

## Rachel's Environment & Health News

### #37 – EPA Says All Landfills Leak, Even Those Using Best Available Liners

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People who are enthusiastic about garbage incinerators often fail to mention that every incinerator has a landfill associated with it. The ash left over from incineration needs to be landfilled, and the ash is toxic. Some engineers (especially those employed to promote garbage incinerators) try to argue that the toxic constituents of the ash will remain safely in the landfill “forever.” But this is a flawed view: the weight of evidence and opinion in the technical world does not agree with this argument. On the contrary, even the U.S. Environmental Protection Agency says that all landfills will leak. The agency has published this opinion on many occasions in the FEDERAL REGISTER. But before we look at the EPA’s reasons for believing all landfills will leak, let’s look at the way landfills are constructed:

A landfill is a carefully-engineered depression in the ground (or built on top of the ground, resembling a football stadium) into which wastes are put. The intention is to avoid any hydraulic [water-related] connection between the wastes and the natural environment. To achieve this goal, there are four important parts of all landfills: a bottom liner, a leachate collection system, a cover, and the natural hydrogeologic setting (the earth).

The hydrogeologic setting can be selected to slow the entry of wastes into the natural environment. The other three components must be engineered. The bottom liner can be one or more layers of clay or a synthetic flexible membrane liner [FML], for example, a sheet of plastic; the liner effectively creates a bathtub in the ground. The leachate collection system consists of sloping the sides of the landfill and putting pipes in the lowest places, to pump out contaminated water and other fluids (leachate) as they accumulate; the pumped leachate is treated at a wastewater treatment plant (and the solids removed from the leachate during this step are returned to the landfill, or are sent to some other landfill). The cover or cap will consist of several sloped layers of clay or FML (to prevent rain from intruding), overlain by a very permeable layer of sandy or gravelly soil, overlain by topsoil in which vegetation can root (to stabilize the underlying layers of the cap).

Each of these components is critical to success. If the bottom liner fails, wastes will migrate directly into the environment. If leachate collection pipes clog up and leachate remains in the landfill, fluids can build up in the bathtub; the resulting liquid pressure becomes the main force driving waste out the bottom of the landfill when the bottom liner fails. If the cover (cap) is not maintained, rain will enter the landfill, resulting in buildup of leachate to the point where the bathtub overflows its sides and wastes enter the environment.

In the FEDERAL REGISTER Feb. 5, 1981, the EPA first stated its opinion that all landfills will eventually leak:

“There is good theoretical and empirical evidence that the hazardous constituents that are placed in land disposal facilities very likely will migrate from the facility into the broader environment. This may occur several years, even many decades, after placement of the waste in the facility, but data and scientific prediction indicate that, in most cases, even with the application

of best available land disposal technology, it will occur eventually.” [pg. 11128]

“Manmade permeable materials that might be used for liners or covers (e.g., membrane liners or other materials) are subject to eventual deterioration, and although this might not occur for 10, 20 or more years, it eventually occurs and, when it does, leachate will migrate out of the facility.” [pg. 11128]

“Unfortunately, at the present time, it is not technologically and institutionally possible to contain wastes and constituents forever or for the long time periods that may be necessary to allow adequate degradation to be achieved.” [pg. 11129]

“Consequently, the regulation of hazardous waste land disposal facilities must proceed from the assumption that migration of hazardous wastes and their constituents and by-products from a land disposal facility will inevitably occur.” [pg. 11129]

More than a year later, on July 26, 1982, the EPA again put its opinions into the FEDERAL REGISTER, emphasizing that all landfills will inevitably leak:

“A liner is a barrier technology that prevents or greatly restricts migration of liquids into the ground. No liner, however, can keep all liquids out of the ground for all time. Eventually liners will either degrade, tear, or crack and will allow liquids to migrate out of the unit.” [pg. 32284]

“Some have argued that liners are devices that provide a perpetual seal against any migration from a waste management unit. EPA has concluded that the more reasonable assumption, based on what is known about the pressures placed on liners over time, is that any liner will begin to leak eventually.” [pgs. 32284-32285].

In the FEDERAL REGISTER May 26, 1981, pgs. 28314 through 28328), the EPA argued forcefully that all landfills will eventually leak. Another EPA quote:

“Many organic constituents are stable (degrade very slowly); other hazardous constituents (e.g., toxic metals) never degrade. Yet the existing technology for disposing of hazardous wastes on or in the land cannot confidently isolate these wastes from the environment forever.

“Since disposing of hazardous wastes in or on the land inevitable [inevitably?] results in the release of hazardous constituents to the environment at some time, any land disposal facility creates some risk.” [pg. 28315]

EPA went on to estimate that the duration of the hazard from a landfill would be “many thousands of years.” [pg. 28315] And the Agency said, “The longer one wishes to contain waste, the more difficult the task becomes. Synthetic liners and caps will degrade; soil liners and caps may erode and crack. ...EPA is not aware of any field data showing successful long-term containment of waste at facilities which have not been maintained over time.” [pg. 28324]

“Ultimately, waste reduction and resource recovery probably provide the best alternative to land disposal,” said the EPA [pg. 28325], though it has never begun any programs to make this happen.

--Peter Montague

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