

Comments on the SWANA Summary Report “Recent Studies Indicate Minimal Heavy Metal Releases from MSW Landfills”¹

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May 2005

The May/June 2005 issue of *MSW Management* contains a review of the Solid Waste Association of North America (SWANA) Applied Research Foundation report in which J. O’Brien, Executive Director of the SWANA Research Foundation, presents a summary of the potential for heavy metals in today’s municipal solid waste (MSW) leachate to pollute groundwater. O’Brien concludes,

“Based on a review of recent studies and published literature, the SWANA report concluded that MSW landfills can provide for the safe, efficient, and long-term management of disposed products containing RCRA heavy metals without exceeding limits that have been established to protect public health and the environment. It further concluded that MSW landfills should contain the releases of RCRA heavy metal pollutants at levels that protect public health and the environment for extremely long periods of time if not forever.”

The SWANA Applied Research Foundation report to which O’Brien (2005) refers is “The Effectiveness of Municipal Solid Waste Landfills in Controlling Releases of Heavy Metals to the Environment,” dated March 2004 (SWANA 2004). Lee (2004) provided a detailed review of this report. As Lee comments, the SWANA Applied Research Foundation report which claims that heavy metals in municipal solid waste (MSW) landfill leachate do not represent a threat to cause groundwater pollution is based on a flawed approach for assessing the critical concentrations of heavy metals in MSW leachate that can be adverse to groundwater quality. The SWANA report uses the US EPA TCLP regulatory limit as a measure of the concentrations of heavy metals in MSW leachate that would not cause groundwater pollution. However, this is not the purpose for which TCLP regulatory limits were developed. TCLP regulatory limits were established to classify wastes as “hazardous” versus “nonhazardous.” So-called “nonhazardous” waste components can still generate leachate that is a significant threat to public health and the environment. The TCLP regulatory limits were arbitrarily established without proper regard to how constituents such as heavy metals in MSW leachate can impair the beneficial uses of groundwaters and surface waters.

The SWANA report presents concentrations of heavy metals in today’s MSW leachate which are sufficient at some locations to cause significant adverse impacts to groundwater quality and surface water quality. Under US EPA Subtitle D landfilling practices, there is potential justification for limiting the concentrations of heavy metals in the municipal solid waste stream as part of an effort to reduce the heavy metal concentrations in MSW leachate.

¹ Report of G. Fred Lee & Associates, El Macero, CA, May (2005) Accepted for publication in *MSW Management* September/October (2005).

The O'Brien *MSW Management* article contains the same misrepresentation of the potential water quality significance of heavy metals in MSW leachate as was presented in the SWANA (2004) report, where O'Brien states that the heavy metal concentrations in MSW leachate listed in Table 2 "... are all lower than the TCLP regulatory limits." However, as discussed by Lee (2004), the issue is not the concentrations of heavy metals in leachate relative to TCLP regulatory limits, but whether the concentrations of heavy metals in leachate are at concentrations that, when the landfill liner system in the minimum Subtitle D landfill ultimately fails to prevent leachate passage through it, can cause groundwater pollution that is a threat to public health and/or the environment. As discussed by Lee (2004), the US EPA TCLP is not a reliable indication of potential impacts on public health. The TCLP was a political testing procedure that was used to distinguish between hazardous and nonhazardous wastes, where heavy metal concentrations that can be over 30 times (for lead) the US EPA drinking water MCL are used to determine if the waste should be placed in a hazardous waste landfill.

Lee (2004) discusses that there are situations where heavy metals in MSW leachate can be transported for considerable distances in groundwater systems with little or no attenuation in the aquifer. Of particular concern are sand and gravel, fractured rock and cavernous limestone aquifers.

The SWANA report and the O'Brien *MSW Management* article attempt to present the image that there are processes that take place in landfills to limit the leaching of heavy metals from MSW components. While there are processes that can limit the mobility of heavy metals in MSW landfills, it is obvious, based on the data presented in O'Brien's Table 2, that the attenuation processes in MSW landfills do not prevent concentrations of heavy metals in MSW leachate that are a threat to public health when the leachate penetrates through the landfill liner system and pollutes groundwater. Table 2 shows concentrations of heavy metals such as lead in some MSW leachate to be 20 times the drinking water MCL. For arsenic the concentration in some MSW leachate is 10 times the MCL.

Another topic area that the SWANA report and O'Brien inadequately discuss is the so-called protective nature of today's minimum design US EPA Subtitle D landfills. O'Brien states,

"Landfill liner systems substantially prevent the leaking of leachate from the landfill to the land upon which the landfill is constructed. Based on recent investigations, these liners appear to have a "half life" (i.e., a time frame during which a 50% change in the material properties of the liner occurs) of 970 years. Therefore, the integrity of the liner system can be expected to last through the time frame when significant quantities of leachate are being generated."

While O'Brien did not reference the so-called "*recent investigations*," he lists as a reference a US Environmental Protection Agency report with a date of December 2002. This reference listing is incorrect in that it should have been referenced as Bonaparte et al. (2002), which was issued as a US EPA report in December 2002. A critical review of this report (see Lee and Jones-Lee 2005) shows that there are many reasons why the period of time before failure of a minimum design Subtitle D landfill liner system can be much less than the extrapolated value of 970 years.

O'Brien states, "MSW landfills should contain the releases of RCRA heavy metal pollutants at levels that protect the environment for extremely long periods of time if not forever." This statement is based on an unreliable assessment of the critical concentrations of heavy metals in landfill leachate relative to the potential for heavy metals in MSW leachate to cause groundwater pollution that is a threat those who use leachate-polluted groundwaters as a domestic water supply. A proper analysis of the threat that heavy metals in MSW leachate represent to cause groundwater pollution that is a threat to domestic water supplies must be made on a site-specific basis considering the characteristics of the aquifer system that will be polluted when the landfill liner system eventually fails to prevent leachate from penetrating the liner system.

An issue that evolves from this discussion is whether it is appropriate to restrict the heavy metal content of the MSW waste stream. Of particular concern are the large amounts of electronic items that are being deposited in MSW landfills. The SWANA report is being used, albeit incorrectly, to claim that there is no need to restrict electronic waste deposition in MSW landfills. The SWANA (2004) report and O'Brien (2005) summary paper on this report do not provide information that can be reliably used to justify allowing electronic waste items in the MSW waste stream. At this time it is unclear whether allowing consumer electronic waste items in the solid waste stream will significantly increase the threat to public health through pollution of groundwaters by MSW leachate. However, since minimum design US EPA Subtitle D landfills will ultimately cause groundwater pollution, it is appropriate to reduce items in the MSW waste stream that potentially lead to increased pollution of groundwater.

References

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