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# LANDFILLS

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## Landfills in Northwest Indiana

Seven counties in Northwest Indiana; Jasper, Lake, Laporte, Newton, Porter, Pulaski and Starke constitute the richest area of biodiversity in Indiana and one of the richest areas in the Great Lakes basin. Situated in both the Mississippi and the Great Lakes Watersheds, this ecologically diverse area is the result of glacier activity that ended more than 10,000 years ago. As a result, this area is rich in many areas that have a potential for landfills. It also contains many soil types that are not conducive to landfills. In addition to the soil problem, refuse is developing into a serious problem in Northwest Indiana because of limited space and dense populations.



### **What is a Landfill?**

According to *Zero Waste America's* web site, a landfill is a carefully designed structure built into or on top of the ground in which trash is isolated from the surrounding environment. The purpose is to avoid any water related connection between the waste and the surrounding environment, particularly groundwater. This isolation is accomplished with a bottom liner and daily covering of soil. Basically, a landfill is like a bathtub in the ground; a double-lined landfill is one bathtub inside another. Unfortunately, unlike bathtubs all landfills eventually will leak, out the bottom or over the top.

### **What is the composition of a Landfill?**

There are four main components of any secured permitted landfill; *a bottom liner, a leachate*

**collection system, a cover and the natural hydrogeologic setting.** The natural setting can be selected to minimize the possibility of wastes escaping to groundwater beneath a landfill. The other components must be engineered. Each component or element of a landfill is critical for success.

Regarding the **Natural hydrogeologic setting**, you want geology to do two things that are in fact contradictory. To prevent the wastes from escaping, you want rocks as tight (waterproof) as possible. If leakage occurs and it will, you want the geology to be as simple as possible so you can easily predict where the wastes will go. This is the reason why the type of soil around the liner is vitally important. Another crucial element in any landfill is the **Bottom Liner**. The state of art bottom liners on the market today are plastic (HDPE) liners, which are only 100 mils or 1/10 of an inch thick. Liners may be clay or made of a synthetic flexible membrane. The bottom liner in effect creates a bathtub in the ground. If it fails, wastes will migrate directly into the environment. Even though these tough plastic polyethylene liners (HDPE) are recommended by EPA, a number of household chemicals will degrade HDPE, permeating it (passing through it). This will cause it to lose strength, softening it or making it become brittle and crack. In addition to common household chemicals, items such as mothballs, margarine, vinegar, ethyl alcohol (booze), shoe polish, peppermint oil will all degrade HDPE and render it dangerous to the surrounding environment. Studies show that a 10-acre landfill will have a leak rate somewhere between 0.2 and 10 gallons per day. The **Leachate collection system** is also an extremely important component to any effective landfill. Leachate is water that gets contaminated by contacting wastes. It seeps to the bottom of a landfill and is collected by a series of pipes. Pipes laid along the bottom of the landfill capture the contaminated waste and other fluid (leachate); this leachate is then pumped to a wastewater treatment plant. If leachate collection pipes clog up or if they are crushed by the tons of garbage, they may become weakened by chemical attack (acids, solvents, oxidizing agents or corrosion). If this occurs and leachate remains in the landfill, fluids can build up in the bathtub. The **Cover** is generally several sloped layers; clay or membrane liner (to prevent rain from intruding and to prevent leachate formation) overlain by a very permeable layer of sandy soil, overlain by topsoil in which vegetation can root and stabilize the underlying layers of the cover. If it is not maintained, rain will enter the landfill resulting in buildup of leachate to the point where the bathtub overflows and waste enters and contaminates the surrounding environment. Covers are vulnerable to erosion, vegetation, burrowing soil-dwelling mammals, reptiles, insects and worms, sunlight, cave-ins and rubber tires which "float" upward in a landfill all present constant threats to the integrity of the cover. (Zero Waste)

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## Soil Classification Used for Landfill Applications

Before a landfill can be developed, a soil survey must be conducted. In a soil survey, the following terms apply: slight, moderate, and severe. Slight means that the soil properties and the site features are generally favorable for landfill development. Moderate means that the soil properties and site features are not favorable for landfill development. Finally, severe means that the soil and site features are unsuitable for landfill development.

The soils can also be classified for the use of daily landfill cover. Landfill cover is soil that is placed onto the top of waste. A rating of good indicates that the soil features are suitable for daily cover. A rating of fair signifies that the soil features are moderately favorable for daily cover. A rating of poor indicates that the soil should not be used for landfill cover unless special designs and alternatives are arranged to make it suitable for cover use.

Types of Soil Found in Northwest Indiana

**Northwest Indiana is diversified with at least thirteen types of soil.**

· **BaA – Blount Silt Loam;**

- **EIA – Elliot Silt Loam;**
- **McA and McB – Markham Silt Loam;**
  - **MrB2 – Mortley Silt Loam;**
  - **Pe – Pewamo Silty Clay Loam;**
    - **RIB – Riddles Silt Loam;**
- **Sb – Sebawa loam, Shaly Substratum;**
  - **So – Suman Silt Loam;**
  - **TcB – Tracy Sandy Loam;**
  - **Wh – Washtenaw Silt Loam;**
  - **Wt – Whitaker Loam.**

## Summary of Northwest Indiana Soil

These soils have severe limitations for landfill applications because of their physical properties. Any excavation of one soil would impact other soils in the vicinity. Another common feature to these soils is their wetness. The seasonal high water tables are near the surface for almost all of the soil types, except Pinhook and Tracy. The high water tables make them highly vulnerable to contamination and require a great deal of money and materials to drain water away for excavation sites.

These soils are very suitable for farming. Northwest Indiana is a large farming community for these reasons. The soils are perfect for growing crops such as corn and beans; however, the soils are very poor for landfill use. In addition to contamination, the high water table will require significant dewatering to allow excavation. This has the potential to dramatically lower the water table and cause existing home and irrigation wells to go dry. (Camp).

## Best Soil Used for Landfill Applications

The best soil to use in a landfill is blue clay. Blue clay is composed of fine particles transported by glacial melt ways and deposited in deep ocean waters between 50,000 and 37,000 years ago. The soil is best suited for landfills because it is impervious to water, chemicals and it compacts very well. When a landfill site has been excavated, the clay is saved and used as landfill cover. After each layer of garbage is placed in the landfill, a layer of clay is placed on top of the garbage and compacted. This results in a solid layer of garbage that are impervious to the elements.

## Proposing a landfill in Northwest Indiana

To propose a landfill in Northwest Indiana, certain criteria and regulations must be adhered to. Prior to 1995, there was no criterion regarding the design of landfill until the Federal CFL Subtitle D was passed. This federal law mandates that all landfills in the United States must comply with minimum standards. According to “How a Landfills Work” at Lycos Zone, an environmental impact study must be done on the proposed site to determine:

- *The area of land necessary for the landfill;*
- *The composition of the underlying soil and bedrock;*
- *The flow of surface water over the site;*
- *The impact of the proposed landfill on the local environment and wildlife;*
- *The historical or archaeological value of the proposed site. (Howstuffworks)*

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## What types of landfills are there in Northwest Indiana?

Currently there two types of landfills, a **public landfill** which we have in Munster and private landfill which is located in Laporte County. Public landfills are easier to regulate and control because they control what comes into their landfill. A **private landfill** is more predicated on making money and is often less concerned on what is brought in. The interstate commerce clause is not an issue because local governments have their right to restrict who can dump what at the local landfill. (Lynch)

Sanitary land filling in the United States has made monumental strides in the past 20 years, moving open dumps with little or no regulation to state of the art facilities with sophisticated containment systems and environmental monitoring, improved operations, and increased regulation. At the same time, stringent regulations have caused landfill capacity to decline: between 1986 and 1996, the total number of landfills in the United States fell from 7,683 facilities to 3,581.

In 2000, U.S. residents and businesses produced more than 221 million tons of waste, which is approximately 4.5. pounds of waste per person per day. However, the amount of waste sent to landfills in 2000 was down 13% from the 1990 total, and the amount of waste recovered in recycling has nearly doubled during the same period. (ASCE).

In 1996, 116 million tons of waste went into landfills, compared to 140 million tons in 1990. It has been calculated that at the current rate of waste generation, all of America's garbage for the next 1000 years will fit into a single landfill measuring 120 feet deep and 44 miles square; in other words, a patch of land approximately the size of three Oklahoma cities. (Plastics).

Currently there are two open and operating landfills in Northwest Indiana, Munster and Deercroft landfills located in Munster, Indiana and Michigan City, Indiana.

The landfill located in Munster was originally a brickyard in the early 1900's. Up until the early 1970's it produced bricks for the local economy and region.

The brickyard went out of business when the Clean Air Act was passed in the early 1970's because it did not have enough money or resources to meet the new standards set by the Act. The site was then sold to a private company that turned the brickyard into a dump.

In 1975, the Indiana Board of Health was influenced by the Indiana Department of Environmental Management to change laws that would impact all dumps. The laws were put into place to control and regulate what debris was placed in the dumps. The environment and groundwater were issues that IDEM wanted to protect and regulate.

Prior to IDEM passing laws, all dumps operated without regulation and were making money. The dumps received debris to include hazardous chemicals and wastes. After IDEM passed laws regulating dumps, many of them were forced to close because of the money needed to operate them. The Munster dump was no exception. In 1975, it closed and was bought by the town of Munster. Munster turned the dump into a landfill that still operates today.

Currently, it encompasses 144 acres of land and employees six people. It receives approximately 640 tons of garbage daily form the town, which makes it a small landfill by current standards. A large landfill may receive as much as 2,000 tons of garbage daily. It is well suited as a landfill because it is

built on clay, which is the best soil used for landfills because of its properties. (Mandon).

These two facilities received a tremendous amount of waste in 1999. The tables will represent just how much was received during this time. (IDEM).

**Total Disposal of Solid Waste in 1999 for Munster Landfill**

Waste in Tons	# Of Operating Days	Disposal per Day	
	126,396	258	490

**Total Disposal of Solid Waste in 1999 for Deercroft Landfill**

Waste in Tons	# Of Operating Days	Disposal per Day	
	544,913	305	1787

Northwest Indiana currently accepts waste from other locations across the United States. The total out of state waste received during 1999 was 2,147,830 tons. The table represents the states that contributed to Northwest Indiana's waste sites. (IDEM).

**Out of State Waste Received in 1999**

<u>State</u>	<u>Total Tons Recieved</u>
California	93
Illinois	1,779,180
Kansas	60
Kentucky	176,376
Michigan	37,021
Missouri	1,935
Nevada	155
Ohio	151,614
Texas	122
Wisconsin	1,274

**Do Landfills work?**

Unfortunately, starting in the 1970's and continuing throughout the 1980's and 1990's, the U.S. Environmental Protection Agency (EPA) funded research, which showed that burying household garbage in the ground poisons the groundwater. EPA has spelled out in detail the reason why all landfills leak. (*Dr. Peter Montague, REHN*). Even with the state of art double liners, EPA officials still expect landfills to fail and eventually poison the groundwater. (*Dr. Peter Montague, REHN*) There is just inadequate known data relating to contamination due to landfills leaking; however, there were ground wells tested in the Wheeler area surrounding the Wheeler Landfill. These ground wells were found to be contaminated and the water unsafe to drink. As a result, Waste Management negotiated a settlement with the affected citizens, and paid for city water to be brought to their homes. Unfortunately, the problem of the contaminated water still remains in the ground, and the potential for groundwater contamination in Wheeler is very real. (Lynch)

Groundwater contamination may result from leakage of very small amounts of leachate. TCE is a carcinogen and one of the volatile organic compounds typically found in landfill leachate. It would take less than 4 drops of TCE mixed with the water in an average sized swimming pool (20,000 gallons) to render the water undrinkable. (Landfills Leak)

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## Landfills and your Health

There is insufficient data linking health problems with our local landfills in Northwest Indiana; however, there have been more than adequate documentation nationwide to assure a direct correlation with landfills and health problems. According to Dr. Peter Montague in Rachel's Environment & Health Weekly, the following are just a few documented studies that highlight the extent of the problem:

\* Significantly reduced stature (height) for a given age among children who lived near Love Canal, the chemical waste dump in Niagara Falls, N.Y.;

\*Low birth weight and birth defects in California children born in census tracts having waste disposal sites. In Tucson, Arizona abnormal amounts of children born with heart defects revealed that 35% of them were born to parents living in a part of the city where the water supply was contaminated with Trichloroethylene (TCE) from a hazardous waste site. The rate of birth defects of the heart was three times as high among people drinking the contaminated water compared to people in Tucson not drinking contaminated water;

\*Enlargement of the liver and abnormal liver function tests reported in residents exposed to solvents from a toxic waste dump in Hardemann County, Tenn.;

\*Dermatitis, respiratory irritation, neurologic symptoms and pancreatic cancer at 7 waste disposals sites. (Dr. Montague REHM)



## Landfills affect on the Environment

Landfills present a clear and present potential threat to human health as well as a threat to our environment. As noted even the best landfill liners will leak...”82% of surveyed landfill cells had leaks while 41% had a leak area of more than 1 square feet, “ according to Leak Location Services, Inc. (LLSI) website (March 15, 2000). This is an alarming statistic considering that in addition to leakage, landfills also provide problems to our health and environment through hazardous contaminated air emissions. Over ten toxic gases are released from landfills especially the toxic gas of methane gas. Methane gas is a naturally occurring gas created by the decay of organic matter inside a landfill. As it is formed, it builds up pressure and then begins to move through the soil. In a recent study of 288 landfills, off-site migration of gases, including methane was detected at 83% of these sites. (REHM)

When a new municipal landfill is proposed, advocates of the project always emphasize that “no hazardous wastes will enter these landfill.” Studies have shown that even though municipal landfills may not legally receive “hazardous” wastes, the leachate they produce is as dangerous as the leachate from hazardous waste landfills.

## Conclusion

There is no debate that all landfills eventually contaminate our environment and pose a serious threat to our health. In Indiana these landfills are monitored and regulated by EPA and IDEM. The main problem associated with contamination is the “corrective action” that needs to occur to clean up the problem. In a recent study of 163 municipal solid waste landfills, there was evidence of ground-water contamination or adverse trends in ground-water quality at 146 of them. That’s a 90% contamination rate for groundwater beneath municipal solid wasteland fills. Once it is contaminated it is almost impossible to clean it up. The only way to guarantee clean groundwater is to never contaminate it in the first place. (Zero Waste)

Landfills Leak [www.stopwmx.org/liner.html](http://www.stopwmx.org/liner.html)

Landfills: Hazardous to the Environment.

[www.zerowasteamerica.org/landfills.htm](http://www.zerowasteamerica.org/landfills.htm)

Soild waste conditions. ASCE. Report. [www.asce.org/reportcard](http://www.asce.org/reportcard)

The Basics of Landfills: How they are constructed and why they fail

[www.zerowasteamerica.org/basicsOfLandfills.htm](http://www.zerowasteamerica.org/basicsOfLandfills.htm)

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Last updated: 8 February 2003

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