

Comments on
Waste Management of Canada ESRDs Expert Rebuttal
Dated November 14, 2012

Comments by
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D. Chaw offered “rebuttal comments” on our October 13, 2012 report on deficiencies in the Province of Alberta Finance and Administration Division Regulatory Approvals Centre (Centre) Approval of the Waste Management (WM) application to construct the Thorhild Landfill, and in the WM application, itself, for ensuring protection of groundwater resources for as long as the landfilled wastes are a threat. Her comments failed to address, much less refute, many of the key, significant deficiencies we raised and discussed concerning WM’s Thorhild Landfill proposal to develop, construct, operate, close, and provide assured postclosure care for landfill monitoring, maintenance, and remediation of the groundwater pollution that will result. She did not address the ramifications of the inevitable deterioration and failure of the landfill liner system to collect and remove all leachate that will be generated in the proposed landfill, for as long as the wastes that would be deposited in the landfill will be a threat to generate leachate that can pollute groundwater impairing its use for domestic and many other purposes.

Chaw’s initial comment was:

“ESRD agrees with the motion by WMCC that the comments by Dr. Lee regarding his opinion of the requirements established in the Standards for Landfills, February 2010 (Standards) should not be considered or reviewed by the Board.”

As discussed in our comments on that “motion” in:

Lee, G. F., and Jones-Lee, A., “Response to Waste Management’s November 2, 2012 Motion to Alberta Environmental Appeals Board to Disallow Portions of Dr. Lee’s Report and Possible Evidence at Hearing,” Comments Prepared by G. Fred Lee & Associates, El Macero, CA, November 18 (2012).

http://www.gfredlee.com/Landfills/Thorhild_Response_Nov2_Motion.pdf

the Centre’s review of the WM Thorhild Landfill application focused on whether the proposed landfill would meet *minimum* Alberta Landfill Standards, not whether or not the proposed landfill will protect groundwater resources from impact of the landfill for as long as the landfilled wastes are a threat. The Alberta Appeals Board’s review is not restricted to the issue of compliance with minimum landfill standards, but rather must consider the reliability of the proposal to provide protection of public health and environmental quality for as long as the wastes in the landfill will be a threat. It is clear that the WM-proposed Thorhild Landfill will not meet the public health and environmental quality protection requirements of the Alberta Environmental Protection and Enhancement Act and Water Act.

In many of her comments D. Chaw restated the minimum Alberta Landfill requirements followed by unsubstantiated statements that those requirements are protective. Such an assessment ignores the substantial professional literature that shows that those requirements,

applied to the proposed landfill, will not be protective of public health and environmental quality for as long as the wastes in the landfill will be a threat.

In several of her comments D. Chaw offered her understanding of the long-term fate of the wastes and landfill containment systems. Despite overwhelming technical literature to the contrary, she asserted that the Landfill Regulations, and therefore the WM-proposed Thorhild Landfill, will be protective. Based on Dr. Lee's more than four decades of investigating more than 80 MSW landfills and his university research on landfill liners, her assessment of these issues is not reliable. A summary and references to this literature was included in our October 2012 report.

Overall, D. Chaw has failed to refute our findings that the WM-proposed Thorhild landfill will be a significant threat to public health and the environment. The current permit for the proposed landfill should be reversed by the Alberta Appeal Board, and the appeal should be upheld.

Some specific aspects of D. Chaw's comments are discussed below.

Numbered Page 5 of the Rebuttal Comments begins a discussion entitled, "*G. Fred Lee and Associates (Tab 1)*," which is followed, beginning on unnumbered page 8, by "*Rebuttal Evidence of D. Shaw, Ph.D., ESRD Waste Policy Advisor Responding to comments of Dr. Lee.*"

D. Chaw disputes our statement that the Alberta groundwater quality boundary has the same meaning as the US EPA's "Point of Compliance." The US EPA's "point of compliance" for groundwater quality monitoring is the point beyond which there is to be no exceedance of groundwater quality standards. That point establishes the near-landfill boundary beyond which groundwater quality must be protected; i.e., it is the beginning of the compliance boundary.

Inadequacy of Clay Liners

D. Chaw makes some general assertions concerning the adequacy of landfill liners and claims that the Alberta groundwater protection regulations' requirements for a minimum of 8 m of "impermeable" natural clay layer and a vertical separation of 30 m from an "exceptional underlying aquifer" results in situation in which the "*degree of risk contaminant permeability is very low.*" As discussed in our report, clay layers are well-known to be permeable to leachate-polluted water. A low-permeability clay layer will not prevent leachate-polluted groundwater from polluting underlying groundwater and hence will not prevent violation of Alberta groundwater protection regulations.

D. Chaw claims, "*Geomembrane liners are highly effective impermeable membranes.....*" Such a statement is highly misleading. Plastic sheeting membrane liners used in landfills will not prevent leachate-polluted groundwater from penetrating the liner, and will therefore not protect groundwater quality for as long as the wastes in the landfill will be a threat. This issue was discussed in detail in our report, with numerous citations to the professional literature concerning the deterioration and eventual failure of plastic sheeting geomembrane liners.

D. Chaw states, "*Mitigation of groundwater contamination risks is not solely reliant on the landfill liner design as is suggested by Dr. Lee. Other safeguards are in place such as*

monitoring of environmental parameters (groundwater, surface water, landfill gas and leachate) to continually assess performance, and operational requirements such as frequent removal of leachate from landfill cells, waste acceptance policies, surface water management criteria, etc.

“Protection of groundwater is also a function of the performance of the entire landfill system including the leachate collection and removal system. Landfills operators are required to maintain a leachate depth of no more than 300 mm at the bottom of the liner. This means there is minimal contact between the liner and the waste. To maintain this depth leachate must be frequently removed. When leachate is not in constant contact with the waste and is frequently removed, the negative aspects of leachate are prevented. The less retention time results in a leachate that has lower concentrations of dissolved or suspended organic and inorganic compounds.

“The surface water management system is also required to minimize the amount of water that comes into contact with waste, in addition to ensuring the protection of surface water and minimizing the impacts of the landfill to the local hydrologic system.

“Waste acceptance policies are in place to minimize the types of waste that negatively contribute to leachate quality or unexpected risks. Landfill operations generally, such as providing daily cover, also serve to minimize the risk of migration of leachate, amongst other things.

All industrial activities in Alberta are required to adhere to allowable release limits to air, land and water. Landfills are regulated to meet release limits as well. The groundwater, leachate and surface water monitoring systems required at all landfills to measure the environmental performance of the landfill.

D. Chaw’s statements provide a highly distorted impression of our report. A critical and reliable review of our report shows that it, in fact, provided technical discussion of each of these factors that enable, allow, and do not prevent the pollution of groundwater by landfilled wastes in a landfill of the type that Waste Management proposes to construct at the Thorhild site. Our discussion included numerous references to the professional literature that discuss and support the finding that the WM-proposed Thorhild Landfill will not protect groundwater water quality for as long as the wastes in the proposed landfill will be a threat. While each of the aspects noted by Chaw has the potential to be effective for a short period of time, that period of time is infinitesimal compared with the period during which the wastes in the landfill will be a threat. None of those aspects, either alone or in combination, can be expected to provide, much less ensure, protection of groundwater quality over the period during which the wastes in the landfill will be a threat. A key issue discussed in our report, but not addressed by D. Chaw, is that the wastes in the proposed landfill will be a threat for a very long period of time - likely forever – and long past the period during which Waste Management will operate and maintain the protective features mentioned by D. Chaw.

Much of the rest of D. Chaw’s comments on buffer lands, gas migration, leachate and landfill gas, groundwater monitoring is a restatement of Alberta Landfill Standards, in which she simply asserts, without reliable technical support, that the Standard is protective. However, as discussed in our report, when considering the length of time during which a landfill can generate landfill

gas and leachate, it becomes clear that there is a great possibility that the proposed Thorhild Landfill will pollute groundwaters under the landfill and under adjacent properties.

D. Chaw states with respect to “*Buffer lands*”

“Dr. Lee's concern regarding the protection of health and land use restrictions to adjacent development is specified in The Subdivision and Development Regulation (AR 43/2002) (Municipal Government Act). A setback distance of 450m is required between any residence and an operating landfill.”

Again D. Chaw fails to address the issue beyond indicating that some regulation will be met. Her response does not reflect an understanding of the issues contributing to the importance of the existence of adequate buffer lands between where wastes are deposited and adjacent property lines. As discussed in our comments, it is well-known that a setback distance of 450m (30m) in the context of the proposed Thorhild Landfill will not be adequate to prevent the trespass of gaseous emanations from the landfill, including odours, onto adjacent lands.

D. Chaw states with respect to “*Inadequacy of Landfill Cover*”

“The landfill final cover requirements reflect the regional risks associated with Alberta's climatic conditions in mind. Alberta is in a semi-arid continental climate regime, with low annual precipitation and cold temperatures.”

As discussed in our report, including reference to a state of California study of landfills in arid and cold climates, such covers do not prevent water from entering landfills to generate leachate that pollutes groundwater.

D. Chaw states with respect to “*Leachate and Landfill Gas*”

“The length of time a landfill will generate leachate and landfill gas can be predicted by modelling the water balance for the landfill cover system. The water balance modeling takes into account factors such as; precipitation rates, surface water run-off, percolation, evapotranspiration, slope of the cover, and the water holding capacity of the soil and waste.

As discussed in our report and in references cited therein, the approach typically used to predict leachate generation and landfill gas generation may potentially be applicable at the time of construction of the landfill cover; however, over time the permeability of the cover changes and the HELP model is no longer reliable for make those predictions. Furthermore, as also discussed in our report and associated literature citations, a reliable cover serves only to delay generation of additional landfill gas and leachate; the buried wastes do not become innocuous over time by virtue of their being buried in the landfill.

With regard to the postclosure care period, D. Chaw states that we have misstated the length of the required postclosure period. We discussed in our report the confusion that exists in the WM application regarding how long Waste Management is committed to providing comprehensive postclosure monitoring, landfill maintenance, and remediation of the groundwaters that become polluted by leachate. At no location in the Waste Management application did we find a clear statement that Waste Management will provide assured postclosure funding for as long as the wastes in the landfill have the potential to generate leachate that is a threat to pollute groundwater impairing its use for domestic and other purposes.