

# Risk & Remediation

## Enhancing Environmental Progress Through Performance-based Regulation

*The advent of environmental indicators under the GPRA is driving a set of new environmental behaviors in the regulating and regulated communities.*

Historically, environmental programs, such as waste site remediation, have been

**Agency management and project managers will need to adopt methods to combine traditional and risk-based implementation approaches...**

“process-driven,” where the success of the program is measured in terms of the number of steps in the process that have been completed, such as the number of workplans approved, or the number of enforcement orders issued. However, in recent years there has been a growing awareness that

sites are not getting cleaned up under such a bureaucratic system. Progress towards actual cleanup has been slow because this paradigm emphasizes administrative procedures rather than performance and results, it is costly and time-consuming to implement, and it results in generic, often impracticable cleanup goals (such as returning a site to background conditions without regard to current risk). The litigious atmosphere of the *status quo* contributes to the lack of results, as well.

In 1993, Congress passed the Government Performance and Results Act (GPRA), which mandates that all federal agencies must measure performance and become more accountable. Under GPRA, U.S. EPA is required to demonstrate progress on programs under its purview. Ultimately, the Agency's appropriations will be tied to its ability to demonstrate such progress.

*continued on pg. 2*

### I N S I D E

<i>Enhancing Environmental Progress Through Performance-based Regulation ..</i>	<i>Risk-based State Remediation Programs: A New Paradigm .....</i>
1	4
<i>Letter to our Readers .....</i>	<i>What's New at Gradient .....</i>
1	5
<i>Risk-based Prioritization .....</i>	<i>Guest Editorial: A State Regulator's Perspective on the Use of Voluntary Programs .....</i>
3	6

## Letter to our Readers

April 1999

Dear Colleague,

In this issue of *Trends in Risk & Remediation*, we review several developments that are fostering the streamlining of remediation programs. These include: performance-based metrics for the RCRA Corrective Action Program developed in response to the Government Performance and Results Act of 1993; proposed approaches for site-specific prioritization; and various streamlining approaches incorporated in state voluntary programs, including the privatization aspects of the Massachusetts Contingency Plan. We discuss how these programs and approaches are precipitating positive behavioral changes among regulators and the regulated community alike.

Contributors to this issue include Dr. Teresa Bowers, a Principal and expert in exposure modeling and negotiation of risk-based remediation targets. She is joined by Dr. Joshua Cohen, a mathematician and expert in quantitative tools for risk-based decisions, and Mr. Manu Sharma, an engineer who specializes in the transport and fate of environmental contaminants and the derivation of risk-based remediation goals. We are pleased to welcome to this issue Mr. Edward Pfau, Voluntary Action Program Toxicologist at the Ohio EPA. We thank him for providing the state regulator's perspective on the development and success of Ohio's Voluntary Action Program.

We trust that the information and analysis provided in this issue of *Trends* will help you in your daily work.

Yours truly,



Neil Shifrin  
President

## Gradient Corporation

*Trends in Risk & Remediation* is a quarterly publication of Gradient Corporation. As a national leader in risk assessment and negotiation of risk-based remediation, Gradient offers this publication free of charge to interested groups and individuals. If you have a colleague who would benefit from this publication - or if you have comments or suggestions - please contact Carol Counihan, Editor, at 617-576-1555 or email us at [trends@cam.gradcorp.com](mailto:trends@cam.gradcorp.com).

# Enhancing Environmental Progress Through Performance-based Regulation

continued from pg. 1

As a result, EPA is moving aggressively toward the development of "Environmental Indicators" (EIs) that can be used to measure program progress by tracking changes in the quality of the environment. To date, the Resource Conservation and Recovery Act (RCRA) Corrective Action program is affected far more than the CERCLA program.

Perhaps the most relevant EI from the standpoint of environmental risk is CA725, "Current Human Exposures Under Control," which pertains to the RCRA Corrective Action Program. This EI is met if there are no unacceptable human exposures to contamination, *e.g.*, in excess of appropriate risk-based levels, under current land- and groundwater-use conditions. (Potential future-use scenarios for human exposure, as well as ecological receptors, may still be considered as part of selecting a final remedy, but are not part of this EI. Additionally, an EI for protection of ecological receptors may be developed in the future.)

One goal prescribed by GPRA is for EPA to have 95% of its "high priority" facilities compliant with CA725 by the year 2005. In other words, EPA's success will be based on whether it achieves control of human exposures at 95% of these sites within the next six years. A second EI, CA750, "Migration of Contaminated Groundwater Under Control," must be achieved at 70% of these sites within the same time frame. This second EI will be met if the migration of contaminated groundwater has been "stabilized," and if a monitoring plan is in place to ensure that such contaminated groundwater remains within the original area designated as contaminated.

There are currently approximately 1700 "high priority" facilities nationwide, at which human exposures have been controlled at less than 300 to date (Fields, 1999). If we examine the challenges associated with meeting the CA725 and CA750 goals within six years for this large number of sites, it is clear that EPA will need to move rapidly from its current "process-based" regulatory approach to a more "results-oriented" focus. This will require a change in both philosophy and behavior.

Agency management and project managers will need to adopt methods to combine traditional and risk-based implementation approaches and to streamline the existing process. A method of prioritization (see related article) will be required in order to identify and address those solid waste management units (SWMUs) that are not yet CA725 compliant. In its *RCRA Implementation Plan for 1998-1999*, EPA identified several strategies emphasizing innovation and flexibility in the RCRA Corrective Action process, including:

- Continue to make site "stabilization" a priority;
- Focus on the worst sites and worst SWMUs first;
- Streamline the administrative process;
- Encourage the use of innovative technologies; and
- Encourage owner/operators to initiate remedial programs voluntarily.

This new approach could accelerate the rate of expenditure for members of the regulated community, as monies will be applied to actual remediation activities, *versus* the current condition of merely preparing work plans and awaiting agency comments. Although some in the regulated community may see this increased rate of expenditure as a disadvantage, the earlier reduction of off-site liability may prove to be advantageous, and faster cleanups will certainly improve public perception. GPRA signals an important step forward in the area of environmental protection, because it will focus the behavior of both the regulated and regulating communities on getting results, not merely on shuffling paper.

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#### References:

- Fields, T. 1999. Remarks to the U.S. EPA RCRA National Meeting, Plenary Session "Building Bridges to Partnership." January 12.  
U.S. EPA. 1998. *RCRA Implementation Plan for 1998-1999*.

## GPRA ENVIRONMENTAL INDICATORS FOR THE U.S. EPA RCRA PROGRAM

	Environmental Indicator	Criteria for Achievement
CA725	Current human exposures under control	95% of high priority facilities by 2005
CA750	Migration of contaminated groundwater under control	70% of high priority facilities by 2005

# Risk-based Prioritization

*The most efficient remedial strategies will be those that prioritize actions based on consideration of risk reduction and other secondary goals.*

U.S. EPA's efforts to maximize the number of sites in compliance with the GPRCA environmental indicators CA725 and CA750 will put industry under new pressure to expedite remediation. However, the Agency's focus on results also provides industry with a new opportunity to further its own goals while helping EPA to achieve the GPRCA mandate. Specifically, industries with sites subject to RCRA Corrective

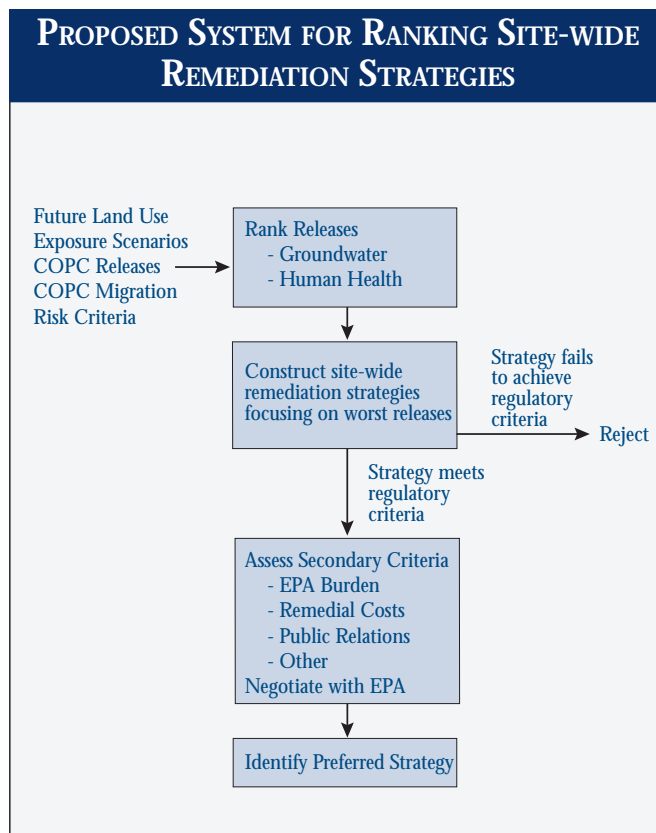
**Ranking site releases in terms of their contribution to site-wide risk and groundwater contamination highlights those releases for which remedial action will further the goals of both industry and EPA.**

Action can now work with EPA to identify approaches that most quickly address these sites.

GPRCA partially aligns industry and Agency goals because both parties are now interested in optimizing resources invested to achieve site-wide

compliance with both human health and groundwater criteria. EPA must efficiently address sites because the Agency has finite personnel to review workplans. Industry can minimize EPA's review burden by prioritizing the releases according to their contribution to human health risk (CA725) or groundwater contamination (CA750). For example, a plan that addresses the "worst" releases first may offer an expedited path to achieving CA725 and CA750 compliance, reducing cleanup costs and environmental liabilities, and improving public relations.

In order to identify the most efficient remedial strategies consistent with regulatory mandates, a prioritization system must be developed that identifies releases contributing to the greatest extent to CA725 and CA750 non-compliance. EPA Region VI has advanced a risk-based priority screening tool for public health (U.S. EPA, 1998), a modified version of which can serve as the foundation for such a system. The proposed Region VI system ranks releases at a site by comparing their risks to pre-specified screening risk limits (*e.g.*, a lifetime cancer risk of  $10^{-6}$  or a hazard quotient exceeding 0.25). Site data are used to 1) determine future land use at the site; 2) identify plausible exposure scenarios; 3) determine if, in light of these exposure scenarios, there have been any chemicals of potential concern (COPC) released; 4) predict if any of the COPC releases have the potential to migrate to other media (*e.g.*, from soil to groundwater); and 5) determine if the releases have the potential to contribute to the exceedance of risk criteria. The



Region VI system recommends remedial measures for only those releases that exceed a risk screening level.

A modified version of this system, described here, can be used to further both Agency and industry goals. Instead of imposing a dichotomous classification (acceptable or unacceptable) on each release, the first step of this modified system would instead quantify each release's contribution to total site-wide risk or groundwater contamination. A second step would then identify all acceptable site-wide remedial strategies (*i.e.*, strategies that, by remediating a combination of releases, would reduce site-wide human health risks and groundwater contamination to within regulatory limits.) The final step would assess each strategy with respect to other, secondary goals, which could include implementation time (primarily an Agency consideration), elimination of liability (an industry consideration), total remediation cost (an industry consideration), and public perception (a consideration for both the Agency and industry). The figure illustrates this system for ranking site-wide remediation strategies.

*continued on pg. 5*

# Risk-based State Remediation Programs: A New Paradigm

*Risk-based state remediation programs are promoting progress in the redevelopment of contaminated properties.*

A number of states, such as Massachusetts, West Virginia, and Ohio, have completely revamped their state remediation programs in recent years. In this effort, two models have been used by the states: 1) developing voluntary cleanup programs; or 2) privatizing the remedial decision-making process. Both of these types of programs generally use a tiered, risk-based

*In a four-year period since the new (Massachusetts) program was promulgated, approximately 1,000 more sites were "closed out" than during a similar period under the old program.*

approach and offer the following benefits – reduced administrative burden and faster results, impetus for brownfield development, and increased liability protection and certainty. These state programs have been very successful

overall and have prompted some U.S. EPA Regions (e.g., EPA Region VI; see related article) to rethink and modify their programs. According to one EPA Region VI official, "In many ways we're playing catch-up, the states are way past this [the Region VI proposed strategy] in terms of writing risk rules and shifting their programs accordingly." (*Risk Policy Report*, 1999.)

A good example of a revamped program is Massachusetts', which was promulgated in 1993. This program, which applies to inactive sites as well as operating facilities, is based on a site prioritization system. Remediation decisions at high priority sites are made with direct agency oversight and involvement, whereas decisions at low priority sites are handled by private Licensed Site Professionals (LSPs). The Massachusetts Department of Environmental Protection (MA DEP) has established a target of auditing 20% of LSP-lead sites.

In order to aid LSPs in making remedial decisions, the MA DEP promulgated default, risk-based, cleanup standards (referred to as Method 1 standards). The regulations also

include a provision for conducting site-specific risk assessments, which are referred to as Method 2 and 3 risk characterizations. In these site-specific assessments, the risk assessor is allowed the flexibility of using creative approaches, such as area-weighted averaging for calculating exposure point concentrations, statistical techniques for establishing background concentrations, etc. – scientifically valid tools, which were not readily accepted by regulators in the past. By using any of the risk assessment approaches (i.e., Method 1 through Method 3), the LSP can evaluate the need for and extent of remediation required under current and reasonably foreseeable future land and groundwater use scenarios. In addition, the regulations make the process of imposing land use restrictions less onerous than before. The revamped program has a clear end-point, referred to as the Response Action Outcome (RAO), which is a statement filed by the LSP after remediation has been completed or is underway (e.g., a groundwater pump and treat system is operational).

A recent review of the effectiveness of the new regulations conducted by MA DEP (1998) found that, overall, the program has been effective in expediting remediation and moving sites through the system. In a four-year period since the new program was promulgated, approximately 1,000 more sites were "closed out" than during a similar period under the old program (*WSJ*, 1998; MA DEP, 1998). In particular, many brownfield sites have been remediated and put back to productive use. Although MA DEP has not been able to achieve their target of auditing 20% of LSP-lead sites, a majority of the audits (87%) did not reveal any problems. On the whole, the redesigned Massachusetts program is a good example of creative approaches being used by states to relieve the bureaucratic logjam in site remediation.

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## References:

Massachusetts Department of Environmental Protection (MA DEP) and the Board of Registration of Hazardous Waste Site Cleanup Professionals. 1998. *21E Program Evaluation Draft Generic Environmental Impact Report*. June 30.

*Risk Policy Report*. 1999. "Region VI Drafts Risk-based Strategy to Streamline Corrective Action." Inside Washington Publishers 6(2): 3-7. February 19.

*Wall Street Journal (WSJ)*. 1998. "State's Privatization Plan for Cleanups Has Flaws." July 29.

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## What's New at Gradient

### Teresa Bowers and David Merrill Attend SAB Meeting

On March 16 in Washington, D.C., Dr. Teresa Bowers and Mr. David Merrill of Gradient made presentations at a U.S. EPA Science Advisory Board meeting on the topic of whether risk-based cleanup levels should be applied as average acceptable concentrations or not-to-exceed threshold concentrations at waste sites.

### Recent and Upcoming Presentations

**St. Louis, MO. June 20-24. Joshua Cohen.** "Estimating outdoor and indoor dust lead levels from accidental bridge repair containment releases," at the Annual Meeting of the Air & Waste Management Association.

**Gargnano, Italy. June 7. Barbara Beck.** "The development of a stochastic physiologically based pharmacokinetic model for lead," at the International Agency for Research on Cancer (IARC) International Conference on Lead Exposure, Reproductive Toxicity and Carcinogenicity.

**Gargnano, Italy. June 7. Teresa Bowers.** "Implications of blood lead models on permissible exposure levels for protection of adults and children," at the IARC International Conference on Lead Exposure, Reproductive Toxicity and Carcinogenicity.

**Boston, MA. March 28. Harry Swift.** "Hydrology/Fate and Transport," at the Northeastern University/New England Chapter of the Academy of Certified Hazardous Materials Manager's review course.

### Recent Articles

Chapnick, S.D., M. Sharma, D. Roskos, and N.S. Shifrin. 1998. An alternative to the inappropriate use of Toxicity Characteristic Leaching Procedure (TCLP). *American Environmental Laboratory* 10(7): 18-19.

Ram, N.M. 1999. The tools of environmental litigation: How environmental litigation support teams employ a unique set of skills and tools to improve the outcome and reduce the costs of legal disputes. *International Jour. Environ. Forensics* 1(1): 68-86 ([www.aehs.com/IJEF](http://www.aehs.com/IJEF)). March.

Wait, A.D. 1999. Evolution of organic analytical methods in environmental forensic chemistry. *International Jour. Environ. Forensics* 1(1): 8-18 ([www.aehs.com/IJEF](http://www.aehs.com/IJEF)). March.

Wait, A.D. and E. Butler. 1999. Forensic chemistry: Tools for discerning site liability. *Environmental Compliance & Litigation Strategy* 14(9): 4-5. February.

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## Risk-based Prioritization

*continued from pg. 3*

Ranking site releases in terms of their contribution to site-wide risk and groundwater contamination highlights those releases for which remedial action will further the goals of both industry and EPA. For example, remediating those releases contributing the most to risk and groundwater contamination can reduce the number of releases that must be addressed in order to achieve some degree of environmental protection. Doing so may decrease remediation costs for industry, and workplan review time for the Agency. It may also address those

releases posing the greatest potential for public concern and liability. In general, this ranking scheme facilitates the development of remedial strategies that best advance multiple goals for industry and for EPA, including, most importantly, the protection of public health and the environment.

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U.S. EPA. 1998. *Draft Risk Management Strategy*. Multimedia Planning and Permitting Division, Region VI. October.

# A State Regulator's Perspective on the Use of Voluntary Programs

*Ohio's VAP seeks to balance human health and environmental protection with site redevelopment goals.*

The Ohio Voluntary Action Program (VAP) was among a number of state voluntary cleanup programs that took shape in the mid-1990s. Like many other brownfield programs, the impetus behind its creation was the removal of environmental and legal barriers that precluded redevelopment and reuse of contaminated sites throughout the state. The program allows "volunteers" (e.g., property owners, lenders, and developers) to investigate and clean up contaminated properties and seek protection from state civil liability associated with the contamination.

A critical link between the volunteers and the State of Ohio is provided by the Certified Professionals, who oversee site investigation and remedy implementation. Certified Professionals

*The VAP is a performance-based program and provides for the use of a variety of remedies...*

harness the expertise of the private sector to supervise site cleanups, thus reducing the administrative and regulatory oversight burden placed upon the

State. A Certified Professional makes the determination that the site meets program standards and supports that finding in a document called a No Further Action (NFA) letter. An NFA letter is subject to both Agency review of documentation before a request for a Covenant Not to Sue is either honored or denied, as well as a rigorous audit program in the calendar year following the NFA letter issuance.

The VAP final program rules promulgated in December 1996, establish the criteria for the conduct of voluntary actions, from the investigation of site history to the demonstration of compliance with the risk-based standards for the site. The rules are comprehensive and detailed, and some would say voluminous

and prescriptive. The rules represented a major undertaking for both the Ohio EPA and the stakeholder community, who were full participants from the outset of the process. The rules, which address activities ranging from the mundane (e.g., title searches) to the specific (e.g., fate and transport modeling), were intended to preserve the intent of the enabling statute, while drawing upon best professional practices in the field of environmental investigations and property transactions.

The development of program rules also serves as a paradigm for the challenges of program implementation. Approximately 150 sites have entered the VAP to date, and sites range from a one-half acre dry cleaner to a 200-acre oil refinery, with environmental issues ranging from simple to complex. The number and type of remedies implemented at a site vary considerably as well. The VAP is a performance-based program and provides for the use of a variety of remedies, including institutional and engineering controls, and active and passive remediation.

The Ohio EPA has learned much in the first two years of program implementation under the final VAP rules. Stakeholders have expressed concerns about the timeliness and consistency of agency reviews, and the costs associated with shepherding a property through the entire VAP process. To address these concerns, the VAP has introduced a standard submittal form and a streamlined review process effective this past January. In seeking to balance the twin goals of ensuring protection of human health and the environment and promoting redevelopment of contaminated sites, voluntary cleanup program regulators in Ohio and elsewhere will need to be judicious in their exercise of oversight, and diligent in their efforts to improve implementation.

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## In the next issue:

*Overview: Issues in Sediment-driven Remediation*

*Ecological Risk Assessment Methods for Sediments*

*Human Exposure to Sediments and Health Risk Implications*

*Guest Editorial: Industry Perspective on Managing Sediment Risks*

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T R E N D S • I N

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