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"Old landfill sites are a problem both in terms of their harm to the environment and the cost of cleaning up and containing them," -- *Jane Diamond*, EPA acting director for Superfund (2001)

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What Will the PDC Landfill Mean for Peoria's Future?: A Costly Clean-Up

Peoria Disposal Company (PDC) is offering to monitor the landfill for 30 years post closure. But as we know, and as the EPA has said many times[1], the hazards inside this landfill (heavy metals, industrial solvents, and many other hazardous chemicals) will pose a public health risk for thousands of years. No landfill -- no matter how sophisticated the construction -- will last for thousands of years. And when this landfill leaks, Peoria County is going to have to foot the bill to clean up the mess. The landfill operator, no matter how upstanding a corporate citizen, will be long gone. We're talking about millions of dollars to clean up the residual mess. And as any hydrogeologist will tell you, once groundwater is contaminated, it's virtually impossible to decontaminate it. Your community will be drinking contaminated water that causes birth defects, low birth weight and cancer for generations to come.

Starting in the early 1980's and continuing through the 1990's the U.S. Environmental Protection Agency (EPA) says clearly that landfills will 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." [1, 2, 3, 4, 5, 6, 7, 8] And leading hydrological engineering firms (like Geraghty & Miller of Port Washington, NY) have found that upwards of 86% of landfills surveyed were contaminating local groundwater.[8]

Why Do All Landfills Leak?

Landfills are bathtubs in the ground designed to contain garbage and/or industrial wastes. Just like it is impossible to build a swimming pool that will not crack, fall apart and eventually need to be replaced, it is impossible to build a landfill that will not leak. Two fundamental laws of nature – gravity and that 'things fall apart' – guarantees that rainwater will enter the bathtub,

creating a toxic stew (leachate) which will leak out the bottom or over the sides of the tub thus spreading the hazardous contents into the surrounding environment, contaminating the drinking water and impacting human health.

Landfill caps, liners and leachate collection systems – three avenues of failure

Landfills leak because the three core protective elements -- the cap, the liner and the leachate collection system -- will eventually fail. The cap is designed to keep water out, hence the expression 'dry-tomb' landfill. But in order to protect the cap from freeze/thaw, wind/rain erosion and other natural forces, the cap is planted with vegetation. Vegetation attracts animals which dig holes in the cap making room for larger plants/roots and slowly but surely the integrity of the cap is destroyed. In a series of articles in Waste Age – the waste haulers trade journal – Michigan State University scientists revealed the extent of this type of damage that vegetation and wildlife inflict on landfill caps.[3]

They found that burrowing animals -- such as worms woodchucks, badgers, muskrats, moles, ground squirrels etc. – can move literally tons of soil in the surface of a landfill each year. Clay presents little barrier to such animals; "synthetic liners, measured in mils [of thickness], are not likely to impede these same mammals," Johnson and Dudderar observe. Non-mammals are also a problem: crayfish, tortoises, mole salamanders, and "a variety of worms, insects and other invertebrates "can make holes in a landfill cap." [3]

Earthworms alone can have a devastating impact on a landfill cap. Earthworms pass two to 15 tons of soil through their digestive tracts per acre per year. "The holes left as they move through the soil to feed increase water infiltration," Johnson and Dudderar comment. They give evidence that worm channels allowed plant roots to grow to a depth of nine feet in Nebraska clay soils. In a section called "The fundamental dilemma," Johnson and Dudderar sum up: "At this point you may well say: 'If we plant, we're encouraging plant and animal penetration of the clay cap. If we don't plant, we get erosion or freeze-thaw destruction of the cap.' "Unfortunately, that is one of the fundamental dilemmas." [3]

Leachate Collection System Failure

When the leachate collection system eventually fails to pump fluid out of the landfill the bathtub will fill up with leachate. When this happens, immense pressure from the weight of water and waste will build, forcing leachate to leak from the bottom (directly through the liner and through cracks, tears and holes in the liner). Over time, these immense forces, combined with the corrosive action of industrial chemicals in the dump, will destroy the bottom liner causing leachate to leak into the surrounding groundwater (drinking water).

There are two reasons that leachate collection systems fail: they become clogged (with silt or mud, microorganisms, and precipitated minerals) and fall apart. Although the main pipes can be periodically cleaned, unclogging the perforated portions of the system is virtually impossible. Furthermore, the pipes themselves will corrode, crack and crumble from the chemical action of acids, solvents, oxidizing agents and other corrosive materials in the waste stream going into the dump.[9]

Studies of landfill leachate (garbage juice) – whether they be municipal solid waste or hazardous waste landfills – show that it is extremely toxic and known to contain a variety of substances that cause cancer, birth defects, neurological disorders, and other negative health effects. Brown and

Donnelly at Texas A&M University studied the leachate of 58 landfills and they concluded "The risk calculations based on suspect carcinogens... indicate that the estimated carcinogenic potency for the leachate from some municipal landfills may be similar to the carcinogenic potency of the leachate from the Love Canal landfill." [10]

When PDC Vice President Ron Edwards claims that his company's landfill "isn't a Love Canal" he isn't basing that statement in the chemical reality of landfill leachate. Brown and Donnelly's study found 113 different toxic chemicals in leachate from municipal landfills and 72 toxic chemicals in leachate from hazardous waste landfills. The hazardous waste landfill leachate contained 32 chemicals that cause cancer, 10 that cause birth defects, and 21 that cause genetic damage; in municipal landfill leachate, they found 32 chemicals that cause cancer, 13 that cause birth defects, and 22 that cause genetic damage. [10]

HDPE and Clay Liners

State of the art liners and caps are made with compacted clay and HDPE plastic. According to the EPA, liners will delay the introduction of leachate into the environment but will not prevent it because eventually the liner will deteriorate. Says EPA: "First, even the best liner and leachate collection systems will ultimately fail due to natural deterioration, and recent improvements in MSWLF [municipal solid waste landfill] containment technologies suggest that releases [of leachate] may be delayed by decades at some landfills." [11] EPA goes on to say that human error may also contribute to leachate "releases due to design or operating errors (e.g., tearing of liners or disposing of wastes that are incompatible with the liner) and routine deterioration of liner." (pg. 33344)

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 even if they are installed with the very best and most expensive quality-control procedures.[7] This rate of leakage is caused by pinholes during manufacture, and by holes created when the seams are welded together during landfill construction. Examination of actual landfill liners reveals that even the best seams contain some holes. In addition to leakage caused by pinholes and failed seams, there is evidence that HDPE 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." [6]

All of these data are consistent with the manufacturer's own information on HDPE. According to Phillips Petroleum, maker of HDPE, there are a number of household chemicals that will degrade HDPE, pass through it, make it lose strength, softening or hardening it (making it brittle). A thick piece of HDPE (1/10 of an inch thick) has the stiffness of linoleum tile. [12]

Chemicals known to Phillips to be incompatible with HDPE include aromatic hydrocarbons and halogenated hydrocarbons – both of which are common in industrial waste streams. Phillips says the following household chemicals can cause 'stress cracks' in HDPE: Acids (acetic acid), food (cider, lard, margarine, vinegar, and vanilla extract), Toiletries and Pharmaceuticals (detergents, dry cleaners, hair oil, shampoo, lighter fluid, shoe polish and others); and Oils (castor, mineral, peppermint, and vegetable); Industrial Chemicals: Amyl alcohol, chlorobenzene, cyclohexanol, ethyl alcohol, methyl alcohol, propyl alcohol. Many of these same chemicals, according to Phillips, could permeate and thus weaken the HDPE.

But leachate that contaminates drinking water isn't the only dangerous thing about landfills. Landfills naturally give off a variety of gases (methane and carbon monoxide) which are mixed with toxic volatile organic compounds (VOCs) that have negative health impacts on the humans living near landfills.[13]

Landfills are Dangerous -- Health Effects of Living Near Landfills

Now that we've established that all landfills leak – no matter how sturdy their construction – let's look at their effects on human health. Public health scientists have found that people living near landfills suffer at least three forms of ill-health: cancer, birth defects and low birth weight. This is why the local medical doctors have spoken out against the PDC landfill: "Physician organizations at all three hospitals have united to urge the Peoria County Board not to approve the expansion." [14].

Cancer – Studies in New York found that women living near landfills had increased rates of leukemia and bladder cancer.[15] A 1995 study of families living near a large landfill in Montreal, Quebec reported an elevated incidence of cancers of the stomach, liver, prostate, and lung among men, and stomach and cervix/uterus among women.[16]. A 1990 study found an increased incidence of bladder cancers in northwestern Illinois where a landfill had contaminated a municipal water supply with trichloroethylene (TCE), tetrachloroethylene (PERC), and other chlorinated solvents.[17] A 1989 study by the EPA [U.S. Environmental Protection Agency] examined 593 waste sites in 339 U.S. counties, revealing elevated cancers of the bladder, lung, stomach and rectum in counties with the highest concentration of waste sites.[18]

Birth Defects – At least five studies have reported finding an increased chance of birth defects among babies whose parents live near a landfill. In Wales, the chances of birth defects were doubled among families living near a landfill.[19] A 1990 study in the San Francisco region found a 1.5-fold greater chance of birth defects of the heart and circulatory system among newborns near a solid or hazardous waste site.[20] A 1990 study of 590 hazardous waste sites in New York state found a 12% increase in birth defects in families living within a mile of a site.[21] A 1997 study of women living within a quarter-mile of a Superfund site showed a two-to four-fold increased chance of having a baby with a neural tube defect, or a heart defect.[22] A preliminary report in 1997 found a statistically significant 33% increased chance of a birth defect occurring in babies born to families living within 3 kilometers (1.9 miles) of any of 21 landfills in 10 European countries.[23]

Low Birth Weight -- The most commonly reported effect of living near a landfill is low birth weight and small size among children. Studies in New York (Love Canal), New Jersey, California, and Quebec all found that children living near landfills have significantly lower birth weights. -- low birth weight is correlated with a variety of developmental problems later in life. Low birth weight is a leading cause of infant mortality, and leads to many long-term health conditions and developmental disabilities that can impair school readiness.[24]

The first careful study of this subject took place at Love Canal near Niagara Falls, New York. In a blinded study published in 1989, researchers found that children who had lived at least 75% of their lives near Love Canal --the notorious toxic chemical dump --had significantly shorter stature than children who lived farther away from the dump site. These results held up even after controlling for birth weight, socio-economic status, and parental height.[25]

Conclusion: All Landfills Leak

Landfills, no matter how sophisticated, are just bathtubs in the ground. Like everything else that man or nature builds, landfills fall apart. First the cap with leak allowing water to enter the landfill. Toxic leachate will then build up inside the landfill. Over time the leachate will spill over the side of the tub, or leak out the bottom or both. The leachate will contaminate the local groundwater with toxic chemicals. Landfills also cause hazardous air pollution. The combination of air and/or water pollution have measurable negative impacts on human health including: cancer, low birth weight babies, and birth defects.

According to the EPA the duration of the hazard from a landfill would be “many thousands of years.” [1, 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.” [1, pg. 28324]” Building an additional landfill (the PDC landfill is already 81 years old) in this community will guarantee health problems and expensive remedial action for the foreseeable future. The owners of PDC won't pay for this. Peoria's children, grand children and great grandchildren (for hundreds even thousands of generations) will pay for this with their health and tax dollars.

PDC's claims that they will guarantee a safe operation for 30 years means nothing. Even if they could guarantee safe operation for 10 years (which they can't because science has shown that the very best landfill technology is deeply flawed and will result in groundwater contamination) its besides the point. This landfill and indeed all landfills that accept the kinds of products we use in modern society (whether they are toxic industrial byproducts or normal everyday household garbage) guarantees that toxic leachate will contaminate the communities groundwater and local air with harmful chemicals. A landfill is hazardous for thousands of years. When the landfill is closed, PDC will take its profits and do business elsewhere. If the state tried to hold them accountable, they will simply bankrupt and leave the community holding the bill to try to clean up the mess which is virtually impossible to clean up and certainly very costly.

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