

Comments on  
Draft US EPA Guidelines for  
Evaluating and Adjusting the Post-Closure Care Period for Hazardous Waste  
Disposal Facilities under Subtitle C of RCRA

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The US EPA [<http://www.epa.gov/osw/hazard/tsd/td/ldu/financial/hwclose.htm>] invited public comment on its “Public Review Draft 4-29-15,” entitled, “Guidelines for Evaluating and Adjusting the Post-Closure Care Period for Hazardous Waste Disposal Facilities Under Subtitle C of RCRA,” released as a memorandum on April 29, 2015 [[http://www.epa.gov/osw/hazard/tsd/td/ldu/pdf/post\\_closr\\_gd.pdf](http://www.epa.gov/osw/hazard/tsd/td/ldu/pdf/post_closr_gd.pdf)].

### **Purpose and Need for Guidance**

The memorandum described the purpose of and need for the guidance as follows:

*“The purpose of this memorandum is to provide guidance to assist regulators in evaluating the length of the post-closure care period for hazardous waste disposal facilities subject to Subtitle C of the Resource Conservation and Recovery Act (RCRA), and in determining whether it should be adjusted. This guidance also provides information to assist facility owners and operators in preparing documentation to support a decision to adjust the post-closure care period.”*

*“Post-closure care requirements apply to land disposal units that leave hazardous waste in place after closure. These include landfills, land treatment units, surface impoundments, and other units (e.g. certain tanks or containment buildings) where the constructed unit has been removed, but not “clean.”*

*“Post-closure can be generally described as the period of time after closure during which owners and operators conduct specified monitoring and maintenance activities to preserve the integrity of the containment system and to continue to prevent or control releases of contaminants.”*

*“Still, the regulations’ identification of a 30-year post-closure care period does not reflect a determination by EPA that 30 years of post-closure care is necessarily sufficient to eliminate potential threats to human health and the environment in all cases. In fact, the regulations provide authority for a permit authority to conduct a case-by-case review of the post-closure care period and to establish arrangements to adjust the length of the post-closure care period on a facility-specific basis, where the record supports a determination that the revised post-closure period will protect human health and the environment.”*

*“It is recommended that the permitting authority consider any unit-specific closure and post-closure requirements when evaluating whether adjustment of the post-closure care period is warranted to protect against any potential impact on human health and the environment.”*

Key to the meaningful evaluation and management of the full impact of hazardous waste facilities is how the US EPA defines the requirement to “*protect human health and the environment*” and “*eliminate potential threats to human health and the environment in all cases.*” These responsibilities have generally been considered in implementation of US EPA regulations to mean reduce exposure of people to levels of a small, select group of toxic chemicals known to have adverse impacts on human health for some period of time. This is reflected in the draft guidance statement,

*“Can the facility owner or operator show through monitoring and modeling that the leachate would not pose a threat to human health and the environment because it does not exceed applicable standards? Will those standards likely be exceeded in the future, for example, through formation and release of degradation products?”*

These nebulous and yet limited definitions of the ultimate goal for protection of public health/welfare and the environment are one of the significant shortcomings of the existing regulations and these draft guidelines.

The US EPA’s consideration of so-called toxic chemicals is restricted to those on a list of commonly considered chemicals, and not to the full array of toxic, carcinogenic, and otherwise deleterious chemicals, known and presently unrecognized, that can be adverse to human health and to the use of water that is contaminated (polluted) by releases from a hazardous waste management facility. If the concentration of one of the listed toxic chemicals is less than a regulatory threshold then the waste that is being tested is said to be “non-hazardous” and can be disposed in a Subtitle D municipal solid waste landfill.

Initially, the US EPA based, in part, its identification of “hazardous wastes” that must be disposed of in so-called “hazardous waste landfills” on the results of a leaching test (“EP-Tox” Test); the “hazardous” designation was determined based on the amounts of listed chemicals leached under specified laboratory test conditions that were not reliably representative of reasonably anticipated landfill conditions. By the time the US EPA completed development of the EP-Tox Test we had completed several years of study devoted to examining the leaching of chemicals from US waterway sediments and the factors that control the release of chemicals from solids in the environment. Those studies lead to the publication of

Lee, G.F. and Jones, R.A., "A Risk Assessment Approach for Evaluating the Environmental Significance of Chemical Contaminants in Solid Wastes," IN: Environmental Risk Analysis for Chemicals, Van Nostrand, New York, pp. 529-549 (1982). <http://www.gfredlee.com/HazChemSites/SiteSpecificTCLP.pdf>

Subsequently we presented the paper,

Lee, G.F. and Jones, R.A., "Application of Site-Specific Hazard Assessment Testing to Solid Wastes," IN: Hazardous Solid Waste Testing, ASTM STP 760, American Society for Testing and Materials, pp. 331-344 (1981),

[http://www.gfredlee.com/HazChemSites/Haz\\_Assess\\_Solid\\_Wst.pdf](http://www.gfredlee.com/HazChemSites/Haz_Assess_Solid_Wst.pdf)  
which received the American Society for Testing and Materials' Charles B. Dudley "Best Paper" Award for that conference for its contribution to the understanding of hazardous solid wastes.

Additional discussion of technical aspects of the unreliability of the US EPA approach for classification of wastes as "hazardous" or "non-hazardous" is presented in the following reports (as described in a subsequent section of these comments):

Lee, G.F., and Jones-Lee, A., "TCLP Not Reliable for Evaluation of Potential Public Health and Environmental Hazards of PCBs or Other Chemicals in Wastes: Unreliability of Cement-Based Solidification/Stabilization of Wastes," Report of G. Fred Lee & Associates, El Macero, CA, September (2009).

[http://www.gfredlee.com/Landfills/TCLP\\_Solidification.pdf](http://www.gfredlee.com/Landfills/TCLP_Solidification.pdf)

Lee, G. F. and Jones-Lee, A., "Flawed Technology of Subtitle D Landfilling of Municipal Solid Waste," Report of G. Fred Lee & Associates, El Macero, CA, December (2004). Most recently updated Jan (2015) [www.gfredlee.com/Landfills/SubtitleDFlawedTechnPap.pdf](http://www.gfredlee.com/Landfills/SubtitleDFlawedTechnPap.pdf)

### **Criteria to Consider for Extending or Shortening the Post-Closure Care Period**

Page 3 of the US EPA draft guidance for evaluating the need for additional post-closure care begins a discussion of the "Criteria to consider for extending or shortening the post-closure care period," and the "Nature of hazardous wastes remaining in the unit." The draft reads:

*"Presence of hazardous waste: Because many hazardous wastes degrade slowly or do not degrade under containment in these units, the continued presence of hazardous waste in the unit (i.e., any case other than clean closure) indicates the potential for unacceptable impacts on human health and the environment in the future if post-closure care is not maintained, and suggests that post-closure care should be extended, even if there is no current evidence of actual releases from the facility."*

This recognition that the absence of current evidence of releases from a hazardous waste facility does not suggest that post-closure care can be terminated is significant and important. As discussed in our "Flawed Technology" review, we have encountered situations of landfill owners/operators such as Waste Management, Inc. who claim that because there have been no detected releases from a particular landfill the post-closure care for that landfill can be terminated. Depending on the quality of construction of the waste management unit and other factors that are not well-defined, releases from a hazardous waste landfill can be delayed for many decades to hundreds years after waste placement. As recognized in the draft guidance and discussed in our writings, some of the components of hazardous waste can be a threat to release hazardous and otherwise deleterious chemicals to the environment effectively forever, i.e., they do not degrade in a way that eliminates their threat. It is heartening to see those critical issues noted, albeit tangentially, in the draft guidance. However, as also discussed in our writings, the US EPA needs to develop a testing procedure for sampling wastes in a landfill by coring and exposing those cores to water for leaching to more reliably evaluate if toxic/hazardous or otherwise deleterious substances (which if present in groundwater would impair its use for domestic, agricultural, or other use) could be leached when exposed to water *in situ*.

*Type of Unit:* Our "Flawed Technology" review discusses the inevitable, eventual failure of

plastic-sheeting and compacted clay liners to prevent leachate that will be generated in a landfill from penetrating the liner and migrating into the underlying groundwater system. Once in the groundwater system, the leachate will pollute the groundwater and render it unusable as a water supply source due to known and unknown/unrecognized hazardous/toxic and otherwise deleterious chemicals.

*Leachate:* The presence of leachate in a leachate collection system is direct evidence that the landfill cover has failed to prevent the entrance of sufficient moisture into the waste and release of waste components/leachate from the buried wastes. The ability of a landfill to delay the generation of leachate depends largely on the integrity of the landfill cover. Over time the integrity of the landfill cover will deteriorate and allow water to enter the landfill that can generate leachate. If the cover is well-maintained during a 30-year, or other, post-closure period, it can be expected that leachate may not be revealed in the leachate collection system during that time. However, once thorough cover maintenance is discontinued, leachate would be expected to eventually be found in the leachate collection system, provided that that system remains functional. Thus, as discussed above, claims by some landfill owners/operators that the absence of leachate in the leachate collection system demonstrates that the post-closure period can be terminated are without merit.

*Groundwater:* Groundwater monitoring systems allowed by regulatory agencies, ostensibly for detecting insipient liner leakage/groundwater pollution, typically employ vertical monitoring wells spaced hundreds of feet apart along the point of compliance. As discussed in our “Flawed Technology” review, such systems are exceedingly unlikely to detect leachate-pollution of groundwater before significant off-site groundwater pollution has occurred. The integrity of a landfill containment system is more reliably monitored for the protection of human health/welfare and environmental quality by the inclusion of an additional leak detection system placed between two composite liner systems. When leachate is detected in the upper leak detection layer, the landfill cover integrity should be restored to a condition that would prevent water from entering the landfill. Such requirements would make it more likely that leachate production would be detected and addressed/stopped before the leachate reaches the bottom liner of the landfill and has the opportunity to leave the containment system. However, even such provisions have a finite ability to contain and address leachate generation that has the potential to pollute groundwater because they will not retain their integrity for as long as the wastes in the landfill will be a threat, and being buried beneath the wastes, are not amenable to reliable inspection and repair.

*Siting and site geology/hydrogeology:* This section of the draft regulations states, “*Relevant facility location characteristics (which might have changed since the post-closure plan was approved) may include proximity to vulnerable areas such as residential areas and surface and drinking water sources.*”

This approach is inappropriate for evaluating the need to extending the post-closure period. The criteria for protection of groundwater from pollution by landfill leachate should focus on the prevention of pollution of groundwater by any component of leachate that could impair the use of groundwater for any beneficial use, independent of the current or potential offsite use of the groundwater.

*Integrity of cover system:* As discussed in our “Flawed Technology” review, because a landfill liner system cannot be repaired as it deteriorates, the integrity of landfill cover must be maintained and improved as necessary to prevent the entrance of water into the landfill. Because the waste will remain a threat for as long as it remains buried in the landfill, a reliable cover that prevents entrance of moisture is the key to preventing groundwater pollution by leachate that will pass through a deteriorated liner system.

### **Recommended Approach for Reviewing Hazardous Waste Management Units Approaching the End of the Post-Closure Care Period**

*Effects on post-closure financial assurance requirements:* This section of the draft regulations states,

*“Finally, permitting authorities should keep in mind that a changed post-closure period may also necessitate revisions to the associated post-closure cost estimate and financial assurance. These changes should be reflected in the facility’s modified permit or other documentation (in the case of interim status facilities).”*

The key to post-closure care that protects public health/welfare and environmental quality for as long as the hazardous waste landfill or impoundment remains a threat is the definition of the funding amount and source to provide full, post-closure care, including monitoring, maintenance, and the inevitably needed remediation of environmental pollution. Without such assurance of appropriately computed and guaranteed funding, the extension of a post-closure period is essentially meaningless, as the unmet costs will otherwise be passed on to taxpayers and the public, rather than being borne by those generating and managing the wastes.

### **Summary Comments**

The US EPA draft “Guidelines for Evaluating and Adjusting the Post-Closure Care Period for Hazardous Waste Disposal Facilities under Subtitle C of RCRA” cover aspects of a number of key issues that need to be properly considered in assessing the need for extending the post-closure period for a hazardous waste landfill. Many of the issues addressed are equally applicable to other hazardous waste management facilities such as waste management impoundments. Our “Flawed Technology” review discusses many of the issues that need to be more properly defined, evaluated, and specified to provide for protection of public health/welfare, groundwater and environmental quality, and the area of the hazardous waste facility. In general the approaches and criteria specified for evaluating the post-closure care measures and duration should be conservative, i.e., error on the side of ensuring protection of public health/welfare and the environment.

### **Experience of Commenters in Investigation of Landfill Impacts**

Dr. G. Fred Lee has had more than 50 years of experience, and Dr. Jones-Lee 30 years of experience, in investigating environmental impacts of municipal solid waste and hazardous waste landfills. We have published more than 100 professional papers and reports on our work on these issues, most of which are available on our website, [www.gfredlee.com](http://www.gfredlee.com), in the Landfill Impacts section at [http://www.gfredlee.com/Landfill\\_Impacts.html](http://www.gfredlee.com/Landfill_Impacts.html). Our papers/reports addressing key issues pertinent to the US EPA’s draft guidance concerning the extension of the post-closure period for hazardous waste management facilities – available from in our website section devoted to Post-Closure Care of Landfills

(<http://www.gfredlee.com/plandfil2.html#postclosure>) – include the following:

- Our “Flawed Technology” report is a comprehensive discussion, with extensive references to the professional literature, of many of the technical issues pertinent to evaluating the impact of landfills on public health/welfare and environmental quality. It contains extensive discussion of post-closure care issues that need to be addressed to protect public health/welfare and groundwater/environmental quality from adverse impacts of landfills. Lee, G. F. and Jones-Lee, A., “Flawed Technology of Subtitle D Landfilling of Municipal Solid Waste,” Report of G. Fred Lee & Associates, El Macero, CA, December (2004). Last updated Jan (2015) [www.gfredlee.com/Landfills/SubtitleDFlawedTechnPap.pdf](http://www.gfredlee.com/Landfills/SubtitleDFlawedTechnPap.pdf)
- A paper we were invited to prepare for publication focusing on MSW landfill postclosure care issues. While that paper is focused on MSW landfills it is equally applicable to RCRA Subtitle C landfills. Jones-Lee, A., and Lee, G. F., “Landfill Post-Closure and Post-Post-Closure Care Funding - Overview of Issues,” *WasteAdvantage Magazine* 5(12):24-26 December (2014). [http://www.gfredlee.com/Landfills/Funding\\_Issues\\_WasteAdvantage.pdf](http://www.gfredlee.com/Landfills/Funding_Issues_WasteAdvantage.pdf)
- Lee, G. F., and Jones-Lee, A., “Comments on the US EPA’s Efforts to Improve Solid Waste Recycling,” in response to request for comments on US EPA webinar, “Advancing Sustainable Materials Management: Facts and Figures 2013,” Submitted to US EPA June 19 (2015). [http://www.gfredlee.com/Landfills/USEPA\\_Solid\\_Waste\\_Recycling.pdf](http://www.gfredlee.com/Landfills/USEPA_Solid_Waste_Recycling.pdf)
- Lee, G. F., and Jones-Lee, A., “Guidance on the Evaluation of Potential Impacts of a Proposed Landfill,” Report of G. Fred Lee & Associates, El Macero, CA (2015). <http://www.gfredlee.com/Landfills/EvaluationImpactLF.pdf>
- Lee, G. F., “Developing Protective Landfills,” Report of G. Fred Lee & Associates, El Macero, CA, January 19 (2013). [http://www.gfredlee.com/Landfills/Sum\\_Developing\\_Protective\\_Landfills.pdf](http://www.gfredlee.com/Landfills/Sum_Developing_Protective_Landfills.pdf)
- Jones-Lee, A., and Lee, G. F., “Expectations of Performance of Subtitle D Landfills: Comments on ‘End of Life, Post-Closure Care, and the Sustainable Landfill’ by J. Morris,” Report of G. Fred Lee & Associates, El Macero, CA, August 2 (2012). [http://www.gfredlee.com/Landfills/Expectations\\_Perf\\_SubtitleD.pdf](http://www.gfredlee.com/Landfills/Expectations_Perf_SubtitleD.pdf)

If there are questions on our writing on these issues please contact us.

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