MANUFACTURING, INC.

Rockton, IL 61072 • Canfield, OH 44406  
Toll-free: 1-800-222-2600 Ext. 245

EPA, such unrealistic assumptions greatly enlarge the universe of low-risk waste that must be managed as hazardous waste," the statement continues. "This is not beneficial to public health and is a waste of the EPA's and society's limited resources. The EPA's own analysis shows the regulation is estimated to cost society \$1 (billion) to \$4 billion for each theoretical cancer case averted, making it one of the most expensive regulations in American history with no overall benefit to public health."

**Objectives.** The new rule, according to EPA, is more than command and control — it provides incentives for waste minimization mandated as national policy in RCRA Sec. 1003(b). "By subjecting management of TC wastes to Subtitle C regulation, EPA is in effect requiring that waste managers rethink their practices for solid wastes that contain hazardous constituents," the Agency states in the final rule.

Radian's Matey says industry, specifically petroleum refiners, might never be able to reach standards for such chemicals as benzene, which she describes as "ubiquitous" in their facilities. As a waste minimization technique, therefore, the rule has more potential for industries that can segregate waste streams, rather than industries like petroleum refining, "where there are so many sources of benzene emissions."

Most industry representatives agree the rule will encourage waste minimization, but some question it as EPA's primary objective.

"Any time you take something non-hazardous and make it hazardous, there's an incentive not to generate as much of it," Bryant says. But "I don't think that (waste minimization) was EPA's primary goal. Congress told them to do it. I don't know if they would have done it otherwise."

Robert Newman, operations manager for Scott Environmental Services, Inc. (Plumsteadville, Pa.), agrees the new regulations will encourage waste minimization. More importantly, he says, "it is a preventive type of regulation designed to alleviate future Superfund sites." Newman's theory is widely held, and is supported in part by EPA's contention that annual compliance costs will be offset by a \$3.8 billion annual savings in cleanups for groundwater damage.

Whatever the Agency's motives, most people believe waste minimization will be one result and increased costs to industry a second outcome.

"TCLP will definitely increase testing costs," says Dan Scudder, facility assessment manager for RMT, Inc.'s (Madison, Wis.) Northern region. "In addition, TCLP will result in an increase in

the quantity of hazardous waste generated, which could cause treatment and disposal costs to rise. Generators also may incur increased costs resulting from higher demand for hazardous waste treatment and disposal services, he adds.

"It's also important for companies that had wastes on the borderline under EP-Toxicity to have their wastes tested, to make sure they do not go over the limits under TCLP," Scudder concludes.

For their part, laboratory representatives seem cautiously optimistic about the revisions. While some expect to see laboratory business increase significantly, others are more cautious. "I think it will be good for the labs," Bryant says, "but a lot of people are already using the TCLP because of the land bans" and state regulations. So, the rush might not be as great as expected. "After all," he says, "companies had almost four years to prepare."

"We're struggling to determine how to prepare for it ourselves," says Radian's Matey. "We're calling our clients to see what they think they'll need." Generally, she says, the company believes the work load will peak as companies strive to comply by the September deadline. Radian expects to see a significant short-term increase in workload over the next six months that will level off, she says.

The tests will not translate directly to massive profits, argue some, because they are labor-intensive, time-consuming and require specialized equipment. Enreco (Amarillo, Texas) laboratories are taking a cautious stand. "It's hard to tell if we will see a significant increase in workload, because a lot of companies have requested TCLP in anticipation of the final rule," says Frank Robinson, project engineer in the company's Technologies Group. "The land bans had more of an impact on lab business," he notes.

"A complete EP-Tox analysis might cost \$565 per sample, whereas a complete TCLP test costs about \$1,700," Robinson says. "However, many companies might not need to test for each constituent." Under the law, a generator need not test a waste for every constituent if the site history indicates, for example, that pesticides are not present.

Although cost estimates vary from laboratory to laboratory, most say the TCLP is 2½ to three times more expensive than the EP. The difference in price, says Scott Environmental's Newman, can be attributed to the TCLP's complexity, quality control and quality assurance measures dictated by EPA, the number of constituents for which the waste is tested, and specialized equipment

needed for testing volatile organic compounds (VOCs).

The specialized equipment Newman refers to are zero-headspace extractors, which prevent sample contamination, and cost between \$1,500 and \$2,000 apiece.

Newman says Scott purchased some zero-headspace extractors about a year ago. "I think a lot of labs are prepared," he says. "They knew it (the rule) would be passed, it was just a matter of when." Also, he notes, many states require the TCLP. To help perform extractions, Newman adds, Scott hired two employees, bringing its total number of laboratory technicians to eight.

Despite the lengthy lead time between proposal and promulgation, all laboratories do not envision a smooth transition to the new rule. "There will be a severe limitation on turnaround time for TCLP tests because of the number of different tests that must be run," says Mitch Rubenstein, organic laboratory supervisor for RMT. "In addition, because TCLP requires the use of more sophisticated testing equipment and takes longer to complete, the cost is considerably higher.

"There is going to be a very high demand placed on laboratories with the zero-headspace extractors that are needed to perform the volatiles testing," Rubenstein continues. "It could create a tremendous backlog at those facilities. Even though RMT has 13 zero-headspace extractors, there could be a waiting list for tests." These backlogs could create compliance problems, because many firms may not have test results prior to the deadline, he adds.

EPA's acceptance of the TCLP will have "a far-reaching implication," says James Menoutis, president of Analab, Inc. (Newark, N.J.). "The TCLP requires a lot more testing than EP-Toxicity. Whereas a full EP-Tox may run somewhere around \$250 to \$400, you're going to see TCLP work — assuming that you're going to do both zero-headspace volatiles, metals, pesticides and herbicides as well as the base-neutral and the acid extractables — run anywhere from \$900 to \$1,500 or \$2,000 a sample."

**Test procedures.** The EP-Toxicity test has been around since about 1982 for the purpose of simulating leaching of a waste disposed in a landfill.

To perform an EP-Toxicity test, technicians use an acetic acid extraction fluid with a pH around 5. After an extraction is performed, the samples are analyzed using appropriate EPA methods for eight metals, four pesticides and two herbicides. If any listed constituents are identified in concentrations above EPA's specified levels, the waste is considered

hazardous.

Test procedures for extraction in EP-Toxicity tests are not defined specifically in the regulations, which left some of the methodology open to interpretation, says J. Steven Gibson, manager of client services in Radian's chemistry division. The TCLP eliminates interpretation by stipulating exact procedures and test equipment, and also changes the extraction solution, he says. For example, his laboratory uses an automated stirring process for EP-Toxicity testing that

is not allowed under TCLP, he relates.

The TCLP adds two broad categories for testing — volatiles and semivolatiles. Now, technicians must perform two extractions — one for volatiles and one for all other constituents. VOCs, which evaporate easily, pose a unique problem. To eliminate misleading results, the TCLP mandates zero-headspace extractors to prevent sample contamination.

Under the TCLP, a buffer, which resists pH changes, replaces acetic acid

## Bioremediation is a controlled industrial process.

### When we're at the controls.

Controlling the microbial environment on a civil scale is the key to success in bioremediation. You simply can't get that level of control with construction or farming grade equipment. That's why we've invested millions to design, engineer and construct specialized soil conditioning equipment for bioremediation.

Our proprietary line of soil homogenizer/ mixer units conditions excavated soil at up to 70 cubic yards per hour. Our soil remixing units tackle our fully isolated bioreactor beds in SIX FOOT LIFTS, cutting a path up to 10 feet wide. Support equipment, all containerized, includes field labs, fermentation tanks, crew quarters, generators and anything else required to do the job efficiently and effectively.

**Don't risk losing control of your bioremediation project. Call us, today.**

**BIOREMEDIATION SERVICE, INC.**  
11200 Westhelmer Rd., Ste. 925  
Houston, Texas 77042  
Ph. (713) 789 2072  
Fax (713) 789 3360



**Delivering Science to the Site™**

as the extraction fluid. And procedural changes call for the addition of the buffer at the beginning of the extraction, whereas the EP-Toxicity test required technicians to add up to 400 milliliters of acetic acid over a 24-hour period as needed to maintain a pH of 5.

Aside from these differences, procedures and analyses basically remain the same, although more controlled, Gibson says, and result from EPA's goal to standardize testing as much as possible. Standardization allows results from one laboratory to be compared with those from another laboratory, he says, eliminating variations caused by slight differences in methodology.

The TCLP also specifies quality assurance/quality control (QA/QC) requirements. "These considerations are not trivial," Gibson says. "The difference in price (between the two tests) will reflect in part the rigor of applying these QA/QC methods." The new rule also lists shelf lives for various samples, including time elapsed from sampling to extraction and from preparation of extraction to analysis. Each parameter class has a different holding time, VOCs having the shortest. "If you don't comply, that kind

of taints the data's credibility," Gibson says.

"We believe there will be a substantial market out there for labs," Gibson says. "However, many companies have submitted samples over the last three years to get an idea of what they would be facing, making most labs capable and prepared to perform the analyses."

While laboratories may be geared up, debate continues in the industry about EPA's assumptions in developing the test method and the Agency's decision to exclude 13 organics included in the original proposal.

"It is my opinion that it is an improvement (over EP-Toxicity), because they've taken out a lot of interpretation on how to handle the tests, so results should be comparable," Gibson says, adding that the TCLP "probably is not perfect."

RMT says its technicians have found an oversight in the way the TCLP pre-test is written for determining the concentration of acid added to the waste: EPA does not specify whether a sample should be stirred during one of the steps. "We have found that by stirring or not stirring the sample during the heating

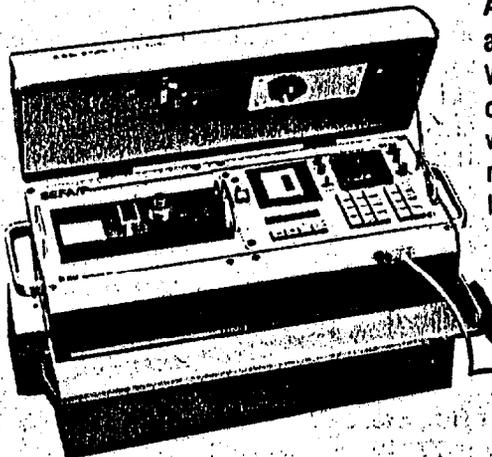
step, you can have varying results," says Bob Stanforth, a senior water chemist for RMT's Northern Region. "We have seen cases where stirring or not stirring affected whether a waste was classified as hazardous."

Critics also charge that, although the TCLP is more reproducible, it does not provide any more information than EP-Toxicity about environmental effects, Robinson relates. "There's no increased accuracy, just (greater) reproducibility. People have been hammering on that quite a bit lately. It's the test *du jour*. There's still a lot of controversy raging within industry."

Although the test is not perfect, Scott Environmental's Newman says he believes the EP test needed improvement, because it "was too narrow in scope. There's been a lot of new information over the last 10 years, as we became more technically astute," he adds, describing the final rule as "an important and invaluable regulatory package."

No matter what their opinion on the quality of the regulations, industry, laboratory and government representatives expect the list of constituents to continue to expand. ▼

NOW ANALYZE  
MIXED WASTE!



XRF is a recommended technique for RI/FS activities. See EPA Report #540/G-87/004. Call today for your free brochure!

## Now you can avoid costly delays by performing complex environmental analyses on-site.

And make the important decisions affecting your RI/FS activities as you sample!

With HNU's new SEFA-P Field Portable X-Ray Fluorescence Analyzer you can detect and analyze heavy metals like lead, copper and cadmium *on-site*, with immediate results. Because there's no waiting for reports to return from the lab, costly analyses are minimized—

saving you time and

money. Our energy dispersive XRF

analyzer is a self-contained, rugged unit providing both qualitative and quantitative analyses in the field. And it's safe and simple to use.

Use it anywhere—from tailgate to tabletop with up

to 8 hours of continuous operation from our convenient, rechargeable battery pack. For additional data storage and quantitative analysis capability, bring along your compatible "laptop" computer.

The SEFA-P from HNU. Heavy metals analysis without delay.



**hnu**

HNU Systems, Inc. 160 Charlemont Street, Newton, MA 02181-9987 Tel: (617) 964-6690 Fax: (617) 965-5812 Telex: 6817153  
See us at Hazmat International, booth numbers 1008 & 1010, June 5-7, Atlantic City, N.J.