Improving Environmental Site Remediation Through Performance-Based Environmental Management

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EXECUTIVE SUMMARY

As noted in the Interstate Technology & Regulatory Council (ITRC) Remediation Process Optimization (RPO) Team's first technical regulatory guidance document, *Remediation Process Optimization: Identifying Opportunities for Enhanced and More Efficient Site Remediation* (ITRC 2004), federal, state, and private-sector organizations will continue—for the foreseeable future—to spend billions of dollars on the characterization and assessment of contaminated environmental media and on the selection, construction, operation, maintenance, and monitoring of environmental remediation systems. As numerous environmental cleanup statutes and their implementing regulations evolved, it was initially assumed that these programs could follow a basic "study, design, build" linear paradigm. However, years of experience have led to the realization that the significant uncertainty inherent in environmental cleanup requires more flexible, iterative approaches that manage uncertainty. Uncertainty, as demonstrated by frequently missed target dates, has forced the development of mechanisms that allow for both the systematic reevaluation of initial objectives and the continuous improvement and optimization of remediation technologies and techniques. These mechanisms and reevaluations are known collectively, or generally, as RPO. The team has identified a related concept—performance-based environmental management (PBEM), a method of project management that relies on establishing, and working towards, performance objectives rather that managing only the process. The ITRC RPO team developed this guide to respond to that realization. Schedules for projects in the operating and maintenance or long-term remedial action phase are frequently measured not in years but in decades. In such instances, RPO and PBEM are not just desirable; they are essential.

Some state agencies (such as South Carolina) have embraced some form of PBEM in their remediation programs. The federal government considers performance-based management such an important concept that federal agencies are being required to implement performance-based management and performance-based contracting (PBC) as part of their business practice. This document provides practical information and guidance to interested parties—regardless of role (responsible parties, regulators, stakeholders)—who need to systematically evaluate and manage uncertainty associated with the remediation process by using PBEM. This document provides information and tools to help ensure that the remediation process is progressing toward acceptable and feasible site cleanup objectives and that selected remediation approaches attain those objectives and remain protective of human health and the environment.

This document offers guidance on the different PBEM frameworks that exist in different programs. It identifies issues affecting state regulators related to the differences between the traditional linear process paradigm and the more holistic PBEM process. The relationship between RPO and PBEM is presented. The document also explores what could and should be included in an effective PBEM program, including what PBEM and PBC are, the regulatory framework that PBEM and PBC must operate within, references that provide examples of successful PBEM and PBC, and resources for further examination of PBEM and PBC.

The traditional, linear cleanup process has been focused on the "how" of remediation, such as the technologies in place. This document continues to look not just at the "how" of site cleanup but

also at the "why." The "why" can be described as the conceptual site model (CSM), which considers all factors involved with the site remediation, such as the environmental and land-use (current and future) plans, site-specific chemical and geologic conditions, and the regulatory environment. The exit strategy or the conditions that must exist to reach an end point in the remediation are also discussed. PBEM creates a framework that links the development or renewed CSM with the exit strategy.

The regulatory environment establishes the need to review and possibly revise cleanup goals to ensure that the target goals are still applicable. As a result, scientific advances and regulatory changes—such as the movement towards risk-based goals and reevaluation of technologies deployed—are core features of PBEM. Therefore, consideration is given to the reevaluation of remediation goals and to ways that potentially inapplicable or unattainable goals can be updated based on these and other new regulatory approaches.

The guidance identifies and describes the applicability, advantages, and disadvantages of various approaches, as well as where they are most appropriate for use. The ITRC RPO Team acknowledges that there are several PBEM formats and has tried to identify as many as possible to familiarize state regulators with these formats so they can anticipate the needs of the PBEM process.

Depending on site-specific conditions and the status of current phase in the overall cleanup process, this document provides examples of when and where a PBC can be appropriately applied for cleanup. There are obvious situations (e.g., excavate and remediate a known amount of soils in a well-delineated case) where a PBC can be used easily compared to other complex situations. An example is completing the definition of free-phase product at a site with a complex geology. However, experience suggests that it is not often clear-cut where PBCs can and cannot be applied. The program areas and regulatory framework under which the remediation is being conducted, site-specific geological and hydrological conditions, and the vision and ability of potential responsible parties, among other relevant things, are all keys to successful application of PBCs. Knowing where a PBC will and will not work is a challenge to predict in complex situations; however, many cases have shown that PBCs were successful even in challenging conditions. At the same time PBCs have been unsuccessful in other cases of remediation that were thought to be clear-cut. Our experience concludes that neglecting the quality issues during the performance criteria determination while emphasizing only time and money issues certainly will contribute to the failure of a PBC process.

This document clarifies some of these issues and emphasizes that approaching remediation in a holistic manner, keeping the end goal all through the process, is an essential way to reduce the uncertainty in remediation decision-making process. That, we believe, is the essence of PBEM approach to site remediation.

This document uses many acronyms throughout that may make reading this document a challenge. After numerous discussions, the RPO team agreed to respect different agencies and organizations that consider those acronyms important within their entities and included them all in this document. The team acknowledges and apologizes for any distress these acronyms may

cause to general reader. Please rely on the acronym list in Appendix G at the back of the document.

Lastly, please note: PBEM and PBC seem to be similar and are sometimes used together, but not interchangeably, when appropriate in this document. The ITRC RPO Team emphasizes that performance-based *contracting* is a *tool* that helps in the successful implementation of performance-based *environmental management*. PBEM is a project management process that uses better techniques—such as PBC and other components or tools—to manage contaminated site cleanups.