Presentation to BAPE Commission

Regarding the Project to establish a Technical landfill site at Danford Lake in the Municipality of Alleyn-et-Cawood.

Thank you for allowing me to exercise my right under Quebec law to present my, thoughts, opinions, concerns and recommendations regarding the Technical landfill site.

My name is Ronald Brennen and I am a taxpayer in the Municipality of Kazabazua. Specifically I reside, during the summer months, at my cottage that fronts on Route 301 near the village of Danford Lake. My wife's family (Wilson) has been resident in the Danford Lake area since the late 1800's, so our family roots run deep in the fabric of Danford Lake

I wish to focus on the issues of, leachate leak rates, leachate collection systems, estimate liner life and viable alternatives to the proposed landfill.

The presentation is based upon information published and available on the internet, the BAPE website and the presentation by the promoter.

1) Leachate leak Rates

1.1 The initial failure of the liner system will not be through general leakage throughout the bottom of the landfill but will be through holes, rips, tears, or points of deterioration in the plastic sheeting flexible membrane liner.

1.2) The initial liner failures will produce finger-like plumes of leachate that will have a high probability of passing between the monitoring wells and not being detected by them.

1.3) Leakage of leachate into ground water is inevitable. It will result from inherent leaks in the liner system. Ground water contamination will result from leakage of small amounts of leachate. TCE is a carcinogen and one of the volatile organic compounds typically found in landfill leachate. It would take less than 4 drops of TCE mixed with the water in an average sized swimming pool (20,000 gallons) to render the water undrinkable (in accordance with drinking water standards).What would that do to the fish and wildlife around the Picanoc River. The major source of leakage of Leachate is dependent upon the number of holes, tears, or discontinuities in the membrane surface. A study done by Laine of 61 Municipal Solid Waste Land fills (MSWLF) showed that in-service geomembrane-lined waste storage facilities using the electrical leak location **method. Approximately 92% of** the facilities tested were HDPE geomembranes ranging in thickness from 60 mil to 100 mils. He discovered

that leaks were found in every liner except those at three smaller facilities. A total of 1,409 leaks were located at the 61 sites surveyed, ranging from 0.3 to 5 leaks per 10,000 square ft, with an average of 3.2 leaks per 10,000 square ft. Leaks were detected in both the parent material and the seams. 87% of the leaks detected were in the seams with the remaining 13% in the parent material. Subsequent evaluations (Bonaparte &Gross 1993) showed that 90% of the leaks were at the seams and 10% in the parent material. Not a significant difference.

1.4) This would translate for a MSWLF the size of the proposed Danford Technical Landfill of 413 leaks for the complete site when it becomes functional.

1.5) The Alberta Government has defined 2 holes per hectare as acceptable. That means for the proposed Danford site that 77 holes are the accepted norm.

1.6) Even the BAPE document DB 21 indicates that at peak monthly rates Liners that the EPA analyzed showed that 50 lphd (liters per hectare per day) could be expected and some peaked at 200 lphd. Even at the normal rate of 10 lphd it would mean a leakage of 140,525 liters per year.

1.7) The truth is that there has been several improvements made in the membrane manufacture and construction techniques but recognizing the reality of the situation is why most governments have a document defining the maximum leak rates allowable for any MSWLF and what corrective action must be taken when any leak detected is above the specified rates.

1.8) A note of caution from a (2005) Swedish study Author(s)NOAKSSON Erik [1 2] ; LINDEROTH Maria [1] ; TJÄRNLUND Ulla [1] ; BALK Lennart [1] ; We have previously found that leachate from a Swedish refuse dump caused toxicological effects, including endocrine disruption and reproductive failures, in feral female perch (Perca fluviatilis) from Molnbyggen and in brook trout (Salvelinus fontinalis) from Vadbäcken. This raised concerns that leachate-induced toxicity might affect fish in other leachate-contaminated lakes.

1.9) The Alberta Government has defined a leak rate that is much greater than that stated by LDC.
http://www.environment.gov.ab.ca/info/library/actionleakagerateguideline.pdf

1.9.1) "The solution a pond meeting all of EPA's minimum technical requirements, incorporating a factor of safety of two, and adjusting the number to reflect two holes per hectare, yields in the order of 1000 litres per hectare per day for landfills." This also translates to 38500 litres per day for the proposed Danford site or 14,052,500 litres per year.

2) Leachate Collection Systems

2.1) A landfill is a bathtub in the ground, and a bathtub can leak two ways: it can leak through a hole in the bottom (failure of its bottom liner), or it can fill up with fluid and spill over its sides. Either way, it's bad news. The basic problem is the fluid. If a landfill begins to fill up with fluid, the weight of the fluid puts pressure on the bottom of the landfill, increasing the likelihood of bottom liner failure, so any fluid inside a landfill is a potential source of trouble.

2.2) To prevent fluid from causing problems, every modern landfill has a system for draining liquids out of the landfill. This is called a leachate collection system. What is leachate? Think of a landfill as being like a drip coffee maker. The dry coffee is the garbage, the water you pour in the top is rainwater, and the dark, brewed coffee dripping out the bottom is leachate. You might want to drink coffee, but you definitely do not want to drink leachate: it has many toxic and dangerous characteristics. It is badly polluted with chemicals and with micro-organisms (bacteria and viruses) that would make you sick.

2.3) One of the least-studied aspects of landfill design is how to make a leachate collection system that will work for many decades (**much less many hundreds of years**). The fact is leachate collection systems can **clog up in less than a decade** and, when that happens, fluids begin to build up inside the landfill--a dangerous situation, as we have noted above.

2.4) Leachate collection systems fail in several known ways. First, they can clog up from silt or mud. Second, they can clog up because of the growth of microorganisms in the pipes. Third, they can clog because of a chemical reaction leading to the precipitation of minerals in the pipes; anyone who has boiled a pot of "hard" water and seen the whitish crusty residue in the bottom of the pot knows what "precipitated chemicals" look like. Fourth, the pipes themselves can be weakened by chemical attack (acids, solvents, oxidizing agents, or corrosion) and may then be crushed by the tons of garbage piled above them.

2.4.1) The first problem (silt) can sometimes be avoided, or at least reduced, by installing a "filter layer" above the leachate collection system. The filter layer may be made up of gravel or of a rug-like plastic material called "geotextile." Since the oldest leachate collection systems date from the early 1970s, humans have very little experience with the

long-term performance of leachate collection systems. The hope is that a "filter layer" will solve the silt clogging problem, but after many decades the entire filter layer itself may clog. **Only time will tell**.

2.4.2) The growth of microorganisms seems to be an uncontrollable problem. The conditions for growth of slime-forming microorganisms are not well understood. Even if they were understood, we could not control chemical and physical conditions (temperature, pH, etc.) at the bottom of a landfill because of the thousands of tons of wastes heaped up in the landfill.

2.4.3) The problem of chemical precipitation also appears to be uncontrollable. The chemical conditions that lead to precipitation may be knowable, but again the conditions in the leachate collection system cannot be controlled because the system is not accessible once wastes have begun to be dumped into the landfill.

2.4.4) The last problem--chemical attack on the leachate collection pipes, leading to destruction of the pipes themselves--also appears to be an unsolvable problem. In principal, this is a good idea. But in the real world, how do you know what's going to be put into your landfill next week? Next year? With 1000 brand new chemicals being put into commercial use each year, over the next 10 years, today's leachate collection pipes may come into contact with 10,000 new chemicals that don't even exist today. Any of those chemicals may attack the pipes. In addition, chemicals mixing together inside a landfill will create new chemical combinations that may produce heat or may otherwise attack the pipes.

3) Estimated Liner Life

While BAPE 21 and other documents state the theoretical life of liners is upwards of 750 years, it remains just a theoretical calculation as the statements in the two paragraphs below highlight the true problem with Liner life expectancy.

N.B.

3.1) The Government should require that landfill applicants construct a double composite liner system for the landfill. Further, it should prohibit the use of geosynthetic clay liners as a substitute for two feet of compacted clay in the composite liner. While the geosynthetic clay is being allowed by regulatory agencies, it is now being **recognized as an unreliable approach** for construction of a composite liner because of the rapid transport of constituents through the liner by diffusion and the potential for liner failure due to minor structural stresses on the geosynthetic clay layer. REF) **Development of a Potentially Protective Landfill: Issues Governing the True Cost of Landfilling** G. Fred Lee, PhD, PE, DEE and Anne Jones-Lee, PhD G. Fred Lee & Associates El Macero, CA

3.2) The results of chemical exposure on flexible membrane liners (FMLs) can range from minor effects such as discoloration to more serious problems such as swelling...In extreme cases the liner may dissolve...or...tearing, cracking, or puncturing {may occur}... the waste may react with the liner-causing degradation of the polymer or its additives or... the waste may dissolve into the liner-resulting in swelling of the membrane without degradation of the polymer." MECHANISMS OF LEAKAGE THROUGH SYNTHETIC LANDFILL LINER MATERIALS by S.E. Butler, A.P. Butler, F.M. Johnston, C.J. Sollars, and R. Perry. JCIWEM, 9 AUG 1995, Imperial College, United Kingdom.

"ALL LANDFILL LINERS AND LEACHATE COLLECTION SYSTEMS WILL FAIL "

4) Alternative approaches

What is needed is an alternative that combines the correct decision of the Quebec government to halt the local municipal trench landfill land fill process with a workable non-polluting way of disposing of the municipal solid waste. It requires a stop to the proposedTechnical landfill site at Danford Lake in the Municipality of Alleyn-et-Cawood, utilizing the present landfill sites at Lachute while a Plasma Gasification plant is built in the surrounding area. The Plasco Energy Group has offered to build the plant at no cost to the taxpayer provided they get a long term commitment for the supply of the municipal solid waste. The Plasco offer is to locate 3 plants within the region to reduce traffic and place the plants close to the source .There would be 2 100 Ton and one 200 ton facilities. The facilities would each require a 5 acre foot print and each would employ 24 personnel.

The Plasma Gasification plant offers the following advantages over a Technical landfill site:

Proposed Engineered Landfill	Plasma Gasification
Can be implemented by 2008	Can be implemented by 2008
Jobs: 4 to 6 permanent plus up to 6 temporary	Jobs: 24 (for a 100 ton) Plant
Up to 80% increase in heavy truck traffic thru the village of Danford Lake	Less than 5% increase in heavy truck traffic
Garbage hauled long distances from source to landfill	Garbage converted to electricity near source
Produces methane (only 60% captured)	**no** methane produced
Site size: 500 Acres	5 acres per site (15 acres for the 3 facilities
Produces Leachate which contains 34 chemicals that produce cancer	**no** leachate produced
liners will leak leachate and potentially Contaminate the Picanoc River	**no liners** to leak (is an enclosed system)
Eventually 8million tonnes mountain of garbage	**no** mountain of garbage
Garbage a valuable energy source is buried	garbage an energy source is converted to electricity
No electricity produced	produces clean electricity and is self sustaining
Threatens wet lands	**no** threat to wetlands
Threatens flora and fauna	**no** threat to flora and fauna
Threatens fish spawning in the Picanoc River	**no** threat to fish spawning in Picanoc River
Not compatible with Quebec government plan to Reduce landfills	compatible with Quebec government plan
Potential long term municipal environmental risk and liability	**no** risk or liability

I have not defined all the pros and cons between the two approaches but just the salient ones

As you can see the Municipality of Alleyn-et-Cawood is best served by adopting the alternate approach from an environmental and potential employment view point. In addition the Municipality would be best served from a financial view point also as there is a developer who wishes to develop 400 recreational lots and the taxes from these would go to the Alleyn-et-Cawood municipality.

Finally, is it acceptable to leave our children, grandchildren, great grandchildren and generations beyond that, a mountain of garbage and potential long term pollution and health problems, particularly when there is an acceptable alternative on our doorstep at the present time?

I think not!

I do not think this project should be approved!

Thank you for your time

Ronald Brennen