The Sustainable Remediation Panel

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Remediation recently developed a Sustainable Remediation Panel in which leaders in the field have volunteered to provide their opinions on difficult subjects related to the topic of how to integrate sustainability principles into the remediation practice. The panel's opinions are provided in a question-and-answer format, whereby selected experts provide an answer to a question. This issue's question is provided below, followed by opinions from four experts in the remediation field.

In developing numerical cleanup standards for site cleanups, including risk-based corrective actions, is it possible to incorporate social and economic metrics into the standards or do these need to be considered separately on a qualitative basis?

DANIEL J. WATTS

The fast answer is that social and economic metrics can be built into numerical cleanup standards. The more precise answer is that it likely would be difficult presently because few examples exist of quantitative expectations and outcomes in the social and economic arenas resulting from a cleanup operation. With decades of experience in setting environmental cleanup goals, numerical metrics are established and accepted, albeit with occasional debate in setting goals for individual sites. Measuring social and economic change or benefit is more complicated because there is a prior need to establish what benefits are desired and then to determine how best to calibrate the change. While agreement on the value of improved quality of life or economic progress can be easy to achieve, assigning goals and measuring progress can be more difficult. Often, this lack of a uniform approach is because the hopes and expectations are local rather than national.

For example, the city of Santa Monica, California, has had a city sustainability program with a set of numerical targets as measures of progress of the city toward sustainability since 1994. Among the criteria are improving residents' perception of personal safety, which has been measured by survey at about 79 percent, and increasing the percentage of inhabitants who are employed within the city, which recently was reported to be 32 percent. Initiatives to facilitate measurable progress toward these goals could be made part of the cleanup standards by assessing how many Santa Monica residents could get jobs as a result of the cleanup or how well factors leading to improved perception of residents' personal safety, such as neighborhood involvement, improved neighborhood appearance, and expansion of nuisance abatement, are incorporated into the cleanup actions. Currently, many cities and some states have sustainability plans; fewer have trend data for all of the criteria they have selected to assess progress toward sustainability. Even fewer have a full set of targets they are trying to achieve for their

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selected criteria. Where such numerical targets for social and economic factors exist, building them into cleanup standards can be relatively easy. Where they are not in place up front, interaction with the community to identify such targets can facilitate their incorporation into the cleanup standards.

MICHAEL F. HOULIHAN

The cleanup standards established by the US EPA and other regulators reflect the values of our nation and its people. But many of those remediation standards were established long ago—as many as 30 years ago in some cases—at a time when our nation's values were different than they are now.

It is possible to incorporate social and economic metrics into numerical cleanup standards; in fact, these metrics are currently incorporated in some important ways. This can be seen, for example, in the U.S. Environmental Protection Agency's definitions of maximum contaminant level goals (MCLs) and maximum contaminant levels (MCLs). MCLGs are defined as "*the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety and are non-enforceable public health goals*," and MCLs are defined by the US EPA as "*the highest level of a contaminant that is allowed in drinking water. MCLs are set as close to MCLGs as feasible using the best available treatment technology and taking cost into consideration.*" For many contaminants, the MCL is higher than its MCLG (e.g., benzene and vinyl chloride), indicating that the US EPA (on behalf of society) has made a decision that it will not be remediating for the contaminant down to risk-based standards. This represents the application of societal and economic metrics to the development of numerical cleanup standards. In addition, the *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (http://rais.ornl.gov/documents/GUIDANCE.PDF) describes, for some steps in the RI/FS process, the allowance of either "best available technologies" or "minimum technology standards," instead of risk-based standards. This allowance of performance-based standards instead of risk-based standards also represents the application of societal and economic criteria in the development of cleanup standards.

However, these metrics are currently incorporated into our cleanup standards based on an outdated value system. Remedy selection involves a number of value judgments regarding human health, environmental protection, land use, quality of life, and economy. The cleanup standards established by the US EPA and other regulators reflect the values of our nation and its people. But many of those remediation standards were established long ago—as many as 30 years ago in some cases—at a time when our nation's values were different than they are now. Surveys show that, today, Americans place higher value on environmental protection, air quality, and sustainability than they did 30 years ago. Also, we have become increasingly aware of the impacts of certain pollutants (most notably, greenhouse gases) that either did not exist or that were not widely considered to be pollutants when cleanup standards were established. Therefore, in some ways, current remediation standards do not entirely reflect our current system of values regarding the environment.

The US EPA's regulations and guidance have evolved over the years in response to our changing values and our knowledge of our environment. Now, those regulations and guidance need to evolve in response to the increased value that we place on sustainability.

RICHARD B. WICE

Numerical risk-based cleanup standards have come a long way over the past 10 to 15 years. Many states have several tiers of response including straight look-up tables for soil and

groundwater remediation and protection of other matrices, including indoor air (which is a relatively recent development); site-specific allowance look-up tables and, in some cases, site-specific risk assessments. Numerical and risk-based corrective actions are often complicated enough in addressing site conditions and the contaminants of concern. These standards are developed to ensure the remedial action is protective of public health and the environment. Social and economic concerns are already considered in cleanup standards when using the broad categories of residential or industrial use of remediated land.

Currently I am not aware of any states that have formally incorporated social and economic metrics into cleanup standards. Stakeholder concerns for social and economic benefits are often separate considerations for site remediation. This is often the case for brownfields projects and sites where environmental justice issues are involved. Consideration of social and economic metrics separately on a qualitative basis may be the best approach in the early stages of trying to identify ways to track and measure these concerns. Eventually, as sustainable remediation approaches develop, they may be incorporated into cleanup standards.

DAVID S. WOODWARD

Generally speaking, social and economic metrics should be considered independently of environmental cleanup standards, including when applying the principles of risk-based corrective action (RBCA). It is extremely important that adequate protection of human health is a baseline expectation before any other metrics (i.e., social and/or economic) are considered. If we start sacrificing human health considerations in the interest of social or economic considerations, green and sustainable remediation will rapidly get a bad reputation and may even be considered "green washing" (i.e., using green and sustainable remediation metrics alone to justify a reduced amount of remediation).

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However, if it can be demonstrated that a remedy, including monitored natural attenuation (MNA), is sufficiently protective of human health, then social and economic metrics can be used to further demonstrate the appropriateness of the selected or existing remedy or MNA. In fact, the best opportunity to consider social and economic metrics may be when utilizing MNA and land-use restrictions (LURs) to preclude the need for the development of a site-specific standard. Regulatory agencies have, in some cases, significant latitude regarding what is required to close a site. On many sites, the key issue can end up being "time." How long is a reasonable amount of time before you must achieve a particular standard? For example, if an aquifer is not used and would not reasonably be used (and an ordinance preventing its use is in place or an LUR could be established), then social and economic metrics could be used to make a very compelling case for a lesser remedy or, in some cases, MNA. Although regulators may not initially consider a lengthy attenuation period (i.e., 30+ years in some cases) as reasonable, after considering the economic, social, and nontraditional environmental metrics (e.g., greenhouse gases), a compelling case can be made for a lengthy attenuation period.

RBCA is a framework that was designed to ensure that a remedy is protective of human health. As such, when conducting an exposure assessment as part of RBCA, if there are no complete exposure pathways, then calculating a numerical standard would be unnecessary because there is no unacceptable exposure to receptors. If the development of a site-specific standard is considered necessary, then there is potential exposure and

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fate/transport and attenuation need to be considered. In these cases, the reasonable amount of time for attenuation (discussed earlier) is driven by the distance to receptors. As also discussed earlier, the social and economic metrics would not typically apply in such a case.

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David S. Woodward has over 25 years of experience in the environmental field. He serves as the director of remediation technology for AECOM Environment and is an active and executive committee member of the Sustainable Remediation Forum (SURF). He is also an active member of the Interstate Technology and Regulatory Council (ITRC) Green and Sustainable Remediation Team and is involved in the development of the Air Force Center for Engineering and the Environment (AFCEE) Sustainable Remediation Tool (SRT). He is assisting in the development of the Wisconsin Initiative for Sustainable Cleanups (WISC) on behalf of the Wisconsin Department of Natural Resources (WDNR).

Remediation is accomplished by instructing Azure Policy to run the deployIfNotExists effect or the modify operations of the assigned policy on your existing resources and subscriptions, whether that assignment is to a management group, a subscription, a resource group, or an individual resource. This article shows the steps needed to understand and accomplish remediation with Azure Policy. How remediation security works. When Azure Policy runs the template in the deployIfNotExists policy definition, it does so using a managed identity. Sustainable remediation Environmental remediation is always an ambitious task. And the case of the Lower Fox River remediation project in Wisconsin is no exception. To reduce risk to both human health and the environment, the project aims to remediate PCB-impacted sediments from a 21.4-km stretch of river through dredging, capping, sand separation, sediment dewatering, water treatment, and ...Â This introduction is the first of a series of fact sheets on the opportunities for implementing best management practices (BMPs) of green remediation. Upcoming topics include renewable sources of energy, enhanced stormwater control measures, BMP checklists for the field, and enabling mechanisms for practitioners. Remediation developed a Sustainable Remediation Panel in the Summer 2009 issue, which featured the Sustainable Remediation Forum White Paper. The panel is composed of leaders in the field of sustainable remediation who have volunteered to provide their opinions on difficult subjects related to the topic of how to integrate sustainability principles into the remediation practice. The panel's opinions are provided in a question-and-answer format, whereby selected experts provide an answer to a question. This issue's question is provided below, followed by opinions from four experts in the remediation field. Life cycle assessment and environmental footprint analysis are considered by many to be important elements of the sustainable remediation evaluation process. The AudioEye Sustainable Testing & Remediation (STAR) Plan is an automatically generated report that details our process for identifying and correcting WCAG errors as well as the ongoing commitment to accessibility. The STAR Plan can assist if a customer is facing legal action or in possession of a legal demand letter. Customers will be able download the STAR plan from within the Portal once AudioEye has been installed on the site. For Enterprise customers the STAR plan is customized to address specific grievances identified in a legal demand letter or lawsuit, and is available through their account manager.