

Association Between Hazardous Chemical Sites and Illness
G. Fred Lee, PhD, MSPH, PE, DEE and Anne Jones-Lee, PhD
G. Fred Lee & Associates
27298 E. El Macero Drive, El Macero, CA 95618
Ph: (530)753-9630 Fx: (530)753-9956 Em: gfredlee@aol.com
www.gfredlee.com

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An issue of considerable concern to those living or working near hazardous chemical sites, including municipal and industrial landfills and Superfund sites, is the potential for releases from these sites to cause illness, such as an increased risk of cancer, birth defects, etc. As discussed by Lee and Jones-Lee (2007) in their review of the “Flawed Technology” of today’s minimum design municipal solid waste landfills, it has been repeatedly found that there appears to be an increase in illness rates for those living or working near hazardous chemical sites; however, definitive information on the magnitude of this increase has been lacking. This situation is now changing, where several studies have been published which show an association of illness to the proximity to hazardous chemical sites/landfills.

The association of illness with hazardous chemical sites, including landfills, has been of concern for many years. Typically, the epidemiological studies that have been conducted have not had the sensitivity needed to make a strong association between releases from the hazardous waste site/landfill and the population near the site. This is typically the result of the fact that the number of individuals potentially impacted is small compared to that which is needed for a definitive correlation using epidemiological techniques. The studies discussed below show that there is a potential association between a particular type of illness (birth defects or clinical diabetes requiring hospitalization) and proximity to hazardous chemical sites.

As stated in the “Flawed Technology” review in a section on the Hazards of Living/Working near Landfills,

“Elliott et al. (2001) have reported that children of people living near landfills in England tend to have a higher rate of birth defects than the general population. A review of the various studies that have been conducted, however, reveals that the epidemiological approach for discerning health effects associated with populations living near landfills is not sufficiently sensitive to reliably determine whether releases from the landfill are at least in part responsible for the health effects. A complicating factor is that those living near landfills frequently are economically disadvantaged and of a different ethnic mix than the general population. Further, data that have been developed on this issue have often been devoted to former (closed) landfill situations, where there is far greater limiting of landfill emissions than will occur, at least initially, with today’s Subtitle C and D landfills.”

According to Elliott, et al. (2001),

“We found small excess risks of congenital anomalies and low and very low birth weight in populations living near landfill sites. No causal mechanisms are available to explain these findings, and alternative explanations include data artefacts and residual confounding. Further studies are needed to help differentiate between the various possibilities.”

Recently, *Environmental Health Perspectives* has published a paper (Kouznetsova, et al., 2007) which relates residential proximity to hazardous waste sites to hospitalization associated with diabetes. The first four authors of this paper are with the Department of Epidemiology and Biostatistics, School of Public Health, and the fifth is with the Institute for Health and the Environment, at the University at Albany, State University of New York, Rensselaer, New York. The investigators concluded,

“After controlling for major confounders, we found a statistically significant increase in the rate of hospitalization for diabetes among the population residing in the ZIP codes containing toxic waste sites.”

Further, the authors state in their discussion,

“Our observations suggest that residence near a hazardous waste site constituted a risk of exposure to these individuals at some time in the past, and this has led to an increased risk of developing diabetes. The risk may still exist. The most likely pathway of exposure is air transport of contaminants; contaminated particulates may be ingested, and both vapor-phase and particulate-bound contaminants may be inhaled. It is unlikely that there are different ingestion patterns of contaminated fish or other food products within specific ZIP codes of residence. Although our observations must be viewed as being hypothesis generating, they provide additional support for a relationship between exposure to environmental contaminants, especially POPs [persistent organic pollutants], and risk of diabetes. Further study is necessary to determine whether this is a causative relationship; if so, we need to determine the relative contribution of POPs.”

An issue that should also be considered is the fact that the population with clinical diabetes requiring hospitalization is small compared to the total number of individuals with diabetes.

It is well-established that airborne releases from hazardous chemical sites (including active and inactive landfills) can have a significant adverse impact on the population within the sphere of influence of the site. The Agency for Toxic Substances and Disease Registry (ATSDR, 2006) has developed a discussion on gaseous emissions from landfills, in which they state,

“Many of the typical landfill gases, notably the alkyl benzenes and the sulfur compounds (both organosulfides and acid gases), may present an odor problem that can cause adverse health effects such as mucous membrane irritation, respiratory irritation, nausea, and stress. If an individual has a pre-existing health condition (e.g., allergies, respiratory illness), these additional health impacts can be significant.”

With respect to the populations at risk from airborne releases of hazardous chemicals from a hazardous chemical site/landfill, as a first estimate, it would be all individuals who experience odors from the site. While many of the chemicals that are responsible for illness are non-odorous, typically, airborne releases from hazardous chemical sites/landfills have odorous components which are readily detectable. It is for this reason that hazardous chemical site and municipal, industrial and hazardous waste landfills should be practicing sufficient odor control so that there is no detectable odor at the site boundary – i.e., no trespass of odorous emissions onto adjacent properties. The odor control should not be done through masking agents, but with treatment technologies that destroy the odor and, it is to be hoped, the hazardous chemicals associated with the odor as well.

It should not be assumed that the typical testing for airborne releases of hazardous chemicals associated with the evaluation of the impact of a landfill or other hazardous chemical site on adjacent properties is adequate to detect airborne hazardous chemicals released from the site. For some hazardous chemicals the analytical method detection limits are not adequate to detect the hazardous chemicals at concentrations of concern, either individually or in combination with other chemicals. The evaluation of whether odorous chemicals are being released from a site should be based on a properly documented assessment by individuals with above-average olfactory sensitivity.

Additional information on the health effects associated with odors released from landfills and other malodorous operations is provided in Lee and Jones-Lee (2007).

References

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