



Technical Outreach Services for Communities (TOSC)



Meridian Road Landfill

Overview

Located near Fortville, the Meridian Road Landfill consists of two polluted areas. The larger of the two, approximately 5.25 acres, is on the west side of Meridian Road. The smaller site, about a third of an acre, is directly east of the western landfill across Meridian Road. The landfills sit on land that was excavated for sand and gravel prior to 1952. From 1952-1965, unregulated dumping and trash burning occurred at the western site. The western gravel pit was operated as a landfill under permits issued by Hancock County from 1965 to 1969, when it received residential, commercial and industrial waste. Paints, chlorinated solvents, sludges and household wastes were reportedly placed in the landfill. The owners of the eastern site had landfill materials placed in a gravel pit in order to fill a depression. Both sites have been inactive since 1969. The landfill was backfilled and covered with local soil when it was closed in 1969.

Initial discovery of contamination

In 1986, the Indiana Department of Environmental Management (IDEM) collected a water sample from a residence at 9843 Meridian Road in response to a complaint regarding water quality. The water sample was analyzed and found to contain volatile organic compounds (VOCs). The VOCs found in the sample were: trichloroethylene (TCE), trans-1,2-dichloroethene (DCE), cis-1,2-dichloroethene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, 1,1-dichloroethane, and 1,1-dichloroethene. The VOCs exceeded drinking water Maximum Contaminant Levels (MCL) in all cases except for 1,1-dichloroethane which does not have a MCL. TCE was the major contaminant of concern since it exceeded the MCL by a sizeable amount, 4900 parts per billion vs. a MCL of 5 parts per billion. These compounds are typically used as metal degreasers or as ingredients in manufacturing processes. All but 1,1-dichloroethene was subsequently found in soil borings taken from the landfill.

Immediately after receiving the sample results, IDEM and the U.S. Environmental Protection Agency (EPA) sampled well water at 67 nearby residences, from the public water supply and school wells, and provided residents at 9843 Meridian Road an alternate water supply of bottled water. An interim carbon filter was installed at the residence in order to remove VOCs from the well water. Later in 1986 a well was drilled into the lower aquifer which provided water free of contaminants. A pond north of the eastern landfill was also sampled and found to contain volatile organic compounds.

In 1986 or 1987 AT&T/Lucent was identified as a potentially responsible party. In 1989 IDEM and AT&T/Lucent signed an Agreed Order to carry out an investigation of the site to determine the nature and extent of contamination.

Samples collected from two residences in the Vernon Woods subdivision, 88 Kingbird Drive and 102 Kingbird Drive, which are south of the western landfill, had arsenic concentrations that exceeded Indiana's drinking water standards. New wells were installed for these residences in 1988.

A water sample collected in September 1988 from the residence at 160 West 1000 North, northwest of the landfill, contained a vinyl chloride concentration of 70 ppb (parts per billion) which exceeded the drinking water MCL of 2 ppb. The well was replaced in November 1988 with a new, deeper well that was placed into the bedrock.

First stage of the Remedial Investigation

In January 1990 Dames & Moore commenced investigating the site for AT&T/Lucent. The findings of the report were documented in a report entitled *Remedial Investigation Report of Findings* (RI) completed late in 1990. Twenty-one soil borings were taken in the eastern and western landfills to determine the nature and extent of contamination in the landfill. Six monitoring wells and seven piezometers were drilled to determine groundwater flow and contamination.

In November 1990, IDEM notified Lucent that the lateral and vertical extent of the landfill had not been established, so a field program was performed in 1991 by Dames & Moore to supplement the findings of the RI. Six additional piezometers, seventeen monitoring wells, Hydropunch® sampling and geophysical surveys were performed in order to further describe groundwater flow and contamination at the landfill site. Two borings were made outside the landfill boundary to provide soil background levels while five landfill samples were obtained from locations previously bored in the 1990 RI. The results of the investigation were submitted to IDEM as a *Supplemental Investigation*, or SI, in May of 1992. Also in 1991 vinyl chloride was detected in a residential well at 80 West 1000 North. The well was subsequently replaced with a new well in an unaffected aquifer.

In 1993 vinyl chloride was detected in a well at 109 East 1000 North, which is northeast of the western landfill. That residence was supplied with bottled water until a new well was drilled. Two more monitoring wells and one piezometer were installed by Dames & Moore in 1993.

From 1993 to 1995 Dames & Moore obtained the necessary approvals to install a groundwater extraction and treatment system. In 1996 the system was installed and commenced operation. Water was pumped out of the ground from an extraction well, EW-2, where it was subsequently treated in an air stripper to remove volatile organic compounds (VOC). The treated water is discharged into Rash's Ditch. Three more monitoring wells were installed in 1997 and an additional monitoring well was installed in 1998.

Groundwater samples and water level readings were taken annually from 1993 through 1998 in order to characterize groundwater quality and 10 residential wells of 54 in the vicinity of the landfill have been monitored quarterly since 1987 on a rotating basis.

Final Remedial Investigation

In the spring of 1999, the final Remedial Investigation report was completed, which summarized the findings of the previous investigations.

Summary of Dames & Moore Final Remedial Investigation

The landfills lie above glacial sediments that were deposited over limestone bedrock, which is found at 110 to 160 feet below the surface. Approximately 20 feet of a silty clay layer is present at the surface. A sand and gravel aquifer lies below the silty clay soils. The water table is usually found within this layer on site. Below this upper aquifer is a clay aquitard, or a layer in which the water does not flow as freely as in an aquifer. This layer varies in thickness in the investigation area. Below this layer is another aquifer termed the lower aquifer.

Since the underlying geological structure was formed as the glaciers retreated from the land, the soils and layers vary considerably under the landfill and the surrounding area. In some place the aquitard is non-existent. Channels of gravel and sand also exist, which might aid in the transport of contaminants.

Installed in the upper aquifer are 14 piezometers and 20 monitoring wells to characterize the groundwater flow and quality. The primary flow direction appears to be towards the north, northeast, and northwest. Dames & Moore believes that the groundwater extraction well EW-2 captures groundwater from almost all of the western landfill (all but the southern tip of the landfill) and all of the eastern landfill. They also state that most of the plume is within the area influenced by the extraction well.

In the 1990 Remedial Investigation and the 1991 Supplemental Investigation, groundwater samples were analyzed for VOCs, SVOCs, pesticides, PCBs, and metals. PCBs and pesticides have not been found in any of the groundwater samples and groundwater sampling for these compounds was stopped in 1992. Observation well, OW-1, was sampled in 1997 for SVOCs. The analysis of the sample showed no SVOCs were present. Dames & Moore states that the lack of these compounds in the groundwater indicates that large amounts of these compounds are not in the landfill.

Sampling events have shown that a plume containing chlorinated compounds, specifically TCE and its degradation products cis-DCE and vinyl chloride, extends to the north from the southern end of the western landfill and from the eastern landfill. Smaller concentrations of 1,1,1-TCA and its degradation products are also present in the plume. Dames & Moore believes that the plume has stabilized and that the release rate of VOCs from the landfills is approximately equal

to the degradation rate of the VOCs. Other VOCs and SVOCs have been detected in some of the samples but this is believed to be caused by cross contamination during sampling or analysis.

Acetone has been found in some monitoring well samples. The source of the acetone is unknown based on the hydrogeologic setting and the behavior of other VOCs.

BTEX (a general term for the four petroleum related contaminants: benzene, toluene, ethylbenzene, and xylene) has been detected in the groundwater on occasion, but Dames & Moore believes that the landfill is not the source of these compounds due to the sporadic nature and location of BTEX detections.

During the Remedial Investigation, twenty-eight borings were placed in the landfill. The samples from the borings were analyzed for VOCs, SVOCs, pesticides, PCBs, and metals. Four of the samples are considered surface samples as they were within 4 feet of the surface. Two of the four surface samples contained VOCs. PCBs were detected in all four of the surface samples. The surface samples were analyzed for arsenic, cadmium, chromium, copper, lead, nickel, selenium, silver, thallium and zinc. Elevated levels of cadmium, chromium, copper, lead and nickel were found in the samples.

The remaining samples qualify as subsurface samples. Eleven of the 24 subsurface samples contained VOCs. Six samples from the western landfill contained SVOCs. Thirteen of the 24 samples contained PCBs with one sample in the eastern landfill containing high levels of PCBs. All of the subsurface samples contained chromium, copper, lead, nickel and zinc at varying concentrations. Arsenic, cadmium, selenium, silver and thallium were detected in some of the samples with cadmium exceeding background soil levels in some of the samples.

Dames & Moore concludes that “the impacts of organic compounds are relatively sporadic and of limited magnitude as compared to the metals constituents.” Based on the infrequency of detection and chemical characteristics, Dames & Moore states that the amount of SVOCs and PCBs in the landfill is minor and are not likely to be leached to ground water in appreciable quantities due to their affinity to adhere to soil.

The residential wells have undergone testing for VOCs and metals. Testing for SVOCs, pesticides, and PCBs have not been performed because on-site groundwater samples have shown that those compounds could not have reached residential wells. Aluminum, arsenic, antimony, beryllium, cadmium, iron, lead and manganese have been detected at concentrations that exceed either the MCL (Maximum Concentration Level), SMCL (Secondary Maximum Concentration Level) or action level drinking water standards. The source of antimony and beryllium is unknown. Detectable levels of cadmium have been found in three residential wells. Unfiltered residential well samples showing detectable total lead levels have occurred throughout the investigation area, with some of the samples above the action level. Filtered samples have shown detectable dissolved lead levels near the landfill.

Samples have been taken from the pond north of the eastern landfill. These samples have shown detectable levels of aluminum, barium, calcium, chromium, copper, iron, magnesium, manganese, potassium, sodium, thallium and zinc. It is believed only chromium, copper, thallium and zinc originated in the landfill. Of these metals thallium was the only metal detected

above its MCL. VOCs which have been found in the pond water are 1,1-DCA, cis-DCE, trans-DCE, 1,1,1-TCA, and TCE. All but 1,1,1-TCA has exceeded drinking water Maximum Contaminant Levels at one time or another.

Exposure pathways and risk will be determined in a risk assessment utilizing data from the Remedial Investigation. The results from the Remedial Investigation and the Risk Assessment will be used in the Feasibility Study to assess possible methods for landfill remediation.



The TOSC program promotes effective citizen involvement in site cleanup projects by providing independent technical expertise to communities. Funded under a U.S. EPA grant, TOSC is housed in the Great Lakes and Mid-Atlantic Center (GLMAC) for Hazardous Substance Research. The GLMAC comprises three leading research universities: The University of Michigan, Michigan State University and Howard University. For more information, contact Kirk Riley at (800) 490-3890 or send e-mail to tosc@egr.msu.edu