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A Performance-Based Approach to Ending Post-Closure Care at Municipal Solid Waste Landfills: A Procedure for Providing Long-Term Stewardship under RCRA Subtitle D

ABSTRACT: The Environmental Research and Education Foundation developed an innovative approach toward evaluating long-term care needs at municipal solid waste (MSW) landfills. The approach emphasizes the operation of MSW landfills in a manner that reduces the long-term threat to human health and the environment, as well as a proactive collection of data on the state of the landfill during post-closure care.

In 1991, the U.S. Environmental Protection Agency (EPA) promulgated new criteria under Subtitle D of the Resource Conservation and Recovery Act (RCRA) that required municipal solid waste (MSW) facilities to provide for a minimum of 30 years of post-closure care (PCC) after final closure. The federal criteria also allowed state regulators to extend or shorten the PCC time period as needed to provide for the protection of human health and the environment. The approach, termed Evaluation of Post-Closure Care (EPCC), developed by the Environmental Research and Education Foundation's (EREF) research is an important compliment to EPA requirements for oversight of MSW landfills.

Regulators and other stakeholders have expressed a need for technical guidance to assist them in their consideration

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of the validity, at any particular site, to shorten or extend the 30-year baseline. To fill this need, EREF funded GeoSyntec Consultants (Columbia, Md.) to develop a peer reviewed, performance-based methodology to evaluate the environmental and health threats on a modular basis. The goal of the research was to design a scientifically defensible, site-specific process to evaluate whether or not landfill source medias (leachate and landfill gas) no longer pose a threat to human health and the environment, and operational or monitoring elements (leachate management, monitoring for LFG migration, groundwater monitoring, and maintaining the integrity of the final cover) can therefore be discontinued. GeoSyntec utilized a team of experts familiar with landfill engineering, operational and monitoring controls, and source media (leachate and landfill gas) characterization to define the EPCC approach. The team of technical experts then worked closely with organizations such as National Solid Waste Management Association (NSWMA), Solid Waste Association of North America (SWANA), Association of State and Territorial Solid Waste Management Officials (ASTSWMO), and other stakeholders to develop consensus on the feasibility of the approach.

The EREF guidance describes:

- Approaches to gather physical and chemical data to characterize the principal landfill components during PCC, and

- Procedures to evaluate physical and chemical data, and show the effectiveness of the principal landfill components of operation and maintenance (O&M) to be protective of human health and the environment at the points of exposure.

The EREF approach can be used to evaluate when a closed landfill has successfully completed post-closure care and is ready to transition into non-regulatory custodial care and potential beneficial use.

The EREF methodology advances the concept of long-term stewardship for landfills by providing clear guidelines for data gathering and sound technical approaches for evaluating the potential impact to human health or the environmental in the area surrounding the landfill.

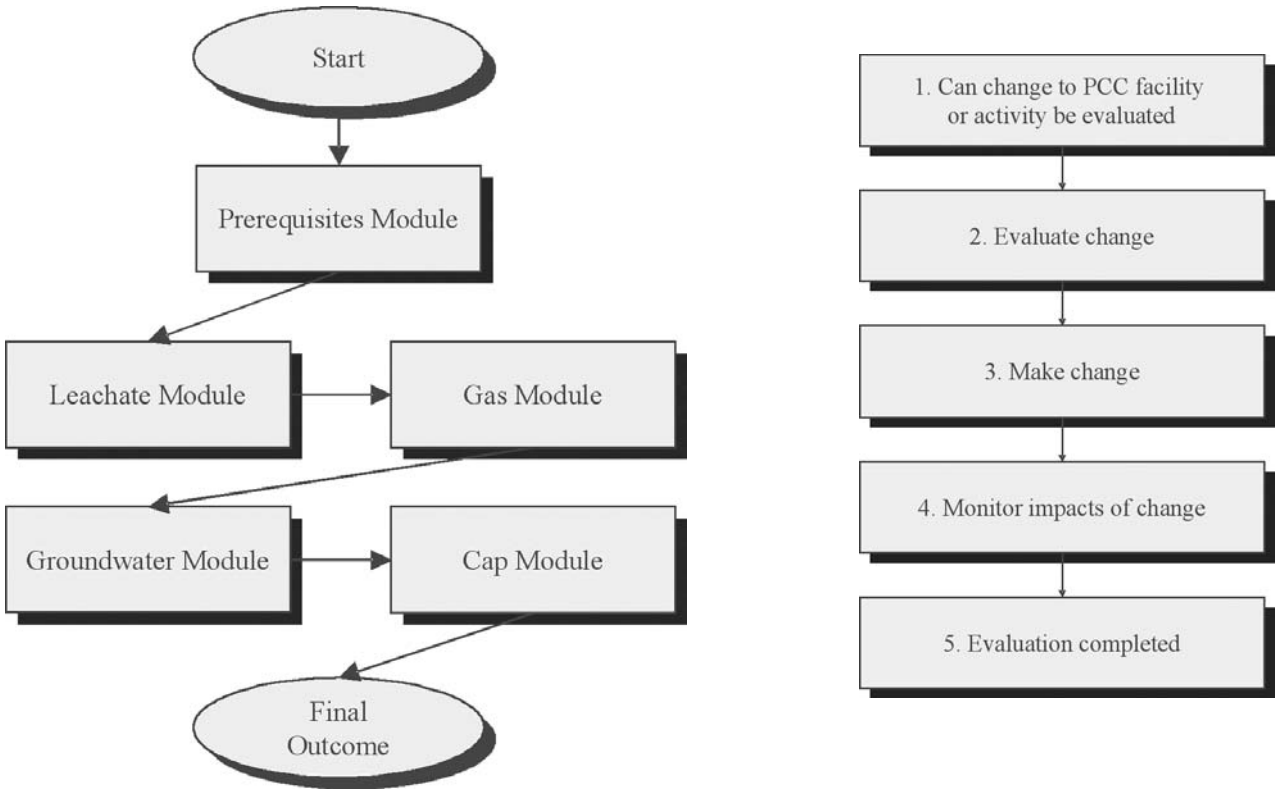

Figure 1. Component Modules of the EPCC Approach (left) and five-step performance-based evaluation philosophy for each module (right).

The approach:

- Facilitates improved allocation of resources;
- Endorses proactive management of those components that may have more potential for threat to the environment during the active life of the facility; and
- Assures that future use of the land will be compatible with its surroundings.

The EREF approach is designed to provide an evaluation of threat on a modular basis. Specifically, the approach includes five modules, one Prerequisites Module (data requirements) and four PCC element Modules as described in Subtitle D (leachate module, gas module, groundwater module, and cap module). The approach allows PCC to be evaluated on a sequential basis. Additionally, a modular evaluation can be conducted on an element-by-element basis during landfill operation and post-closure care to identify whether changes in operational practices can be optimized to reduce long-term potential threats of the landfill. Figure 1 provides a process flow diagram of the EREF EPCC process.

The EREF EPCC methodology refines the post-closure regulatory process to focus resources on the aspects of the facility that need attention. As components of post-closure care cease to be needed (e.g., landfill gas generation declines to rates that no longer require active collection), requirements for that component can either cease or be significantly reduced and more focus can be placed on components that remain active. The EREF EPCC approach also provides a mechanism to evaluate environmental data to facilitate post-closure care decisions, including the optimization of various post-closure care components, up to and including terminating a component. Accordingly, the EREF EPCC process is focused on defining long-term threat potential and encourages cost-effective application of resources to the components that require management consistent with long-term environmental stewardship.

The primary benefits of the EREF EPCC approach provides:

- A defensible, systematic approach that allows for regulatory PCC to end and transition to a non-regulatory care program, termed Custodial Care, after the principal landfill components are demonstrated to not threaten human health and the environment at the points of exposure;
- Technical support to implement proactive operational practices (such as bioreactor or alternative final cover technology), accelerate waste decomposition and stabilization, and reduce the long-term threat potential of landfills;
- Justification for optimization of resources during closure and PCC periods; and
- A roadmap for environmental stewardship that ties community desire for the successful return of land to productive use while addressing community concerns that long-term threat to human health and the environment is appropriately evaluated.

Overall, the EREF EPCC approach is an industry milestone to support and encourage proactive operation of active and closed landfills to ensure protection of human health and the environment prior to and during post-closure care. ■

Copies of the report Performance-Based System for Post-Closure Care at MSW Landfills are available by contacting Sarah Stancliff at 703-299-5139 (sstancliff@erefdn.org). Technical questions regarding the project should be directed to Jeremy Morris (jmorris@geosyntec.com) or Mike Houlihan (mhoulihan@geosyntec.com) at GeoSyntec Consultants, Columbia, Maryland 410-381-4333.

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