

Open Burning of Garbage and its Alternatives



Prepared for:
Environmental Programs Branch
Department of Environment
Government of Yukon
P.O. Box 2703 (V-8)
Whitehorse, YT Y1A 2C6

Prepared by: Matthew Nefstead, Environmental Programs Assistant

June 16, 2005
Updated August 22, 2006

This document is intended to present information on this topic, believed to be current as of the above date, and is the result of research compiled by a summer student. This document should not be construed as the official opinion of the Environmental Programs Branch, the Department of Environment or the Yukon Government.

The practice of burning garbage is currently an integral part of waste management in rural Yukon. Other than Whitehorse, Haines Junction, Mt. Lorne, Deep Creek, Marsh Lake, Dawson, and Carmacks, all Yukon communities use some form of burning to manage their garbage. Destruction Bay, Beaver Creek, Horsecamp Hill, Keno City, Ross River, Old Crow, Upper Liard, Silver City, and Stewart Crossing use metal burning vessels for a contained burn, while all other communities place their waste in trenches, burn it, and then cover the ashes. This latter method is often referred to as the “burn and bury” method. According to a report issued by the Engineering and Development Branch in 1997 (currently the Community Development Branch of the Department of Community Services), it allows for a significant reduction in the volume of waste, to about 15% of its original volume. This extends the life of the disposal site and reduces equipment operating times, making it more economical than a sanitary landfill both in capital and operating costs. Also, suitable equipment is not currently available to properly operate the facilities as landfills in some of the smaller, remote communities.

Toxic emissions from burning garbage, while difficult to quantify, pose a significant risk to public health and the environment. A report by Peter Reid (BC Environment Air Quality Meteorologist) described the dioxin and furan¹ emissions from a landfill fire near Kamloops in 1996 as “very high” (Reid, 1997; p. 3), with recorded levels as high as 22 pg/m³ I-TEQ² dioxins. This adds clout to the argument that the Yukon should consider the possibility of a ban on the open burning of garbage.

Capital Investment Options

Local and National Models

The 1997 Engineering and Development Branch report mentioned above states that eliminating burning of municipal solid waste (MSW) in the Yukon would require significant increases in spending. Under Yukon’s current waste management strategy this would certainly be the case, but it is certainly not impossible to eliminate burning, and there are alternative methods to account for the extra cost.

Whitehorse, Haines Junction, Mt. Lorne, Dawson, Marsh Lake, Deep Creek, and Carmacks have all stopped burning domestic waste, and now either only burn wood waste or burn nothing at all. This was accomplished through intentional investment by either the municipality or the Yukon government, along with the establishment of waste diversion programs. Whitehorse, for example, has a well-established private recycling sector, while the City operates a large-scale composting service. Carmacks opened a new landfill site to accommodate the extra garbage resulting from a burning ban. Mt. Lorne developed a waste diversion strategy focusing on organics and recyclables, and garbage is now collected at a transfer station before being transported to Whitehorse. Similar transfer stations were established by the Government of Yukon at Marsh Lake and Deep Creek in 2006. Haines Junction purchased a compactor and a truck to transport it at a combined

¹ Dioxins and furans are persistent organic pollutants (POPs) that are considered highly toxic and carcinogenic, and they are a major concern when assessing the emissions from combustion. They are more precisely known as polychlorinated dibenzo-p-dioxins (PCDD) and polychlorinated dibenzofurans (PCDF).

² International Toxic Equivalency Quotient, a unit allowing for the measurement of all dioxins in terms of their relative toxicity.

cost of \$97 500, allowing the community to compress its garbage and extend the life of the landfill.

Elsewhere in Canada, the City of Iqaluit, Nunavut, invested in a wheeled compactor for \$300 000 and stopped utilizing cover material, thereby extending the life of their almost-full landfill by approximately 7 to 10 years. However, the lack of cover material has resulted in a great amount of scattered garbage throughout and beyond the disposal facility, and the City is still struggling to find a long-term solution. In Newfoundland, burning is slated for elimination through an aggressive program of waste reduction and infrastructure improvements. The NWT has prohibited the burning of MSW, partly through the development of Guidelines for the Planning, Design, Operations, and Maintenance of Modified Solid Waste Sites. For example, landfill life is extended by mounding waste on top of existing layers in a controlled and engineered fashion (Kent, Marshall, & Hawke, 2003). The NWT does allow burning of paper products, paperboard packaging and untreated wood waste where alternative methods of disposal or recycling are not feasible, and open burning of food waste may be acceptable where cover material is scarce.

Incineration

In many urban areas, incineration is used as a cleaner, more efficient method of waste disposal compared to open burning, but at a cost of millions of dollars. Incinerators of the size that would be used by small northern communities range from \$25 000 to \$600 000 (US Dollars), according to a report by Alaska's Department of Environmental Conservation and the Alaska Energy Authority (Emswiler & Crimp, 2004). However, the high-efficiency incinerator used by the City of Skagway, Alaska costs about \$2.3 million (US Dollars), and they spend about \$53 thousand per year in fuel costs while paying for about 1.5 operators (Janine Kostelnik, personal correspondence). While incineration is certainly cleaner and more efficient than open burning, many communities like Skagway have found that it requires a large capital investment, high operation costs, a large amount of garbage, and constant supervision by skilled operators.

Some jurisdictions use a technology known as waste-to-energy, capturing the heat from incineration to generate electricity, but this process is not seen as practical for small northern communities (Emswiler & Crimp, 2004). The report by Emswiler and Crimp also suggests a number of ways to increase the efficiency of open burning, mostly by increasing the available airflow. These methods cause a significant reduction in the production of dangerous emissions, and it is recommended that some of these be adopted in the Yukon if open burning continues. The burning vessels, though not considered a final solution, are a safe improvement to open burning until an economical alternative can be found.

It is clear that financial investments can lead to improvements in waste management capability. However, not all municipalities have access to the surplus funds required for such an undertaking. Are there methods that can be used to improve waste management efficiency without a major financial investment? It seems that there are, indeed, a number of options.

Alternative Waste-Reduction Options

Zero Waste

The most promising waste reduction model appears to be the Zero Waste model. A product of the GrassRoots Recycling Network, this model aspires to eliminate landfilling entirely. This may seem unreasonable or unattainable, but its proponents argue that this perception is simply an artifact of conditioning in a “throw-away culture”. Many locales are adopting a version of this model, which advocates local commercial development from recycling initiatives, providing innovative companies with valuable materials diverted from the waste stream, as well as advocating composting and many other waste reduction initiatives. One important pillar of the model is the “polluter pays” principle. Under this principle, the onus for waste management is taken away from governments and placed squarely on the backs of waste generators, as it is for tires under Yukon’s Designated Materials Regulation. This may mean reducing the number of garbage bags that will be collected for free, charging for collection, or imposing fees on manufacturers who produce highly-packaged products. This would encourage residents and businesses to reduce their consumption of throw-away goods, while holding manufacturers accountable for producing excessive packaging waste. It has been estimated that one third of the waste stream is packaging (Environmental Programs Branch, 1995). In this way, the government’s income can be increased to match waste flow, or waste flow can be reduced to match the government’s income.

Another pillar of the Zero Waste model is the development of local business opportunities for the use of waste. An excellent example is a facility near Edmonton (Rubber Tech International Ltd./Champagne Edition Inc.) that processes used tires into useful products like playground surfaces. In this case, a material formerly considered to be waste contributes to Edmonton’s local economy while providing an inexpensive and abundant source of construction material. Such a large operation may not be feasible in small Yukon communities, but there may be other similar business opportunities available.

Canadian jurisdictions that have already started to initiate a Zero Waste program include Toronto, Nova Scotia, and the following regions in BC: the Town of Smithers, and the Regional Districts of Kootenay Boundary, Cowichan Valley, and Nanaimo.

Public Education

Another and likely the most important option for waste reduction is public education. It is estimated that paper and other organics make up about 65% of the waste stream (eg. Environmental Programs Branch, 1995). If every residence in the Yukon used a backyard composter, it is conceivable that landfilled waste could be reduced by half. Even if residents don’t compost animal products as large-scale compost operations do, there would still be a significant diversion. Another worthy target of public education campaigns is recycling participation. Recycling programs are becoming increasingly accessible in the Yukon, but people need to use this service if it is going to make a difference. The authorities responsible for waste management in each community should encourage residents in rural areas to make use of available recycling programs, adjusting their disposal practices in accordance with a realization of the quantity of recyclable material

they normally throw away. According to the 1995 waste management report from this Branch, plastics, glass and metals make up 25% of the waste stream by weight.

Single-Stream Management

In some larger centres, Materials Recovery Facilities (MRFs) separate waste into recyclables, organics, and waste that must be sent to the landfill. This process, known as single-stream waste management, reduces or eliminates the need for source separation, or the separation of waste by residents, while maximizing material recovery. However, like incineration and its cousin waste-to-energy incineration, MRFs may not be feasible in small Yukon communities due to the staffing costs involved; the separation is generally done by hand, so at least one full-time employee would likely be required in each community. It may be that economies of scale are what make these operations worthwhile in larger municipalities, and these economies would not apply in small communities. Nevertheless, municipalities could consider increasing their resources for managing waste in this manner as sorting recyclables from waste may be less expensive than landfill expansion.

Conclusion

It will be difficult to find a practical and economical solution to reduce our reliance on the burning of garbage. Any feasible solutions will likely require the involvement of community members as well as the local and territorial governments, working together to reduce waste production, increase diversion from dumps, and implement innovative methods of dealing with waste. Until such solutions can be fully realized, it is important to manage the impact of burning through the use of efficient and safe burning practices.

References:

- Emswiler, Bert E., & Crimp, Peter M. (2004). *Burning Garbage and Land Disposal in Rural Alaska: A Publication for Small Alaskan Communities Considering Incineration and Energy Recovery*. Juneau, AK: State of Alaska. Available at <http://www.dec.state.ak.us/eh/docs/sw/Burning%20Garbage%20Factsheet.pdf>.
- Engineering and Development Branch. (May, 1997). *Evaluation of a Ban on Burning as a Means of Garbage Disposal in the Yukon: An Analysis of Cost Implications*. Whitehorse, Yukon: Department of Community Services.
- Environmental Programs Branch (as Environmental Protection and Assessment Branch). (1995). *Managing Yukon Garbage*. Whitehorse, Yukon: Department of Environment (as Department of Renewable Resources).
- Kent, R., Marshall, P., & Hawke, L. (2003). *Guidelines for the Planning, Design, Operations and Maintenance of Modified Solid Waste Sites in the NWT*. Yellowknife, NWT: Ferguson Simek Clark Engineers & Architects for the NWT Department of Municipal and Community Affairs. Available at: http://www.enr.gov.nt.ca/eps/pdf/solidwaste_guidelines.pdf
- Reid, Peter D. (1997). *Air Quality Monitoring Associated with the Kamloops Indian Band Landfill Fire: August 12 - 21, 1996*. Kamloops, British Columbia: BC Ministry of Environment, Lands & Parks (Southern Interior Region).

Further Reading:

- Crittenden, Guy. (2004). *Toronto's new 60 per cent diversion plan*. Solid Waste and Recycling Magazine, June/July 2004. Available at http://www.solidwastemag.com/issues/ISarticle.asp?id=152131&story_id=19835141113&issue=06012004.
- Earth Tech. (2004). *Dioxins and Furans Emissions from Open Burning of Municipal Solid Waste in Canada at Landfill Facilities*. Canadian Council of Ministers of the Environment.
- Engineering and Development Branch. (October, 1997). *Analysis of Cost Implications of a Ban on Burning as a Means of Garbage Disposal in the Yukon*. Whitehorse, Yukon: Department of Community Services.
- Environmental Protection Division. (1993). *Municipal Solid Wastes Suitable for Open Burning*. Yellowknife, NWT: Department of Environment and Natural Resources. Available from: <http://www.enr.gov.nt.ca/library/pdf/eps/burning.pdf>
- GrassRoots Recycling Network: <http://www.grrn.org/>.
- Kent, R., Marshall, P., & Hawke, L. (2003). *Background Report for Updating the Guidelines for the Planning, Design, Operations and Maintenance of Modified Solid Waste Sites in the Northwest Territories*. Yellowknife, NWT: Ferguson Simek Clark Engineers & Architects for the NWT Department of Municipal and Community Affairs. Available at: http://www.enr.gov.nt.ca/eps/pdf/Background_Report_Solid_Waste_Sites.pdf
- Zero Waste Working Group, Recycling Council of British Columbia. (2002). *A Zero Waste Tool Kit for Local Government*. Available at http://zerowastenorth.com/pdf/gov/Zero_Waste_Local_Gov_Kit.pdf.