

MEMORANDUM

MEMO TO West Burlington File
FROM Toby
DATE April 19, 1984
RE Meeting with Kevin Ridley

On April 18, we met with Kevin Ridley to discuss the Dillon Report. He noted at the outset that there were so many uncertainties with the Report. It is his opinion that an increase in the volume in Phase A will increase the concentration of the leachate. While Kevin agrees that it will take more time for water to infiltrate with a higher amount of leachate and there will be more surface water runoff, there may be more time for more reaction between the leachate and the water and a greater concentration.

Regarding missing information, Kevin says that Gartner Lee assume there is no reaction between the clay and the leachate. Regarding the leachate in the manhole, it is Kevin's opinion that this is dilute leachate and therefore it does not accurately reflect the state of leachate in the landfill. The report states that flow is vertical and then lateral. This would mean that the manhole is only collecting a small amount of leachate in the lateral part. It would be the surface runoff that would be dilute.

There is no accurate figure of leachate. See page 257. They say that there should be four times a year monitoring. Note: There hasn't been. He has asked the MOE for figures. They monitored in April and November when more water was running through in the area. This would also add the dilution factor. Between May and August, they would get more concentrated leachate, but we do not have results.

See page 195 toe-drain. They say there is 762 in the manhole and that there is attenuation. However, they can't explain the chlorides of 15,400 in borehole 17. Borehole 17I is the deepest borehole.

Page 184. The geology at the Bayview site is similar to the site here and therefore many of Cherry's findings are relevant. Note: Borehole 4,3,5,10,9 are non-functional. Borehole 8A is supposed to be functional, but there don't appear to be adequate readings.

Borehole 20 - the log is not listed in the chemical analysis even though it is listed as a functional manhole.

Where is the manhole. Phenols are high in number of well logs.

Figure 17, 18. There is an A and then A₁, B, B₁, however there are no C, C₁, D, D₁, no flow components. This is the crucial part of the site as it deals with east west flow.

Question of where the plume is advancing. According to Kevin, it might have reached Borehole 17 in November 81. It has doubled by 1983 and therefore, the old figure may be two years down the road.

See page 14 in Cherry. There he gets a porosity of .001. Gartner Lee has .5 in the shale. Cherry's figure is 50 times greater in predicting the plume. It is 50 times slower using Gartner Lee's porosity. They also use $V = K_i/N$ This may be the wrong formula.

Question whether Gartner Lee is using a geometric mean or arithmetic means in determining their permeability. Cherry makes some reference to using a geometric means. Gartner Lee uses arithmetic means.

Borehole 17 shows where the front of the plume is. The log notes that it has been augered. This would lead to the conclusion that there is no contaminating drill water. However, if there was water it should be flushed through by now. They might argue that the water diluted the background salinity of the site, however, it should be flushed out quickly.

Gartner Lee makes a reference to intrinsic permeability. This is a measurement of length squared, e.g. metres squared. The proper measurement is length per unit time i.e. the permeability coefficient. Note: 1×10^{-9} metres per second = 1×10^{-7} cm/s. See page 37 - Freize and Cherry.

Page 116. Compact soil, different moisture, get different densities. However natural soil is 8 to 13%. Therefore, K would have been faster. See page 114. Natural moisture content percentage borehole 7, borehole 13.9, compare it to density and moisture content.

There is no ~~x~~ test of permeability in the refuse.

See Q-6 or Q-23. Says that the parameters in borehole 16 and 17 are associated with leachate from landfill.

Re velocity. Using Cherry's porosity figure, you get 750 metres a year south of landfill. Gartner Lee says that it is at most at best 180 metres from the fill if it is travelling at 15 metres per year. The leachate was put in 12 years ago. If we use the rate that Cherry calculated on page 16 of his Report, i.e. 130 metres per year times 12 years, we are getting 50-60 metres off-site in other words, Lake Ontario. That is similar to his report that says the leachate is getting to Lake Ontario. Kevin also notes that the ground water divide may be altered by landfilling. However the potentiometric divide which is an imaginary surface of energy period may not be altered and therefore flow in Phase D would be into the creek.

Kevin stressed that we need more data on the other side of 403. We also have to know if the sedimentation pond is lined or not. If it isn't lined, it is concentrating leachate which will then go into the shale.

They can't argue that roadsalt would get into the water because they were saying on the one hand that it takes 75 years to get through 1.5 metres of till.

See Borehole 17. There chlorides went from 337 to 8300. In nine years it went 320 metres, therefore 36 metres a year. This is still more than Gartner Lee. Spring should be investigated before any more garbage is put in the site. The tendency now is to do baseline studies. They haven't done one.

The problem will be that even though drinking water may not be affected, there may be seepage at the surface. For example, the ground water table will rise in storms or in spring melt and then the water will rise and contact the surface. They could flood basements or there will be oil slicks. Note: The formula $V=Ki/N$ is O.K. in sandy soils but in till they should have used the advection dispersion equation or the convection dispersion equation, the diffusion of ions through compacted materials. The formula is O.K. in fractured till. They plan to dig through the fractures until they get down to 1.5 metres of till over shale. Note: Even if 90% efficient, 10% of leachate is large volume and could get into the shale. Till layer could react with leachate and no longer be a containment area. Note: They should be doing tests with the leachate with the till to see what kind of reactions.

Note: In the executive summary, they say that velocity = .02 m/a Kevin doesn't know how they got average. Should use geometric means - see Cherry's report page 14/15. Note also that he says that's right, the velocity of 75 years to go through 1.5 metres of till is not accurate. In sand, it might be O.K., but they should use a more complex analysis. The porosity used in the shale was 50 times greater than Cherry's porosity. See page 54 U.S. EPA report. Cation capacity 10 to 15 meq/100g. Montmorillonite is 100. Cations, clay take up. The higher the number, the more it can attenuate. Also note the surface water 1 compared with surface water 3 at page Q-6. It definitely shows that there is an impact on surface water.

This is important note regarding permeability. Permeability is the same as hydraulic conductivity. They shouldn't use water. They should leachate on the site, esp. when they can get it here. Could also be done over a period of months. Note: the expansion area of 1980 is referred to, but isn't specified. There are no details on under-drain. (I believe there are).

Appendices are not complete and the calculations are referred to in appendix 01 and are not indicated.

They discuss attenuation, but chlorides are not attenuated. Therefore, it should not be in that chart.