Subsurface Remediation or I Love That Dirty Water

by Mike Barcelona

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In the last issue of this journal, Dr. John Bredehoeft presented a thoughtful paper on the incredible long-term costs that may be incurred to clean up our nation's solid and hazardous waste sites. He articulately argued that given the current technology level, costs, and likely operational time periods over which remediation can be done it makes sense to invest in long-term technology research and development (R&D). These efforts should be undertaken to more effectively identify and remediate immediate environmental and public health risks associated with these sites. This is what Superfund/CERCLA (Comprehensive Environmental Response, Compensation and Liability Act) calls for by way of "permanent" remedies.

Much of what has been accomplished thus far in remediation efforts has been limited to containing subsurface contaminants rather than destroying or removing them from the environment. The technical case for accelerated R&D efforts is easily made since they should reap real benefits for future generations. The question which looms large at this point is how best to gain public, regulatory, and responsible-party acceptance of "experimentation" at sites which by law should be cleaned up.

The need for research and development as well as a re-examination of the policy and practice for contaminated site management

has been recognized for some time. These needs were the focus of a recent unique meeting: the Forum on Remediation of Ground Water Contamination held in Denver, Colorado, February 2 to 4, 1994. The forum was sponsored by NGWA, American Bar Association, Chemical Manufacturer's Association, Clean Sites Inc., Colorado Department of Health, U.S. EPA - Technology Innovation Office, and Western Michigan University. Representatives of government, industry, legal advocates, consulting groups, the public, and academia convened for an open discussion of the issues. Participants were exposed to optimistic insights, horror stories, and perspectives for the future. Frustrations with current Superfund policies and practices and with other sites under DOD or DOE responsibility were discussed.

Much of the forum dealt appropriately with specific problems confronting shareholders on all sides of the negotiating table. Legal uncertainties, confusing language in the statutes, public resistance to delay, and the technical complexities in site characterization and remedy selection were among the openly debated topics. Since the number of sites in varied hydrogeologic settings to be handled essentially as Superfund sites has been projected to exceed 300,000, both national and technical priorities demand careful scrutiny. Perspective and continued

dialogue must be enjoined and maintained if we are to be successful professionally. We as a profession are at risk in this undertaking if we are not totally honest with the public. Their concerns over sustained economic growth, jobs, renewal of infrastructure, health care, and crime may easily overshadow the need to make a long-term commitment to R&D.

During the forum, Dr. Peter Fritz of the Umweltforschungszentrum in Leipzig, Germany, eloquently presented the potential for studied remediation strategies in a country that has pursued resource utilization and waste management practice without the benefit of citizen input. The optimism he expressed in the face of staggering cleanup efforts should prove to be inspiring as the U.S. debate heats up.

National priorities will take time to sort out as both the reauthorization of Superfund and the Clean Water Act are considered by Congress. The wrangling will be exceptionally hot over liability apportionment and the selection of remedies which will protect both the environment and public health. We must not shrink from our responsibility to communicate the technical strengths and weaknesses with which we can proceed. Hopefully, realistic legislative proposals and workable policies will balance evenly among competing societal priorities. Then we may be assured that patience and the resources for effective remedial strategies will be applied to the sites that pose the most urgent need.

I recommend that you carefully review the notes from this forum, expected to be available from NGWA by May 1, keeping in mind the following points:

- Our knowledge of the subsurface environment (i.e., both pristine and contaminated) exceeds what we may have enjoyed if a national "check our resource" initiative had been mounted in 1980. However, we need to do a better job of collecting valuable site-specific geologic and hydrogeologic data

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and then capitalize on this information in R&D efforts.

- Our talent base has never been better prepared for the utilization and protection of ground water resources. We must build on this foundation and train

new professionals as well as create trust across the negotiating table.

- Emerging technology development, particularly for in situ containment and remediation, must be done at many sites given unique containment behavior and varied hydrogeologic settings. Realistic estimates of risk reduction, treatment performance, and the potential impact of residuals must be communicated to encourage application at other sites. These variables must first occur on the experimental and demonstration levels.
- Examples of remediation R&D at operational sites have been reported at sessions of scientific meetings. However, rarely have the great number of physical, chemical, and microbial variables been either controlled or measured. Real-world laboratories for comprehensive technology trials and intercomparisons are being developed by Department of Defense, Department of Energy, and EPA in part supported by the Strategic Environmental Research and Development Program. Engineering design packages for promising technology transfer and proven cost-benefit analyses should issue from this and related efforts. Emphasizing team-building to round out the complement of disciplines applied to such experimental trials and demonstrations will serve us well.

As ground water professionals we are on the leading edge of scientific and engineering discoveries with lasting value. Gradual but significant gains toward solving the most frustrating problems will be made. It makes good sense for all of us to keep informed of the advances. We'll do our best on these pages to help.

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