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LEACHATE AND PRECIPITATION RUN-OFF AT LFs, WASTE PILES, AND LT  
UNITS, HAZARDOUS WASTE FROM MIXTURE OF

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Management of Precipitation Run-off from Land Treatment Units

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INTRODUCTION

In the attached April 10, 1984 memo addressed to David Wagoner of Region VII, I described OSW's policy on the management of precipitation run-off from active, inactive, and closed portions of hazardous waste management units. The April 10 memo focussed primarily on scenarios applicable to waste piles and landfills. This memo clarifies some of the important concepts discussed in the April 10 memo and describes how OSW's policy on management of run-off applies to hazardous waste land treatment units.

SUMMARY

Under 40 CFR 261.3(c)(2), precipitation run-off is not presumed to be a hazardous waste. In contrast, leachate generated from the treatment, storage, or disposal of a hazardous waste is a hazardous waste by definition (§261.3(c)(2)). A mixture of precipitation run-off with a listed hazardous waste is a hazardous waste unless the mixture is delisted, and a mixture of precipitation run-off with a characteristic hazardous waste is presumed to be a hazardous waste unless it is shown not to exhibit any characteristic of hazardousness (§261.3 (a)(2)(iii) and (iv) and §261.3(b)(2)). Because of precipitation run-off and leachate is a hazardous waste.

Run-off from the active portions of hazardous waste landfills and waste piles, because of their design, will almost inevitably consist in part of leachate and should, therefore, be presumed

initially to be a hazardous waste. The owner or operator can overcome this presumption by demonstrating that the collected run-off consists only of precipitation run-off. Because it is unlikely that the precipitation run-off from closed portions of hazardous waste landfills and waste piles will have mixed with leachate, run-off from these portions can generally be presumed not to be a hazardous waste.

Regarding land treatment units, the rules and preambles do not specify whether precipitation run-off and leachate should be presumed to mix. To clarify, the Agency will not presume that collected run-off from a typical land treatment unit is a hazardous waste.

In all cases, the owner or operator still collect all run-off in accordance with the Part 264 and 265 regulations and is still responsible for determining whether the run-off exhibits any of the characteristics of a hazardous waste defined in Subpart C of Part 261.

## DISCUSSION

### Clarification of April 10 memo

My April 10 memo explained the key definitions and concepts regarding the management of run-off from land-based hazardous waste treatment, storage, and disposal units. In understanding that policy, it is important to recognize the relationship between leachate and run-off, and the applicability of the mixture rule (§261.3(a)(2)(iii) and (iv) and 261.3(b)(2)) and the "derived from" rule (§261.3(c)(2)).

#### □ Precipitation Run-off

"Run-off" is defined in §260.10 "as any rainwater, leachate, or other liquid that drains over land from any part of a facility." Run-off generally consists of precipitation (rainwater) run-off, and may also contain leachate. EPA intends "run-off" to cover liquid that flows over and quickly off of the land surface of the facility. Because of this, any contact between precipitation run-off and waste will be minimal. In the preamble to the regulations issued on May 19, 1980 (45 FR 33096), EPA expressed this by stating: "... the water in precipitation run-off in many

cases may not have had sufficient contact with the waste to solubilize waste constituents." Because of the belief that in many cases run-off would contain neither leachate nor significant levels of waste constituents, EPA did not categorically list run-off as a hazardous waste and because of the lack of significant contact between precipitation run-off and leachate, EPA specifically excluded precipitation run-off from the "derived from" rule in §261.3(c)(2).

There are two situations, however, in which EPA classifies run-off as a hazardous waste. First, it is a hazardous waste if it exhibits any of the characteristics of a hazardous waste defined in Subpart C of Part 261. Second, under the mixture rule (§261.3(a)(2)(iii) and (iv)), it is a hazardous waste if it is mixed with a hazardous waste, including leachate. Regardless of whether the run-off is judged to be hazardous or nonhazardous, it still must be collected in accordance with the Part 265 and 264 regulations.

#### □ Leachate

"Leachate" is defined in §260.10 as "any liquid, including any suspended components in the liquid, that has percolated through or drained from a hazardous waste." EPA intends that "leachate" broadly refer to any liquid that has made significant contact with a hazardous waste by draining from it or passing through it. Although leachate varies in quality, it typically contains significant levels of solubilized waste constituents. EPA is particularly concerned about liquid that has passed downward through the wastes in the waste management unit and emerges from the bottom or side of the unit.

Under the "derived from" rule, leachate from a hazardous waste is defined as a hazardous waste. Leachate derived from a listed hazardous waste is considered a listed hazardous waste, and it must be handled as such unless (1) it is delisted pursuant to 40 CFR 260.20 and 260.22, or (2) in the case of the few listed wastes listed solely because they failed a characteristic of Part 261, Subpart C, it no longer meets the characteristic (§261.3(a)(2)(iii)). Leachate derived from characteristic wastes is presumed to be a hazardous waste until it is shown that the leachate does not exhibit any of the characteristics of a hazardous waste defined in Subpart C of Part 261.

## □ Mixture of Precipitation Run-off and Leachate

The mixture rule in §261.3(a)(2)(iv)i states that a solid waste is a hazardous waste if it is a mixture of solid waste and one or more hazardous wastes listed in Subpart D. [Waste mixtures containing characteristic hazardous wastes are treated just like any other solid waste, i.e., they will be considered hazardous only if they meet the characteristics.]

The mixture rule applies to precipitation run-off (and indeed any other solid, nonhazardous waste or material that is mixed with a listed hazardous waste). Because leachate from hazardous waste is named as a hazardous waste under §261.3(c)(2), a mixture of precipitation run-off and leachate is a hazardous waste. The key factor in determining whether precipitation run-off has mixed with leachate is the unit design. The evaluator must determine if the design allows leachate to migrate from the bottom or side of the unit and mix with precipitation run-off in a common collection facility,. Figure 1 in the appendix to my April 10 memo illustrates a typical landfill scenario in which leachate and precipitation run-off mix. In this scenario, leachate percolates downward through the waste and then moves laterally along an underlying intermediate cover. This leachate then seeps from the active face and accumulates in the same areas as the precipitation run-off from the active area.

Because of the usual design of landfills and waste piles, it is highly likely that in the active portions of these units the run-off and leachate will mix. (An exception would be a pile or landfill operated under a roof). Because Parts 264 and 265 require collection of the run-off, the collection unit will likely contain a mixture of precipitation run-off and leachate. Due to the mixture rule, this run-off will likely be a hazardous waste.

Because the generation of leachate is minimized in properly closed portions of these units, it is much less likely that leachate and run-off will commingle in properly closed and maintained portions. This run-off, therefore, is usually not a hazardous waste because it is unlikely that the precipitation run-off has mixed with leachate.

## □ Policy for Land Treatment Units

My April 10 memo did not specifically describe how the above policy is applied to hazardous waste land treatment units. However, references to land treatment units were made in the appendix to the memo. Several of these references need further clarification. These references suggested that the run-off from active and closed portions of these units should be presumed to be a hazardous waste because the run-off would in most cases come into contact with surface-applied wastes.

The requisitions and preamble discussion on run-off from hazardous waste land treatment units do not specifically address whether precipitation run-off and leachate will usually mix in the active or closed portions of these units. To clarify, the Agency will not initially presume that this mixture will occur in the active or closed portions of typical land treatment units. Therefore, run-off from these units will generally not be considered a hazardous waste (unless it exhibits a characteristic). The following discussion explains the basis for and possible exceptions to this general policy.

The same general concepts described above for landfills and waste piles apply to land treatment units. First, the "derived from" rule does not apply to precipitation run-off (i.e., unlike leachate from a hazardous waste, precipitation run-off is not presumed to be a hazardous waste). Limited contact of precipitation run-off with the waste on the soil surface does not automatically render the run-off a hazardous waste. Second, run-off is a hazardous waste if it (1) exhibits any of the characteristics of a hazardous waste, or (2) mixes with a listed hazardous waste or leachate. Third, the most important factor in determining whether run-off and leachate have mixed is the design of the unit.

The design of land treatment units is fundamentally different from landfills and waste piles. Land treatment units rely on successful treatment rather than physical barriers to prevent escape of waste components. They are "open systems" in that they are not required to have liners for containing waste. At a typical land treatment unit, wastes are treated in the treatment zone and treated soil pore liquid (or "leachate")\* is then allowed to move out of the bottom of the unit (see Figure 1 in attachment

2). The absence of restrictive layers in the treatment zone of a land treatment unit, such as intermediate covers for lifts in a landfill, limits the lateral movement of "leachate." Also, most land treatment units are relatively flat, which decreases the chance for "leachate" seeps out side slopes should any lateral movement occur. Because of this design, it is unlikely that "leachate" will move laterally and mix with run-off from active or closed portions of typical land treatment units. Therefore, the run-off from typical land treatment units will not be presumed to be a hazardous waste. This issue of "soil pore liquid" versus "leachate" (see footnote) does not effect the run-off policy for this case.

There are certain land treatment unit designs that may allow the mixing of "leachate" with run-off, and for which the run-off policy is still unclear. For example, certain units may be designed to include a liner system that promotes the lateral movement and commingling of "leachate" and run-off. Figure 2 in attachment 2 illustrates this case. Another example is where the ground water at least periodically discharges to a run-off collection ditch or impoundment, e.g., where the run-off collection ditch or impoundment is constructed below the water table and downgradient of the facility. In this case, "leachate" and run-off would mix, as illustrated in Figure 3 of attachment 2. The run-off policy for these two cases (i.e., figures 2 & 3), as well as for designs that may be used to lower the water table (e.g., drainage systems), is dependent on the resolution of the leachate/soil pore liquid issue. When we complete the evaluation of this issue, additional guidance addressing these cases will be provided.

\* Several petitioners in the Part 264 regulation litigation recently questioned whether treated soil pore liquid should be considered "leachate." It may be argued, for example, that soil pore liquid should no longer be hazardous after it is "treated" and emerged from the bottom of the treatment zone of a properly operating land treatment unit. If such a liquid is deemed to be "leachate," any ground water or other liquid with which the leachate mixes would also be a hazardous waste. Thus, any ground water withdrawn to artificially lower the water table (to comply with the one meter separation requirement under §264.271) would have to be managed as a hazardous waste. OSW is currently evaluating this issue, and its ramifications on LT unit designs, particularly in high water table areas. Additional guidance will be provided on this issue when this evaluation is completed.

Please contact Ken Shuster, Chief of the Land Disposal Branch, at FTS 382-3345, or Art Day at 382-4680 if you have any questions or additional information is needed.

#### Attachments

cc: John Lehman  
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