



A Ten Year Prospective On Remediation

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For the last thirty years we have all been working very hard to put ourselves out of the remediation business, so why be concerned with where remediation will be ten years in the future? In responding to environmental legacies of the past hasn't industry put policies and procedures in place to prevent the creation of future liabilities? Don't we design and operate facilities today to minimize the generation of wastes and the potential for spills, releases and discharges? If so, how can there be any significant remediation issues in the future?

Good questions. I think that most remediation practitioners would agree that there have been significant accomplishments and a constant focus on prevention and waste minimization. However, because of such a strong sense of accomplishment, many may find it difficult to accept that much still remains to be done.

While government reports abound with data on the thousands of contaminated sites that have been remediated, data also reports thousands that are yet to be investigated. In the future, even more so than today, mergers and acquisitions will drive investigations through the due diligence process. Not only because of the significant liability that can result from the transfer of contaminated property, but changing requirements for disclosure will compel a more in-depth understanding and reporting of contingent liabilities. There will be a sharper focus on the remediation of Brownfield properties, as redevelopment of infield properties intensify with population growth, and billions of dollars are made available for infrastructure projects. Yes, unfortunately, for a number of reasons



remediation challenges will be with us for the indefinite future, not only because of evolving issues but also from the legacies of our current regulatory processes.

A Responsible Party is Responsible Forever

Few, outside the legal profession, realize that in the U.S. a responsible party is always on the hook. Since Superfund/CERCLA, (Comprehensive Environmental Response, Compensation and Liability Act), was created in 1980, there have been good days and bad days. While it has produced profound societal benefits over time, it has also created an unforeseen problem – perpetual liability. Under the current liability scheme, a Responsible Party is responsible forever and that liability cannot be eliminated with a “No Further Action” letter from a Regulatory Authority, insurance, a sale “as is”, indemnity or anything else. In the U.S., a Responsible Party is responsible forever- and forever is a long, long, time.

Remediated Sites Will Come Back

Being on the hook forever has to make one concerned with the potential for “comebacks”. In the past, remediated sites have come back to the responsible party and that will happen even more in the future. They will resurface as changes are made in land-use and engineering and institutional controls fail to be maintained by current property owners. In the future, when conditions that were unknown at the time of cleanup are discovered, and as engineering controls are no longer considered adequate by reasons of changes in the law, remediated sites will be revisited. Also, changes in cleanup standards driven by improved analytical methods and the identification of new contaminants and risks will reopen many sites. In one state, typical of many, 60% of the current cleanup standards are based on analytical capability with the health standards lower. In 2007, EPA launched ToxCast, a program to build computational models to forecast the potential human toxicity of chemicals with its first phase profiling 340 chemicals. Also the National Academy of Science has released a Toxicity Testing Vision and



Strategy that proposes the use of advances in biology and bio technology to transform toxicity testing. One should anticipate that changing toxicity criteria, increased testing, and improved analytical methods that lower detection limits will result in more stringent cleanup standards and one day reopen your closed site.

EPA Has Increased Scope – More to Come

In addition to the re-remediation of fully remediated, closed sites, more new sites will come. While the Superfund program claims to have worked its way through 67% of the National Priority List, the EPA has been busy increasing it's scope by bringing "Megsites" (sites with remedy costs exceeding \$50 million) into the program. Just think how many harbors, lakes, estuaries, river systems and mining sites are likely to have historic impacts, each covering several square miles in area that will require long time frames and considerable resources to address. I doubt if anyone really knows just how many big sites are out there, but be assured that when they come they will arrive with a big price tag. For global companies evolving remediation challenges outside the U.S. will also increase scope. Many countries today are where the U.S. was 30 years ago and are just now developing the rules, regulations and processes to address environmental contamination.

So what if we are not quite through the pipeline and there are remediation issues in the future? Why be concerned, why not just do what we have done in the past? Good questions. If one looks at the past as an indication of the framework we must work within going forward, a number of opportunities to improve the "remediation process" become apparent. But will we, as an industry, be bold enough to devote the necessary resources to bring about the much-needed change?



U.S. Regulations and Regulatory Process

In the mid 1990s over 90,000 environmental laws and regulations had been imposed since the 1960's.... 90,000! That's an average of 3000 new regulations per year. While we had an abundance of regulations to guide us, we had a system that generally lacked leadership at the EPA. It has been a decentralized program with all regions acting in an autonomous manner, with little or no overarching process. When the EPA failed to make decisions, states filled the void creating different standards to deal with common issues and, as we all know, when authority lies within many entities it makes it difficult to make a risk management decision. Is there no leader at the helm?

The remediation regulatory process in the U.S. has been extremely inefficient, as evidenced by the lack of progress, in spite of the enormous amount of resources expended. While industry has pushed for a "risk based approach" where remedial actions are driven by actual risks, there has been a reluctance in the U.S. to allow project managers in the agency to make risk based management decisions, furthermore not many want the responsibility. Guidance and policies have been overly conservative and the process highly prescriptive. Since Love Canal there has been an obvious lack of trust of industry – a responsible party engaged in remediation is not only told what to do, but how to do it. This has resulted in a very costly, inefficient, burdensome process with milestones measured in decades. A study conducted by AEI-Brooking Joint Center for Regulatory Studies of 267 remediation sites concluded that the median cost for a cancer case averted was \$418 million dollars and that 5% of expenditures eliminated over 99% of the risk. Another way of putting it: 95% of the costs were spent to address less than 1% of the risk. Over the years, as I have responded to regulatory agencies in developing countries anxious to understand how to develop their own rules and regulations there has never been a problem in identifying what NOT to do. The important question is do we have the appetite, the desire, the will to learn from our own mistakes?

When RCRA (Resource Conservation and Recovery Act) and CERCLA were passed in the 70's and 80's there was a belief that we could restore soil and groundwater



to background conditions in a reasonable time frame and at a reasonable cost. After thirty years of road test we now know better, but have failed to account for that reality in our laws and regulations. Will the regulatory process in the U.S. move from “process based” to “performance based”? Will the next administration remove what doesn’t work and put common sense into regulations? A dubious but hopeful thought.

Technology

Often we forget that remediation technology has only been around for a few decades and that we are still at “first principles.” When I would ask a colleague, an expert in remediation technology, the status of our know-how he would respond with, “it is still awfully dark down there”.

Prior to the mid 1980’s the conventional technologies employed for remediation were fairly basic – generic dig and haul, land filling, pump & treat and incineration. In 1984, when the amendments to RCRA mandated treatment, the incineration industry flourished. Later, when it became apparent that conventional technologies were inefficient, fell way short in meeting the stringent cleanup standards and too expensive, innovative technologies began to emerge. Following years of practical application in the field, industry and the regulatory agencies began to realize that neither technology nor economic resources were sufficient to enforce unrealistic standards and more often than not, remediation would become a long-term effort that would take many years to complete.

As we look to the “green future”, new products, new chemicals, new medicines and new processes will emerge. Nanomaterials, biotechnology, genetically modified organisms, bio- solids from bio-fuels, exotic materials and chemistry from the manufacture and disposal of sophisticated electronics, batteries, fuel and solar cells, etc., will all bring new contaminants. “ Not-in-my blood” will continue to drive biomonitoring programs, and result in pressure from a concerned society that will require the remediation of persistent, bio-accumulative chemicals at any concentration, regardless of risk. Will remediation



technologies be adequate to meet the challenges of the future? Will technologies be able to reduce the time and offset the significant increase in cost to remediate greater volumes of material due to lower cleanup criteria? Are sufficient efforts and resources being expended by companies, consortia, and government to develop new remediation technologies? Will we be able to chase the molecules and “get it all ?”

Fewer Skilled Professionals

Many see less money being spent on R&D. Programs at universities are being dropped as fewer graduates enter engineering, even fewer in environmental engineering and even less in remediation. Centers of excellence and strength in academia are becoming fewer and fewer.

If one accepts that there will continue to be remediation issues well into the future, then one must be concerned with the availability of qualified, educated and seasoned resources. This shortage is particularly more significant and challenging with evolving complexities of new contaminants and public pressure to detect and remove all trace quantities. Furthermore, the lack of adequate resources available to support remediation programs in the regulatory agency could be even more of a problem as the default for not having resources that can reach the substance of the issue usually is the reliance on procedures and processes, i.e. “check the box mentality.” A “cookie cutter” approach, rather than an integrated, site-specific approach with risk-based decision making will only drive more inefficient use of resources.

Environmental Management In Transition

A few years ago Richard MacLean (Competitive Environment Inc.) introduced us to the notion that we are undergoing a significant transition of environmental management in the U.S. We are transitioning from a regulatory driven period where authority and power were clearly in the hands of regulatory agencies to a



stakeholder driven period where NGO's, local communities, public, and stock analysts are rule makers as well. In remediation we have been adjusting to the transition from a period where there was a need to inform the public to a period where there is a requirement for open, public participation in decision making. In the future a company must not only have the proper governance in place to assure compliance, but will have to respond to the questions of whether they are responsible users of human capital (employees, customers, communities), as well as natural capital, (raw material and environment)".

The regulatory process for remediation has focused primarily on the short-term where long-term, large scale impacts have not been addressed. The concept of Sustainable Remediation responds to the requirement that we be responsible users of raw materials and the environment. In the future, the unintended consequences of fuel, energy and natural resource consumption and the emission of green house gases and other pollutants from environmental cleanup projects will no longer be acceptable.

Cost Will Be Higher

For a number of reasons the cost to address remediation liabilities in the future will increase. One area that will drive up costs comes from a concern that many companies will fail and then pass the cost burden for cleanups onto the public. This concern, based on flawed information, is driving a revision of federal and state regulations. Over the next ten years we will likely see changes in Financial Assurance requirements that will require industry to bear additional costs for duplicative and unnecessary financial instruments. Many reports over the last few years by EPA, ASTSWMO, (Association of State and Territorial Solid Waste Management Officials), OIG, (Office of Inspector General), GAO, (Government Accounting Office), and others, have presented unduly negative views of the existing Financial Assurance framework for environmental cleanups. Legislation will likely be introduced in Congress, and states will continue to pursue revisions to their regulations to restrict, if not eliminate, the use of self-guarantee for financial assurance. They may instead require trust funds, surety bonds, letters of credit, and insurance. The impact to industry for these additional liquid financial



assurance mechanisms has been estimated to exceed \$1 billion per year in out-of-pocket costs.

SUMMARY

In spite of the billions of dollars that have been spent during these last thirty years or so to remediate contaminated soil, groundwater and sediments, much still remains to be done. Not only will Superfund “Megsites”, increased pressure on brownfield redevelopment and new contaminants add sites to the portfolio but advances in analytical methods and a need to get it all, regardless of risks, will reopen and add many new sites. This increase in the number of sites requiring remediation will come at a time when less qualified professional resources are available and will likely result in considerable cost as remediation will be required to address contamination at very low concentrations.

In the future, we will likely have a different approach to remediation that will require resources with different skill sets. When selecting a remedy, the most sustainable technologies and methods will need to be employed. Not only will remedies need to be protective of human health and the environment, but they must also consider global warming, recycling, resource preservation, waste generation and safety.

To be responsive to an even greater and more complex remediation challenge, over the next ten years, we must be more efficient and effective in our use of resources, both human and natural. Only by learning from the past can we hope to have a different outcome in the future. We must revise our laws and regulations to remove what doesn't work. If we ever hope to achieve milestones measured in years, rather than decades, all stakeholders must recognize the value of a working relationship and partnership built on mutual respect and common goals.