

Public Health and Environmental Protection Issues for the Proposed Belize Mile 27 Landfill

Submitted by

Dr. G. Fred Lee, PE, DEE
G. Fred Lee & Associates
El Macero, CA USA
Ph 530 753-9630 Fx 530 753-995655
Email gfredlee@aol.com Website www.gfredlee.com

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Based on a request from Dr. Allen Hershkowitz of the Natural Resources Defense Council, I have conducted a review of the “Belize Solid Waste Management Project Environmental Impact Assessment Mile 27 Sanitary Landfill” prepared by Stantec Consulting Int. dated December 1999. I find that this Environmental Impact Assessment (EIA) fails to provide the information that should be provided to decision-makers and the public to demonstrate that the proposed Mile 27 Landfill will protect public health, groundwater and surface water resources, and the environment from the hazardous and deleterious waste components that are proposed to be deposited in this landfill. A summary of my findings is presented below.

Background to Comments

I received a bachelors degree in environmental health sciences from San Jose State University, San Jose, CA in 1955, Master of Science in Public Health from the University of North Carolina in 1957, and a PhD degree from Harvard University in Environmental Engineering in 1960. For 30 years I taught university graduate-level environmental engineering and environmental science courses and conducted research on water supply, water and wastewater treatment, water pollution control, and solid and hazardous waste management at several major USA universities. During my university teaching and research career, I conducted over \$5 million in research and published over 500 papers and reports on this research.

Beginning in my university undergraduate studies and throughout my university career, I have been involved in municipal solid waste management issues, including evaluation of the impacts of landfills, integrity of landfill liners, groundwater monitoring, and related topics. Many of the papers that I have published are devoted to these issues.

Since 1989 when I retired from university teaching and research, I have been a full-time consultant on water quality and solid and hazardous waste management. A summary of my recent activities is available on my website, www.gfredlee.com. I have published extensively on the problems with current management approaches for municipal solid wastes (MSW), and on their appropriate management. Available at this site are my papers and reports devoted to evaluating the impacts of proposed and existing landfills on public health, water resources, and the environment. I have frequently been

involved in review of environmental impact statements/assessments for proposed landfills on behalf of water utilities, municipalities, counties and other governmental agencies, industry, and public and private groups. I am familiar with the characteristics of a properly prepared EIA that fully discloses the potential hazards/impacts of a proposed landfill.

Summary of Findings

The EIA prepared by Stantec Consulting for the Belize Ministry of Natural Resources, Environment and Industry provides a highly superficial and in some instances unreliable assessment of the potential impacts of the proposed Mile 27 Landfill. The approach used in this EIA is to make statements about environmental impact issues, claiming that the proposed landfill will not be adverse to public health, water resources, and the environment without having an adequate basis for the statements. In some instances the statements about the protection that will be provide by the proposed Mile 27 Landfill are contrary to what is well known about the impacts of well designed, constructed, operated, and closed landfills. Based on my experience, I find that this EIA is deficient in providing full disclosure of the potential impacts of the proposed Mile 27 Landfill. This finding should cause this EIA to be rejected by the reviewing authority as inadequate and unreliable.

Specific issues that need to be more reliably addressed are summarized below. Technical background to the issues summarized below can be found at www.gfredlee.com in the Landfill and Groundwater Quality Protection section.

Inadequate Buffer Land Between Landfill and Adjacent Properties

The EIA claims that the proposed Mile 27 Landfill will not be adverse to the owners/users of the adjacent and nearby properties. However, highly limited buffer land exists between the landfill property and the adjacent property lines. It is well known that the adverse impacts of landfills can extend for a mile or more (several km) from the landfill. As proposed, the Mile 27 Landfill will be adverse to adjacent and nearby property owners/users due to odours, fugitive wastes, vermin, smoke from fires, and dust, etc.

The Belize Zoo, and especially the Tropical Education Centre associated with the Belize Zoo, is located within 1 km of the landfill site. There can be little doubt that the zoo and this centre will be adversely impacted by the proposed landfill.

The EIA statement that the daily cover of the deposited wastes will prevent these well known landfill active life waste fugitive emission problems is not in accord with common practice at well run landfills. This situation leads to the justified NIMBY (not in my backyard) position that adjacent and nearby property owners/users have adopted about locating a landfill in their area without adequate buffer lands to dissipate the active life release of the landfill. At least a mile or more of landfill owner-owned buffer land should exist between the landfill waste deposition areas and the adjacent property lines. The owners of adjacent properties should be able to use their property at the property line without adverse impacts from the landfill.

Inadequate Information on the Threat of the Landfill to Groundwater Quality

The EIA claims that the natural geologic strata that underlie the proposed landfill will protect the groundwater from pollution by landfill waste-derived leachate (garbage juice) for as long as the wastes in the proposed landfill will be a threat. The waste in the proposed Mile 27 Landfill will be a threat to pollute groundwater effectively forever. These wastes will contain hazardous and deleterious refractory organic and inorganic components that will not decay, but are subject to leaching by water percolating through the landfill.

The EIA states that, *“The proposed sanitary landfill at Mile 27 Western Highway site has been selected to take advantage of the depths of impermeable clay, which will act as a natural liner preventing percolation of leachate into groundwater.”* Those familiar with the properties of clays know that there is no such thing as “impermeable clay.” All clays have a finite permeability which will allow municipal landfill leachate-associated constituents to pass through them. The natural geologic strata at the Mile 27 site are inadequately characterized to support the claim that the wastes’ components will not pass through the strata into the underlying groundwaters for as long as the wastes are a threat.

The limited information provided raises significant concerns about the eventual pollution of the groundwaters underlying the proposed landfill by landfill leachate. The information provided leads to the conclusion that it is only a matter of time, possibly a short time, until the underlying groundwaters are polluted by landfill leachate so that they cannot be used for domestic and many other purposes. In order to properly support the claim that the natural geologic strata will protect groundwater quality from pollution for as long as the wastes are a threat will require a far more comprehensive geology/hydrogeology study than has been conducted thus far. It is highly likely that these studies will show that the Mile 27 site is not a suitable location for the proposed landfill because of the threat to cause groundwater pollution by landfill leachate.

Unreliable Groundwater Monitoring for Landfill Leachate Pollution

The limited information on the characteristics of the geological strata underlying the proposed landfill indicates that the strata are not homogenous or non-permeable. Instead, the strata are characterized as a geological system with layers and lenses of variable thickness. Further, there are apparently substantial calcareous components of the strata that would be subject to attack by the leachate components. Such strata could readily lead to preferential pathways for leachate migration that make groundwater monitoring for leachate pollution virtually impossible to accomplish reliably to protect landfill offsite groundwater from pollution by landfill leachate. While this issue is well understood, it is not discussed in the EIA.

Further, the failure of the EIA to provide details on the groundwater monitoring system, including parameters that will be monitored, location of monitoring wells, analytical methods, frequency of monitoring, etc., makes it impossible to evaluate the adequacy of the proposed landfill groundwater monitoring system.

Unreliable Information on the Potential for “Treated” Leachate to Pollute Surface Waters

The EIA mentions that leachate will be collected in unlined trenches, where it will subsequently undergo anaerobic and aerobic treatment. While not discussed, it should be understood that the leachate trenches will not convey all of the leachate that enters them. Part of it will enter the geological strata underneath the landfill, and eventually pollute the groundwaters of the area. It is surprising that anaerobic and aerobic treatment is proposed to treat leachate, since it is well known that this type of treatment is not adequate to render MSW leachate non-hazardous and non-polluting. The characteristics of MSW leachate are such that this type of treatment will not adequately remove all the hazardous and deleterious chemicals that can be significantly adverse to aquatic life and other resources of receiving waters for the runoff from the landfill area, where the leachate is deposited. Further, these treatment systems will likely produce large amounts of highly offensive odours.

The EIA states, *“Once at capacity or fully treated, the leachate in the cells would either be slowly discharged into a designated evaporation pond or re-cycled back into the active landfill areas.”* Mention is made in the EIA that leachate may be used to suppress dust on roads. This approach should not be allowed, since it will lead to surface water pollution by leachate-associated constituents.

While the EIA mentions that surface water quality monitoring will be conducted, no information is provided on the details of this monitoring. Without this information it is impossible to evaluate the reliability of surface water quality monitoring programs to detect hazardous and deleterious chemicals and pathogenic organisms that will be present in the “treated” leachate.

Unreliable Information on the Ability to Control Landfill Gas Impacts

The EIA mentions that 0.5 m of “clay” will be used to cover the landfill. It is well known that clay layers in landfill covers will develop significant cracks which will allow escape of landfill gas and percolation of water into the landfill.

It is found that the landfill gas impacts to public health and the environment have not been adequately addressed in the EIA. In addition to the potential for explosions, landfill gas typically contains a variety of chemical constituents that are hazardous to humans and wildlife. Further, the flaring of landfill gas as proposed can lead to dioxin formation that is a threat to public health and wildlife. These issues should have been discussed in the EIR.

Inadequate Information on the Long-Term Threat of Proposed Landfill

The EIA fails to inform decision-makers and the public about the length of time that the proposed landfill will be a threat to public health and the environment. Many of the components of MSW are non-degradable and therefore will be a threat to be harmful to public health and the environment. For planning purposes it should be assumed that this period will be forever. The funding needed to monitor and maintain the landfill after it is closed, and to remediate the polluted groundwater, needs to be discussed in a

credible EIA. This EIA fails to address these issues. Without adequate planning and especially assured funding for postclosure care, this landfill could readily become another polluting landfill that will destroy water resources and harm the environment.

Questions on these comments may be submitted to Dr. G. Fred Lee.