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Remediation Trends: New Models for a New Era in Cleanups

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Good Morning,

Thank you for inviting me to talk about one of my favorite subjects: Adaptive Management (AM) as a framework for remediation trends of the future.

First, I'd like to start with a quick look at EPA's stated remediation priorities from Steve Johnson's action plan, and then demonstrate how the AM framework could enhance their success:

- Restore contaminated properties, including brownfields, to environmental and economic vitality
- Promote stewardship through increased resource conservation, including waste minimization and recycling
- Foster technological innovations to support the clean development of domestic energy resources (oil, gas, nuclear, coal, wind, and solar)
- Expand the use of biofuels and promote diesel emissions reductions through retrofit and other technologies
- Promote the reduction, reuse, and recycling of both municipal and industrial wastes

These are all laudable goals, whose chances for achievement will be greatly improved by looking at the changing nature of Superfund and cleanup programs in general, and recognizing that a new framework is needed.

Growth of a wide variety of other cleanup programs, from State Voluntary Cleanup Programs, to OUST, to Brownfields, shifting as environmental priorities and the changing nature of contaminated sites these programs are at a critical cross roads.

Today, I would like to focus on new approaches for Superfund, but these AM strategies apply to any kind of cleanup.

Why it's time for a change

It is time for the government to consider new approaches for more collaborative, better-informed processes and expand the usefulness of federal regulatory programs.

- 1) The “low hanging fruit” has been picked. Those were the easy ones.
- 2) Superfund cleanups still in the pipeline involve complex watersheds, complicated technical issues, and pose challenging environmental and health concerns that require considerable time and resource commitments.
- 3) Unique challenges: EPA should tailor Superfund to accommodate community land use plans and complex environmental systems in order to make cleanups integrated with their surrounding ecosystems.
- 4) Rigid procedures that treat sites as if they were isolated from human activities and other environmental programs have outlived their usefulness.
- 5) To ignore their intrinsic and important relationships to broader natural and social systems is to create unintended consequences at worst, or prove to foreclose more innovative revitalization and reuse options.

Maintain the core mission but keep up with a changing world

Nobody is suggesting that EPA abandon its core mission. However, the program needs to improve its tactics to simultaneously promote future reuse alongside its traditional goals.

Safe to say that the regulators get it: reuse and redevelopment are the engines that drive cleanup.

Brownfields remediation, more by accident than design, has emerged as a model for adaptive reuse because it has created new productive reuse tools that can help address the complexity of remaining Superfund sites

Adaptive management for remediation- an updated approach

Here’s how it works, adaptive management:

- Incorporates experimentation into decision making to allow for continuous adjustments based upon incoming knowledge.
- Takes into account site variability, environmental mutability, and the uncertainty of environmental and social conditions.
- Informs the remediation process and improve its results by advancing EPA’s ability to learn about, monitor, and accommodate site specific circumstances.

- Provides for more active stakeholder representation within the remediation process. With the assistance of adaptive management, Superfund could simultaneously leverage its role and enhance its legacy.

Scenarios that lend themselves to A.M. approaches

Kai Lee, a prominent researcher of environmental applications for adaptive management has described several institutional conditions that indicate that adaptive management could be a useful tool to improve a project's performance. They include:

- 1) Agreement by stakeholders to act despite uncertainty;
- 2) Consciousness by decision makers that they are experimenting;
- 3) Awareness that improvement should take place over biological time scales;
- 4) Knowledge of difficulty of predicting results of human intervention;
- 5) Adequate resources to monitor and quantify ecosystem-wide reactions to experimentation;
- 6) Ability to use or create new models to predict ecosystem behavior and responses.
- 7) Capacity to develop hypotheses;
- 8) A culture that incorporates learning;
- 9) Patience to assess long-term results

Adaptive management is a more flexible approach that tests multiple alternatives simultaneously to determine what option is preferable for a project.

Elements of Adaptive Management Approaches

The federal government has successfully applied the adaptive management approach in a growing number of settings including natural resource management, conservation and habitat restoration, pollution control, and energy applications.

This variety of applications indicates that adaptive management is a useful tool for environmental managers to deal with the uncertainty and long project durations associated with effectuating change at the ecosystem level.

Not a prescribed set of actions but an approach that allows for maximum flexibility to improve understanding of complex systems.

Adaptive management transforms the management process into an experiment to probe the response of ecosystems as human behavior changes. Allowing for simultaneous learning and adaptation thereby allows environmental managers to test the viability of several proposed outcomes while determining how to achieve the best possible success for those outcomes.

Why is Adaptive Management right for Superfund and other cleanup programs?

Because adaptive management confronts complexity and uncertainty inherent in an ecosystem and utilizes it to consider multiple options, the Superfund program is an ideal area to implement this approach.

Since AM is a framework, and not a prescribed approach, it can successfully be utilized to ensure that all kinds of cleanup programs would benefit from it's application.

Conclusions

Challenging times: economic uncertainties, political uncertainties, environmental uncertainties

AM takes those uncertainties into account—abolishes the old model of pump and treat, one size remedy fits all,

AM is not a magic bullet, but it can be a critical tool that provides transparency, enhances stakeholder involvement, and is flexible enough to change with ever-changing variables.

I'd be happy to entertain questions.

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