Proceedings of the Environmental Protection Agency
PUBLIC MEETING ON WASTE LEACHING
Session IV - Leaching Policy and Applications

Panel I - Test Design and Implications: Waste Characterization

David Friedman, of the EPA Office of Research and Development (ORD), opened this panel discussion session with an overview of the issues he saw as important to EPA's leaching policy decisions. His first point was that the original purpose of waste characterization was to determine if a waste needs to be managed as a hazardous waste and that a major secondary purpose was to allow EPA to evaluate a treated waste to determine if it could be removed from regulation as a hazardous waste.

Mr. Friedman indicated that the assumption that wastes will be co-disposed to municipal (nonhazardous) wastes still applies, and that the wastes to be characterized represent only 5% of the total waste volume in a co-disposal scenario. Thus, the situation is not "waste-limited."

From a practical standpoint, Mr. Friedman argued that leaching test must take less than 24 hours. It must assume that the co-disposal would occur in a young landfill with significant organic contents. One must assume that the stability and physical integrity of the waste will not change, since there is no good way to evaluate its integrity. He pointed out that the cost of the test was a critical factor.

Mr. Friedman went on to raise several questions that he thought that the session ought to address, including:

1. Is the co-disposal scenario valid?
2. How important is biodegradation, which the TCLP does not address?
3. There are trade-offs between time to conduct the test and accuracy of the result. How important are these trade-offs?
4. Should waste-specific properties be taken into account?
5. How can we related laboratory testing results to the inputs needed for modeling?
6. Is there a better existing test than the TCLP?
7. Can the problems with waste characterization be fixed with simple modifications or is a new test needed?
8. How accurate must the test be?

Greg Helms, of the EPA Office of Solid Waste, presented a brief version of OSW's perspective on the issues to be considered in characterizing wastes. His major points included:

9. New/modified test(s) must be reliable across a broad array of waste types.
10. The test must be reasonably inexpensive.
11. It must produce results in a reasonable time frame.
12. It must have a clear, rational relationship to the regulatory and management framework

and produce an unambiguous result.

13. It must be useful to risk assessment in site-specific setting
14. It must be accurate or have a known bias, although increased accuracy will lead to increased cost and complexity.
15. It must account for matrix effects and the long-term stability of monolithic wastes.

Harley Hopkins, of the American Petroleum Institute, presented his perspectives on leaching oily wastes, which is a major concern for the oil industry. Mr. Hopkins noted that leaching tests were applied to oily wastes both to characterize hazardous wastes, i.e., Subtitle D vs. Subtitle C management, and in association with corrective actions at contaminated sites. In the case of waste characterization, the groundwater pathway is of concern and relatively specific leaching conditions apply. In contrast, when determining when to begin and when to stop corrective action, other pathways are also important and the various parameters, e.g., infiltration rate, soil type, degradation, volatilization, groundwater velocity, etc., are more site-specific.

Mr. Hopkins indicated that leaching test protocols should be able to handle both cases. The key features a test protocol should have with respect to oily wastes include:

16. Tests should be simple - especially a Tier 1 test.
17. Tests should generate parameters that can be used in a modeling framework that reflects a good description of the source term.
18. Leaching test(s) must account for realistic leaching, especially source depletion over time.
19. The protocol should allow a tiered approach to waste assessment.
20. Flexibility to consider other loss mechanisms, e.g., volatilization, degradation, etc.
21. Flexibility to incorporate site-specific information.

In describing the attributes of new leaching protocols, Mr. Hopkins stated that it would be important to replace the current batch tests with simpler batch tests that are appropriate for oily wastes. The test should be able to address non-aqueous phase liquids (NAPLs) using default values, estimation techniques, or separate specific tests. He felt that the methods should allow the user the flexibility to refine the initial characterization to consider waste properties and the management scenario. Such refinements allow a better characterization at the same level of protectiveness. He advocated a tiered approach, and stated that new tests should account for other loss processes, e.g., volatilization and degradation, with separate estimation techniques/tests using conservative default parameters for lower tier analysis and more specific tests for higher tier analysis.

In terms of refining the characterization of oily wastes, Mr. Hopkins stated that EPA should keep the basic batch leaching test approach, but couple it with totals analysis to obtain leaching parameters for a better assessment of leaching. The refinements should improve the values used for key site-specific parameters, e.g., infiltration rate and degradation rate, that impact risk calculations, account for heterogeneity issues, especially with respect to modeling various transport processes in site specific assessments, and account for kinetic limitations with default values or separate tests, when needed.

In describing the mobility issues surrounding NAPL, Mr. Hopkins noted that because of the land ban restrictions, the mobility of NAPL should be determined separately from leach testing. In many oily wastes, the oil is residually trapped and does not migrate in the environment. Thus, batch tests do not reflect the actual migration behavior. The current batch test protocols report the oily waste as reaching the ground water receptor if a NAPL is generated during the test. However, the presence of a NAPL phase, in fact, generally reduces leachability of organics. Therefore, a new protocol (an estimation technique or test) may be needed to detect those cases where the oil content exceeds a "residual" level.

Mr. Hopkins commented on the utility of batch tests for oily wastes, noting that simple batch tests are useful for describing realistic leaching for organic compounds from oily wastes, especially if equilibrium conditions occur. Batch tests appear reasonable for lower tier characterization. In some cases, the use of Raoult's Law, which is conservative, may preclude leachate testing. Simple batch tests can be used to develop partition coefficients for simple equations to predict leaching with time. He noted that other specific test issues identified by the SAB should also be considered, if relevant, e.g., colloids/emulsions, particle size effects, etc.

Mr. Hopkins stated that new testing protocols should allow the user to characterize the waste and to determine "how clean is clean?" The tests should also:

22. be simple to perform
23. be easy to understand
24. low cost
25. generate data for modeling
26. simulate realistic management scenarios
27. be flexible in terms of the protocol (for site-specific information)
28. be able to account for NAPL mobility
29. keep batch approach - add totals analysis
30. add site-specific information
31. account for heterogeneity
32. account for kinetic limits

Mr. Hopkins stated that NAPL mobility should be determined separately from the leaching tests. He noted that the current batch testing produces misleading results when NAPLs are present. He believes that the batch test is useful for oily waste, particularly in terms of lower-tier testing. However, it will be necessary to generate data that can be used for predictive modeling. He reiterated a call to consider the relevance of the issues discussed by the SAB.

Bart Simmons, of the California EPA, delineated three steps that he felt needed to be taken in any revisions to the leaching protocols. These three steps are:

1. Clearly establish policy goals, in quantitative terms

2. Decide what waste management scenarios are consistent with the policy goals

3. Decide what models will be used and what leaching tests are consistent with those models

Mr. Simmons continued his remarks by presenting two additional concerns to the audience and asking them to suggest others.

1. You must account for the uncertainties of the modeling and risk assessment when considering the leach test.

2. You must consider the economics of the test.

The audience offered the following conditions and observations (Given the number of suggestions, no attempt has been made here to identify the person making each suggestion, nor to comment on their relevance).

1. When formulating policy, must consider adding flexibility to account for waste management practices.

2. Must consider similarities in wastes and combined testing (from similar processes) when considering costs of new testing plans or configurations. There are great similarities within waste classes (based on generation process).

3. Safety Kleen has about 80 new generators per day that fall into 120 "Standard Industry Profile" wastes, out of about 300 generators per day. Being able to accept/process wastes under that information would be a big help.

4. There is currently a bill pending in California to require more testing for waste classification.

5. Waste management scenarios must also consider storage options and all exposure pathways.

6. HWIR is looking at multi-pathway risk in order to exit the waste regulatory system. Should EPA consider a similar approach for entry?

7. For Tier 1 testing, you must keep the model simple. You cannot write regulations that account for all eventualities, all site-specific conditions, and heterogeneity.

8. EPA's challenge: How do you know when someone is not doing what you intended? If a waste is not managed under certain conditions, how might it be managed? If the intent is give credit for management of non-hazardous waste under certain conditions, how do you control that?

9. It seems inequitable to require the same testing for mismanaged wasted and properly managed/treated wastes.

10. This system would include secondary testing to confirm that waste batches would conform to the "Standard Industry Profile," as well as providing operational data for testing.

11. Prescription vs. process aspects of testing (testing a method-defined parameter vs.the PBMS approach to leach testing)

12. Changing the leaching fluid is an easy fix.

13. Defining the accuracy of a test is resource-intensive (precision is easier). EPA must define how accurate they need (want) the test to be, then make the measurements.

14. The history of the particular waste can influence whether a waste fits into a "Standard Industry Profile." Foundry sands are a good example.

15. Cost is only important if the test is accurate.

16. People will pay more for good data.

17. What happens when a waste falls outside of the RCRA regulations? In RCRA, there is a tiered system of landfills to which wastes are assigned on the basis of testing. One can also consider waste compatibility, based on landfill design.

18. Multiple pH leachings, where the pH is determined by the waste, have been useful.

19. One test will not accomplish EPA's wish list. If there was a list of "this procedure for that situation," then the industry could cope. Because the cost of the leaching is a minor component of the overall analytical costs, running two tests, one for inorganics and one for organics is not a burden.

20. Testing frequency is an issue. The Netherlands specifies testing frequency, on a waste-by- waste basis, for the compliance phase of testing.

21. The variability of the concentration of certain elements, at a given pH, can provide a useful indicator of whether or not a waste fits into the "Standard Industry Profile".

22. Industry *is* interested in looking to see if ground water is contaminated, and managing the waste accordingly.

23. Our regulatory system is not amendable to the current state of leaching science.

24. Contingent management is a difficult process, in the regulatory sense.

25. Separate the management scenarios from the test procedure. The scenarios tell you how

to interpret the results. Within reason, the important information to have is the total amount of material that could leach, and that may require multiple test procedures.