Elk Falls composting experiments, past present and future
by Chuck Easton

It has been many months since I last wrote about our composting experiments, so when the PulpCo Weekly asked if I would contribute to a feature on company solid waste initiatives I jumped at the opportunity.

The pulp and paper industry in BC is based on the use of waste materials. Chips and sawdust and hog fuel are wastes from saw milling and it would be impractical to dispose of this large volume without the provinces' pulp and paper mills. Our industry also generates large volumes of waste. Six hundred cubic meters of treatment plant sludge, 200 cubic meters of fly ash and 50 cubic meters of causticizing wastes are produced by Elk Falls every operating day.

The treatment plant sludge is burned but everything else that can't be recycled is sent to the landfill.

In this day of an enlightened public, the mere mention of the word landfill conjures up images of an eyesore that is not only a visual blight, but an area that will produce toxic leachate for many decades. Public opposition can make getting new or expanded landfills virtually impossible. It is in our best interests to make do with what we have. At Elk Falls our biggest disposal challenge is the 200+ cubic meters of fly ash that are trucked to the dumpsite every day.

Our options are relatively simple. The best alternative is to not generate such a large amount however; this is a lot easier to say than to do. A major refit of the number five boiler is likely to run in the range of $35 million dollars and this is something that we simply can't do tomorrow or at least until the pulp prices rise a couple hundred dollars above where they are today. The second alternative is to divert the fly ash to a beneficial use. This option also presents many unique challenges.

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The Past

Our experience with composting goes back to 1992, one year after the start up of the effluent treatment plant. One of our industrious Elk Falls employees prepared a garden box with a mixture of sand, fly ash and treatment plant sludge. That summer he brought in some of the most magnificent beans and tomatoes we had ever seen. His guile was to have the produce tested for contaminants but I think his real motive was to show off his green thumb. Testing showed his vegetables were no different from ones purchased at the local Super Value.

The following year we looked at the sludge from the point of view of spreading it around the forest floor. The costs of transporting and spreading this material beyond a twenty-five kilometer radius from the mill were prohibitive. Besides, at Elk Falls our real solid waste issue was fly ash, not sludge.

In 1994 we decided to get a bit more systematic about our approach so we enlisted the assistance of the UBC Department of Agriculture. Testing of sludge and fly ash indicated we had lots of nitrogen in the sludge and potassium and phosphorous in the fly ash. We ran two truckloads each of ash and sludge down to the composting plant located between Courtenay and Campbell River. Here we mixed trials of sludge fly ash and hog fuel and ran them through the plant. We were able to produce a usable soil amendment in two weeks. The hindrance to further work was the trucking costs; it was cheaper to use our own landfill. We also found that the dioxin content of the fly ash made this product unsuitable for agricultural use, it was however suitable for horticulture.

In 1995 we decided it made more sense to try and produce the soil amendment onsite rather than 30 kilometers away. Three 200 cubic meter test batches were set up and aerated on a weekly schedule. Our goal this year was to see if we could produce a cost competitive material. We also did some preliminary assessment of opportunities in the Campbell River area. After composting, the material was trucked to a sod farm near Courtenay. The farmer reported he needed less fertilizer than normal with our product on his field. Another problem was uncovered when grass growth was retarded where the compost had been dumped prior to the initial spreading. Further testing found the problem to be high salt levels. The final cost of our experiments worked out to $200 per cubic meter, a little higher than where we wanted it to be.
In 1996 we again enlisted the help of UBC and had a masters student assigned to the project. This year we drew upon our previous two years of knowledge and set out to produce 2,000 cubic meters of composted sludge and fly ash. At the end of the project we had produced this material for a little over $5 per cubic meter, enough to be cost competitive. Two problems remain, salt content is still high but not so high that rainfall couldn’t wash it out and the dioxin content is still too high for agricultural use. This material is now growing sod and Christmas trees on another farm near Courtenay.

The farm owner has reported he is able to get a crop from an area of his land that previously had too much clay in the soil to be a good growing area. We continued to watch this area over the following year and found that salt had leached from the soil. Dioxin on the other hand, does not seem to move.

The Present

Over these three years we have learned how to compost at a cost that is competitive with currently available commercial products. We have learned how to produce a soil material that has good proportions of nitrogen phosphorous and potassium. It also has good levels of organic carbon and micronutrients. We have learned that salt and dioxin are the only contaminants that pose a problem and the salt can be overcome.

Dioxin simply limits its application. This fall we plan to conduct some trials to see if the dioxin concentration in fly ash can be reduced to a level that would allow the agricultural use of our product.

During 1997 and 1998 we have assisted the Ministry of Environment and environmental groups in the development of sludge spreading guidelines. Also the environmental groups continue to identify new chemicals of concern so we have a little more testing to do. This is a constantly moving target but it’s one that is not that difficult to hit.

Regrettably no more composting experiments are planned at this point. The little pile that remains from our 1996 efforts continues to grow the most magnificent thistles on Vancouver Island. This spring, out of necessity, we diverted four weeks worth of sludge to the landfill while our boiler was down for major repairs. The experiment this summer will be to use this material as a final cover.

The Future

We are now at a stage where our next step is to find a large-scale demonstrator project to show off the benefits of industrial wastes if used correctly. There are four potential projects in this area which we are watching very closely. The most exciting opportunity is the reclamation of a mine site on Mount Washington. For the last 25 years this abandoned mine has been leaching copper concentrations into the Tsolum River that are
Carbon Monoxide
by Dale Hills (occupation: hygienist)

With campers firing up their furnaces in the cooler fall evenings a little bit of knowledge about carbon monoxide could be a valuable thing.

Carbon monoxide (CO) is an odorless, colorless, and deadly gas. It is most commonly encountered as a byproduct of incomplete combustion of almost any material that contains carbon, especially from internal combustion engines. Most encounters with this gas, that result in deleterious health effects, occur when it is produced inside an enclosed area which has inadequate ventilation. Examples of dangerous situations where CO has proven deadly include operation of internal combustion engines indoors, use of fossil fuel (oil, propane, diesel, kerosene, gasoline) lamps, heaters, stoves, lights, etc. in an enclosed area, and inefficient or faulty fuel furnaces in homes.

It has approximately the same mass as air and will be located evenly dispersed in any area where it is generated. It is an insidious and deadly chemical in that it is entirely undetectable; it gives no warning of its presence, and poisoning can occur with no indication of anything being amiss. CO affects the body by readily diffusing across our lungs and into the blood, where it quickly binds to one of the hemoglobin proteins. It binds to the same location where oxygen would bind, however, CO does not easily come off the hemoglobin molecule, and the net result is that it inhibits the oxygen carrying capabilities of our blood.

The initial health effects of low level exposure (≤ 25 ppm) has been shown to affect psychomotor tasks, such as ‘careful driving’ skills, or complex tasks requiring high levels of hand-eye coordination. Exposure between 25 - 100 ppm may result in a reduction in exercise and heavy work tolerance, often with the onset of agina (heart pain); this level of exposure is now being shown to adversely affect the heart following long term (20+ years) exposure, and is attributed to the increased prevalence of heart attack in smokers and fire fighters. Above 100 ppm CO can cause headache, nausea, poor judgment, a sense of discomfort, and chronic exposure has been shown to adversely affect fetal development. Higher levels (1000 - 4000 ppm) can result in worse health effects which include respiratory distress, unconsciousness, and even death.

One often overlooked place where exposure may commonly occur is in the home or motor homes (camping trailers). Many homes have fuel furnaces and many people have fuel camping equipment. These items are not working efficiently they may release substantial amounts of CO. If anyone is concerned there are CO detectors available in hardware stores (~$50) that do a good job of detecting CO, as long as they are properly used.

For further information please contact Dale Hills (Occupational Hygienist) at local 5427.