

Rachel's Environment & Health News

#316 - New Evidence That All Landfills Leak

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Starting in the 1970s and continuing throughout the 1980s, U.S. Environmental Protection Agency [EPA] funded research which showed that burying household garbage in the ground poisons the groundwater. On several occasions, EPA spelled out in detail the reasons why all landfills leak. (For example, see RHWN #37, #71, and #116)

Then in late 1991, after several years of deliberation, EPA chief William Reilly issued final landfill regulations that allow the continued burial of raw garbage in landfills. (See RHWN #268.) EPA's 1991 regulations require an expensive landfill design: two liners in the ground and an impervious plastic cover over the landfill after it has been filled with garbage. This is "state of the art" technology, the very best that modern engineers can build. However, EPA officials still expect such landfills to fail and eventually poison groundwater.

As early as 1978, EPA knew why all landfills eventually leak. The main culprit is water. Once water gets into a landfill, it mixes with the garbage, producing a toxic leachate ("garbage juice"), which is then pulled downward by gravity until it reaches the groundwater. Therefore, the goal of landfill designers (and regulators) is to keep landfills dry for the length of time that the garbage is dangerous, which is forever.

Now a 1992 report from a California engineering-consulting firm, G. Fred Lee & Associates, has examined recent scientific studies and has confirmed once again why modern "dry tomb" landfill technology will always fail and should always be expected to poison groundwater.[1]

The new report, authored by Fred Lee and Anne Jones, reviews recent evidence--much of it produced by government-funded research--that landfill liners leak for a variety of reasons; that leachate collection systems clog up and thus fail to prevent landfill leakage; that landfill leachate will remain a danger to groundwater for thousands of years; that even low-rainfall areas are not safe for landfill placement; that gravel pits and canyons are particularly dangerous locations for landfills; that maintaining a single landfill's cap for the duration of the hazard would cost hundreds of billions, or even trillions, of dollars; that groundwater monitoring cannot be expected to detect landfill leakage; that groundwater, once it is contaminated, cannot be cleaned up and must be considered permanently destroyed; and that groundwater is a limited and diminishing resource which modern societies grow more dependent on as time passes.

A 1990 examination of the best available landfill liners concluded that brand-new state-of-the-art liners of high density polyethylene (HDPE) can be expected to leak at the rate of about 20 gallons per acre per day (200 liters per hectare per day) even if they are installed with the very best and most expensive quality-control procedures.[2] This rate of leakage is caused by pinholes during manufacture, and by holes created when the seams are welded together during landfill construction. (Landfill liners are rolled out like huge carpets and then are welded together, side by side, to create a continuous field of plastic.) Now examination of actual landfill liners reveals that even the best seams contain some holes.

In addition to leakage caused by pinholes and failed seams, new scientific evidence indicates that HDPE (high density polyethylene, the preferred liner for landfills) allows some chemicals to pass through it quite readily. A 1991 report from University of Wisconsin shows that dilute solutions of common solvents, such as xylenes, toluene, trichloroethylene (TCE), and methylene chloride, penetrate HDPE in one to thirteen days. Even an HDPE sheet 100 mils thick (a tenth of an inch)--the thickness used in the most expensive landfills) is penetrated by solvents in less than two weeks.

Another problem that has recently become apparent with HDPE liners is "stress cracking" or "brittle fracture." For reasons that are

not well understood, polyethylenes, including HDPE, become brittle and develop cracks. A 1990 paper published by the American Society for Testing Materials revealed that HDPE liners have failed from stress cracks in only two years of use. Polyethylene pipe, intended to give 50 years of service, has failed in two years. Lee and Jones sum up (pg. 22), "While the long-term stability of geomembranes (flexible membrane liners) in landfills cannot be defined, there is no doubt that they will eventually fail to function as an impermeable barrier to leachate transport from a landfill to groundwater. Further, and most importantly at this time, there are no test methods, having demonstrated reliability, with which to evaluate long-term performance of flexible membrane liners."

Recent scientific studies of clay indicate that landfill liners of compacted clay leak readily too. For example, a 1990 study concludes,

[I]F A NATURALLY OCCURRING CLAY SOIL IS COMPACTED TO HIGH DENSITY, THEREBY PRODUCING A MATERIAL WITH VERY LOW HYDRAULIC CONDUCTIVITY, AND IF IT IS MAINTAINED WITHIN THE SAME RANGES OF TEMPERATURE, PRESSURE, AND CHEMICAL AND BIOLOGICAL ENVIRONMENT, IT WOULD BE EXPECTED TO FUNCTION WELL AS A SEEPAGE BARRIER INDEFINITELY. IN WASTE CONTAINMENT APPLICATIONS, HOWEVER, CONDITIONS DO NOT REMAIN THE SAME. THE PERMEATION [PENETRATION] OF A COMPACTED CLAY LINER BY CHEMICALS OF MANY TYPES IS INEVITABLE, SINCE NO COMPACTED CLAY OR ANY OTHER TYPE OF LINER MATERIAL IS EITHER TOTALLY IMPERVIOUS OR IMMUNE TO CHEMICAL INTERACTIONS OF VARIOUS TYPES

The 1992 study by Lee and Jones is an excellent resource for anyone wanting to understand why landfills always fail. In their footnotes, they cite 18 other studies of landfill problems that they themselves have authored, so their expertise is unquestionable, their information reliable, their arguments solid.

There has been sufficient scientific evidence available for a decade to convince any reasonable person that landfills leak poisons into our water supplies, and are therefore anti-social.

The question remains: what will it take to convince government--specifically EPA--to base policy on its own scientific studies and its own understanding?

The new EPA administrator is Carol M. Browner, an avowed environmentalist from Florida. Asked to describe Ms. Browner's style, John Sheb, head of Florida's largest business trade association, said: "She kicks the door open, throws in a hand grenade, and then walks in to shoot who's left. She really doesn't like to compromise."

Maybe Ms. Browner could start with a wake-up grenade in the Office of Solid Waste.

--Peter Montague

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[1] G. Fred Lee and Anne R. Jones, MUNICIPAL SOLID WASTE MANAGEMENT IN LINED, "DRY TOMB" LANDFILLS: A TECHNOLOGICALLY FLAWED APPROACH FOR PROTECTION OF GROUNDWATER QUALITY (El Macero, Calif.: G. Fred Lee & Associates, March, 1992). Available from: G. Fred Lee & Associates, 27298 East El Macero Drive, El Macero, CA 95618-1005. Phone (916) 753- 9630. 67 pgs.; free.

[2] Rudolph Bonaparte and Beth A. Gross, "Field Behavior of Double-Liner Systems," in Rudolph Bonaparte (editor), WASTE CONTAINMENT SYSTEMS: CONSTRUCTION,

REGULATION, AND PERFORMANCE [Geotechnical Special Publication No. 26] (New York: American Society of Civil Engineers, 1990), pgs. 52-83.

CLARIFICATION: RIGHTS OF CORPORATIONS

Last week we suggested the need for a Constitutional amendment declaring that a corporation is not a natural person and is therefore not protected by the Bill of Rights and the 14th amendment to the Constitution. Such an amendment would level the playing field somewhat, giving communities and individuals a greater chance of controlling anti-social corporate behavior. As we noted in earlier newsletters (RHWN #308, #309), corporations are now literally out of control. Shareholders cannot control them; boards of directors cannot control them; workers cannot control them; in a competitive world market, even managers have lost control. In some cases, of course, management doesn't care about the environment or the community. But even when managers, as individuals, want to do the right thing, the logic of corporate growth and short-term gain often dictates choices that do not serve the environment or the community. Since corporate behavior is at the root of nearly all environmental problems, stripping corporations of some of their rights (such as the Constitutional protections guaranteed to individual citizens, which the Supreme Court extended to corporations in 1886), would help communities assert control over corporate behavior. Merely DEBATING such an amendment would get people thinking about power in the modern world, asking who has a legitimate right to control what. Ask yourself: who ever gave private corporations the right to manufacture and sell products that can destroy the planet as a place suitable for human habitation? In suggesting such a Constitutional amendment, we omitted reference to the original source of the idea, author Richard Grossman.

For historical background on control of corporations, get: Richard Grossman and Frank T. Adams, TAKING CARE OF BUSINESS; CITIZENSHIP AND THE CHARTER OF INCORPORATION (Cambridge, Mass.: Charter, Inc., 1992). For a copy, send \$4.00 plus a self-addressed, stamped envelope containing 52 cents postage to: Charter, Inc., P.O. Box 806, Cambridge, MA 02140.

--Peter Montague

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