Natural Resources Canada | Ressources naturelles Canada
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Canada

R-NET

Canadian Association of Recycling Industries

RECYCLING TECHNOLOGY NEWSLETTER VOLUME 5, ISSUES #2 AND #3, AUGUST 2000

In a lifetime, the average North American will throw away 600 times his/her adult weight in garbage. This frightening statistic compiled by the Multi-Materials Stewardship board in October of 1998 shows the importance of the four R's (Reduce, Reuse, Recycle and Recover) in waste management.

According to the Packaging Association of Canada, from 1989 through 1996, 11.7 million tonnes of packaging were saved from the garbage heap by reducing, reusing, and recycling. Enough to fill a line of garbage trucks stretching bumper to bumper from Vancouver to Halifax and back to Toronto.

If all the glass bottles and jars sent to Consumers Glass from recycling programs in Canada in 1995 were laid end to end, they would circle the earth four times around the equator (based on an average bottle height of 19.1 cm). Consumer Glass also reports that recycling one glass bottle in the making of a new glass container saves enough energy to keep a 100 watt light bulb illuminated for four hours.

The Canadian Pulp and Paper Association reports that in 1999, Canadian mills successfully transformed a record 5.2 million tonnes of recovered paper into new paper, paper products, and building materials. In 1999, 42% of all paper consumed by Canadians was recycled into newspaper products. The average recycled content of newsprint has risen from 1.4% in 1990 to 22% in 1997, reducing the Canada Pulp and Paper Industry's electricity consumption by over 2.5 million megawatt hours every year.

Still there is room to improve. In Canada, objectives set in 1990 for 50% reduction in solid waste creation by the year 2000 were not met. Also, as few developments in Municipal Solid Waste recycling are published it is becoming hard to continue addressing the issue from R&D standpoint. From our experience there is more information available on the Internet than in the printed format. Unfortunately, the Internet still does not have the stability of the printed medium, sites tend to move, and articles have the tendency to disappear from the servers.

Elizabeth Giziewicz
Editor -in-Chief
CANMET - Mineral Technology Branch

VISIT R-Net's HOME in cyberspace at **http://RNET.NRCan.gc.ca/** This bilingual web site contains current and previous issues. Bookmark this site and visit it often for interesting links and current event listings.

The R-Net team has received numerous requests for copies of the papers we abstracted. We cannot, however, supply copies of the full articles since their reproduction is strictly prohibited through copyright. If you cannot access these articles through your library, please contact the Canadian Institute for Scientific and Technical Information (CISTI) at the National Research Council Canada. More information about CISTI services can be found on the Internet at http://www.nrc.ca/cisti/

Please keep writing to us with your ideas and suggestions. Share your success stories with us, do not forget to tell us about meetings and conferences that you are organizing, and be sure to let us know if you mention us in any of your publications.

Également disponible en français sous le titre R-NET... Bulletin d'information sur la technologie du recyclage.

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http://RNET.NRCan.gc.ca
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Post-Consumer Products

THERE'S VALUE IN USED MATERIALS - DON'T LANDFILL THEM!

By Viive Wark

EGGSHELLS ARE USED for tile pigment.....drums of sulphuric acid are reused in another manufacturing process.....fish waste is used for asphalt blending.....hydrogen peroxide from a pipeline company is being used by a paper recycler in their bleaching process.....tire inner tubes are used to manufacture crab traps.....a tree nursery reuses burlap bags from local peanut and coffee importers.....lab glass pieces from a testing agency are reused in a university chemical lab.....and greenhouse polymer film is being investigated as a secondary supply source for a plastic building products' manufacturer.....

What do eggshells, sulphuric acid, fish waste, hydrogen peroxide, tire inner tubes, burlap bags, and lab glass pieces have in common? All have been reused or recycled for new uses through the Ontario (OWME), British Columbia (BC MEX), and Nova Scotia (NSME) Waste Materials Exchange programs designed to reduce, reuse, and recycle industrial waste materials.

Wastes are resources waiting to be discovered

The creative reuse of these materials demonstrates the basic premise of a waste exchange program - that a by-product from one company may be a valuable resource material to another. This is not rocket science, nor the latest attempt at resource conservation. In fact, waste exchanges have been around for many years - the earliest known exchange was established by the British during World War II to conserve valuable resources and equipment. After the war ended, most exchanges had met their resource conservation goals and ceased to exist until the early 1970's when the concept of promoting transfers of industrial wastes was reborn in Europe and North America. Today, there are three active waste exchange programs operating in Canada - Ontario, British Columbia, and Nova Scotia.

A business opportunity waiting to happen

As the world population increases, consumption grows and as a result, so does the amount and type of wastes being generated. Many of the wastes produced today will remain in the environment for hundreds, perhaps thousands, of years. The creation of these ever-lasting waste materials, combined with a growing consumer population, has resulted in a waste disposal crisis. Resources are drying up, and the amount of space available to dispose of our waste products is shrinking. The utilization of waste exchange services may be one solution to these daunting challenges - and the benefits are not only environmental.

Reducing the wasteful and destructive use of resources represents a major business opportunity. An automotive parts manufacturer in Southern Ontario sends scrap plastic and rubber materials from its manufacturing operation to its sister company that uses cryogenics to reprocess it back into a valuable resource. Once it is ground and pelletized, it is sold externally, or sent back to the automotive parts plant to be used in the manufacture of new parts. This demonstrates how closing the loop can improve both environmental and financial performance.

Another example involves a major consumer packaging company that was spending approximately $200,000 annually on the disposal of polyethylene (PE) and polypropylene (PP) films. The OWME helped to identify end-markets and to establish an on-site separation system. The PE and PP plastics are now recycled at a rate of about 50 tonnes per month. Not only has the company avoided significant disposal costs, they are now generating revenue from material sales.

Development of new and innovative environmental technologies contributes to economic growth and job creation

While the services provided by waste exchanges vary considerably, for the most part, they serve as "match-makers" attempting to hook up generators of waste with end-users. In the case of the OWME, they can also help facilitate research and development projects. This aspect of the waste exchange service can play a key role in economic growth and job creation. While the OWME most often deals in waste streams where an end-market exists, calls are received occasionally from companies looking for solutions to handle problematic wastes. These are wastes that are left out of the recycling loop due to lack of appropriate technology to separate or re-process the material. In an on-going effort to address recycling barriers surrounding material in this category, the OWME continually seeks out R&D opportunities that will lead to the creation of new and innovative technical solutions.

Spent greenhouse polymer to be used in the production of plastic building products?

One R&D project currently being investigated is with Wellington Polymer Technology Inc. (WPTI), manufacturers of "simulated cedar shakes" and other building products. WPTI continually seeks to identify and test the use of different post-industrial materials as potential new sources of raw material. An opportunity to incorporate and recycle greenhouse polymer in the manufacturing process has been identified and WPTI and the OWME are seeking to partner with others to determine the technical and economic feasibility of using this material as an input to their production process. If this project is successful, not only will the manufacturer benefit from lower raw material costs, but the vegetable growing industry will have a market for their greenhouse film, which is currently landfilled.

How the Waste Exchanges work

Participation in any of the three provincial waste exchange networks is simple and **free-of-charge**. Phone, fax or e-mail the waste exchange a list of your "wanted" or "available" materials. The waste exchange staff will then identify available 3R options.

A New Design on Building Buried Garbage Area on Flat Land *(Eng)*
Weijian Zhuang
http://www.ecoweb.com/focus/02192/index.html
The author discusses the construction, operation, and closing of a rectangular buried-garbage landfill (502 metre long and 296 metre wide). The landfill has the capacity of 2,420,000 m^3, lasting approximately 13 years (500 m^3 of garbage buried daily). The article describes and documents the layout and construction stages of this landfill, including the underground drainage and methane gas collection systems. Several technical drawings are included. The operation and subsequent capping of the buried garbage landfill are also discussed. A Chinese patent for this technology is currently pending.

Birds Shun Pretreated Waste
Loelsch F.
*Waste Age **1999**, 30(10), 8-11 (Eng)*
http://www.wasteage.com/edit/month/9910/199910i.html
In Germany, biological pretreatment of municipal solid waste (MSW) was used for the last 20 years at 14 landfills, handling 900,000 tonnes per year. Fifteen additional sites are designed or are under construction. These years of experience have shown that biological pretreatment reduces the waste mass by about 15 percent due to degradation of organic components, improves leachate quality, and increases the waste density from 800 kilograms per cubic metre (kg/m^3) up to approximately 1200 kg/m^3. Also for some unknown reason birds are not attracted to pretreated waste. The author describes

the various MSW pretreatment processes that are currently used in Germany.

5 Ways to Treat Your Leachate
Purschwitz D.E.
*Waste Age **1999**, 30(10), 68-79 (Eng)*
http://www.wasteage.com/edit/month/9910/199910c.html
The author reports on recently developed new combinations of treatment processes to integrate a leachate management system with other landfill operations and to provide a system that is less susceptible to changes in leachate quality. The author describes the following treatments in detail: membrane separation using selective semi-permeable membranes, evaporation of water components in leachate using landfill gas, vapour compressed distillation, falling film distillation, and land treatment options such as constructed wetlands, windrow composting, and poplar tree planting in the final cap of a MSW landfill. The article also includes an insert *"14 Ways to Keep Your Leachate Pumping"* by Mattfeld H.H. This gives hands-on advice on trouble-shooting in the form of a 14 point check list.

There's Green in Your Future
Siegel H.
*Waste Age Magazine **2000**, 31(3), 43-51 (Eng)*
http://www.wasteage.com/edit/month/0003/0003b.html
The article describes several processors successfully recycling green yard waste (including brush, branches and leaves) and wood waste consisting of pallets, crates, furniture makers' refuse and other unpainted or untreated wood. The main challenges encountered are developing niche markets for their end-products, increasing costs for labour, insurance, equipment and fuel, as well as insufficient tipping fees and increased competition, as more processors are entering the industry.

Commonly exchanged materials include:

- Plastics (i.e., stretch wrap, packaging and containers)
- Construction and demolition debris
- Computers
- Wood, cardboard and paper
- Textiles
- Chemicals
- Batteries
- Organics
- Off-spec or damaged items

Remember, before putting your waste materials in a bin and shipping them off to landfill, find out if someone else has any use for them.

For more information, contact: Viive Wark, Marketing Manager, Ontario Waste Materials Exchange. Tel: (416) 778-5283, Toll Free: 1-888-845-9038, Fax: (416) 778-5624, E-mail: vwark@oceta.on.ca, Internet site: http://www.owe.org

You can also contact: Tina Neale, Information Services Coordinator with the British Columbia Materials Exchange. Tel: (604) 683-6009 ext. 313, Toll Free: 1-800-667-4321, Fax: (604) 683-7255, E-mail: rcbc@rcbc.bc.ca, Internet site: www.rcbc.bc.ca
and/or
Peter Geddes, Program Officer with the Nova Scotia Materials Exchange. Tel: (902) 420-3467, Toll Free: 1-800-665-LESS, Fax: (902) 424-5334, E-mail: pgeddes@clean.ns.ca, Internet site: www.clean.ns.ca/materials_exchange/wxh.htm

Municipal Solid Waste

LANDFILL LEACHATE TREATMENT WITH THE WATERLOO BIOFILTER®

By E. Craig Jowett

THE WATERLOO BIOFILTER® system is a single-pass aerobic trickle filter designed for the biological treatment of wastewater. The patented technology was developed in Ontario to cope with Canada's severe climate and has successfully treated municipal, communal, and individual domestic sewage, landfill leachate, food processing wastewater, and some farm animal wastewater. A natural microbial population inhabiting the filter medium feeds on organic pollutants, coliform bacteria, ammonium, and other contaminants.

The Waterloo Biofilter® exhibits high surface area and adherence for microbial attachment, high interconnected porosity for microbial growth and water flow, high retention time (absorbency) of wastewater adjacent to the microbial population, separation of air and wastewater flow paths for high loading rates, low solids production, and consistent medium properties. The plastic foam filter medium forms an interconnected three-dimensional reticulate solid framework, which optimizes retention time and biochemical treatment. It requires only 10% of the area required for conventional sand, soil, or peat filters as the loading rates for the Waterloo Biofilter® are typically 10 times greater than for solid-particle filter media. The medium can be cleaned and re-used relatively easily when required. The transportability of the filter medium makes it ideal for remote access in the north and for areas such as heavy clay belts which have little local aggregate.

Following successful operation in the laboratory environment, the technology has been in pilot field operation (1 m^3/day) since mid-1994 at the Genoe landfill in Owen Sound, Ontario, and in full-scale operation (16 m^3/day design, operating to peaks of 29 m^3/day) since mid-1996 at the Nottawasaga-10 landfill in Stayner, Ontario. Both sites have operated continuously with very low maintenance requirements, and new systems are being planned.

At Nottawasaga the Waterloo Biofilter® unit consists of three concrete tanks, one serving as a "rougher" filter and two serving as "polishers" to treat the rougher effluent. Anaerobic "pretreatment" is provided by the landfill itself. Landfill leachate is collected and sprayed downwards through helical nozzles onto the absorbent synthetic filter medium, through which it trickles by gravity. It is first sprayed onto the surface of a rougher filter where most of the BOD, COD, solids, metals, and hydrocarbons are removed and then passes through a polisher before it is sent to the disposal site.

A remote data collection and monitoring system (Telesafe) allows temperatures and operational parameters such as pump on-off cycles, alarms, and flow rates to be reviewed remotely. The system also allows operational parameters to be changed remotely. This unit has proven invaluable for troubleshooting and process optimization.

Waterloo Biofilter® details:

- Typical removal rates for landfill leachate: 94-98% TSS (Total Suspended Solids), 96-99% BOD_5 (Biochemical Oxygen Demand), 93% COD (Chemical Oxygen Demand), 97% TKN (Reduced Nitrogen Concentration), 40% TN (Total Nitrogen), >99% VOCs (Volatile Organic Compounds), and 90-99% coliform. Pb, Ba and Hg are >90% removed whereas Fe, Al, Mn and most other metals are 50-90% removed.
- Lightweight synthetic medium ensures consistent treatment.
- Replaces heavy imported soil or sand.
- Independent of terrain.
- Independent of soil and drainage conditions.
- No solids production. Small space requirement.
- Standard construction methods and pump controls.
- The filter medium does not require replacement, it may be easily cleaned and reused if the need arises.

Letter to the Editor:

Upon reading your R-Net January 2000 newsletter, I noticed that you referred to the publications available from the American Plastics Council (APC). I wanted to make you aware of The Environment and Plastics Industry Council (EPIC), which is part of the Canadian Plastics Industry Association (CPIA). EPIC is a Canadian council that also focuses on the solid waste management of plastics. In fact, it works very closely with APC. Like APC, EPIC has many publications and other information vehicles available from its web site and I encourage you to visit the site at **http://www.plastics.ca/epic**

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From the Editor:

Thank you very much for pointing out the EPIC site. We are always happy to direct readers to Canadian resources.

A long awaited review of the EPIC site combining numerous publications and activities follows.

The Environment and Plastics Industry Council (EPIC) launched its redesigned web site, at the end of 1999, at **http://www.plastics.ca/epic**
This bilingual site is a resource centre for information on EPIC and plastics solid waste management within Canada. It offers a variety of information, featuring reports, newsletters, and a number of factsheets and other publications on-line. EPIC is an industry initiative dedicated to the responsible use

and recovery of plastics resources. The site also contains a Teacher's Resource Site with course curricula, a virtual adventure game, a newsletter, and links to other sources of plastics information. Publications mentioned here can all be accessed at the EPIC Internet site:

News and Views, a quarterly newsletter that reports on current EPIC activities and issues.

TechTalk, a technical quarterly newsletter informing municipal waste coordinators of new products and/or technologies which may help in decision-making regarding solid waste. Topics include:

- Fire prevention at a materials recovery facility, recycling plant, warehouse, or transfer station. Ten Steps to a Fire Safety Plan (Fall 1999)
- Public collection bins offer new revenue opportunities for municipalities (Summer 1999)
- Tapping into post-consumer PE streams (Spring 1999)
- ASR analyzed as potential fuel substitute (Summer 1998)
- An Industrial Electrostatic Separation Process (Spring 1998)
- New ways to save money for Canadian MRFs (Fall 1997)

A Review of the Role of Plastics in Energy Recovery (31 pages), a report reviewing the results of full-scale and pilot-scale investigations carried out over the last 10 years to determine the effect of increased plastic content in the feed stream on the process and emission performance of the energy from waste (EFW) industry. Full scale investigations were conducted in Germany, Great Britain, the United States, and Japan and the results of pilot studies came from Sweden, the United States, and Finland. The report contains 21 references.

- Low maintenance cost.
- Potential for additional nitrogen, phosphorus, and pathogen removal.
- Suitable for cold weather (-40 °C) and seasonal operation.
- The system can be easily scaled for different sized applications (1,500 L/day to >100,000 L/day) by increasing medium depth and by adding filter modules.
- Both underground and above ground configurations are available.
- The Waterloo Biofilter® treats landfill leachate effectively enough to dispose of the effluent on-site in subsurface trenches and by surface spray irrigation.
- Approved in Ontario and Massachusetts, with pending or partial approvals in many other provinces and states.

The Waterloo Biofilter® is a proven technology that is becoming accepted by regulators and health departments in Canada and the United States. Years of detailed monitoring of field units by independent agents have proven the system to be effective and reliable.

For more information please contact Dr. E. Craig Jowett, P.Eng., President Waterloo Biofilter Systems Inc., by phone at (519) 856-0757, or by fax at (519) 856-0759, Internet site: http://www.waterloo-biofilter.com

POLICY ISSUES

TIME IS PRECIOUS....SO ARE MARKETS. LETS NOT LOSE EITHER

By Brian Smith

Tick Tock....Tick Tock....Tick Tock. Could this be the sound of time signaling the passage of opportunity for the world's metal producers? It would certainly appear to be that signal for the international lead producing industry. But this article is not about lead. This article is about the legitimate indifference of manufacturers as to which materials are used in their products. "Ceteris paribus", if the use of a particular material in a manufactured product is perceived as being unacceptable to consumer markets, a substitute will be found and used. The manufacturing industry is unconcerned that the use of the substitute may significantly damage the markets of the original material. And once that market is gone, it is gone for good.

An October 26, 1999 press release proclaims "*NEMI Kicks Off New Lead-Free Assembly Project*" (http://www.nemi.org/PBFreePUBLIC/index.html). "NEMI", the National Electronic Manufacturing Initiative, is an industry-led consortium made up of more than 50 electronic equipment manufacturers, suppliers, associations, government agencies and universities. NEMI's members include some of the leading original equipment manufacturers and electronic manufacturing service providers such as *3M*, *Motorola* and *Nortel* to name but a few. NEMI's objectives are to have the capability for North American companies to produce lead-free products by 2001, with an eye toward total lead elimination by 2004. As part of this project, NEMI plans to select and recommend an alloy to be used by industry as a "standardized" lead-free solder alternative and to facilitate the smooth transition of manufacturing processes.

It is not unlikely that, once the substitute product is successfully incorporated into Western world production uses, manufacturers will request governments to "level the playing field" internationally, and mandate that only products using the new substitute are considered acceptable for international trade.

NEMI's catalyst for this program was identified as the policy initiatives in Europe and environmental goals announced by leading Japanese electronics firms to eliminate the use of lead from electronic and electrical appliances. In a related article, Japanese electronic firms stated they had initiated "lead-free" solder programs to "cope with a draft proposal made by the European Commission". The European policies are, of course, those contained in the European Commission DG XI's draft directive on Waste from Electrical and Electronic Equipment (WEEE).

While NRCan may be supportive of the policy direction of the WEEE directive, as it relates to industry accepting responsibility for the environmentally sound, life-cycle management of their products, the prescriptiveness of this and other similar directives continues to raise some significant policy concerns. NRCan maintains the view that industry is best positioned to manage these end-of-life products and their related components and, having established the appropriate policy direction, governments should not interfere with efficient management practices by mandating production requirements.

While the WEEE directive is in draft form only and has yet to undergo European interservice consultations, it is, nevertheless, apparent that the inherent message of this directive has been clearly received by the world's electronic and electrical appliance manufacturing industries. The message, alone, was sufficient to catalyze the industry to take steps to eliminate the use of lead from these products.

Would the message of "lead solder elimination" have been transmitted if end-of-life electrical and electronic appliances were managed appropriately within an extended producer responsibilty network? Possibly....possibly not. What is certain, however, is that we have the technology to appropriately manage in an environmentally sound manner all the inorganic and organic components contained in these spent products. It is, as well, certain that if these materials were being appropriately managed within a full life-cycle approach, there would be defensible arguments against the need for government intervention.

The lesson the metal producing industry may learn from this experience is that prompt, responsible, life-cycle management actions are a prerequisite to securing long-term international markets for minerals and metals.

Do not remain complacent. Anyone who believes that international actions of this nature are limited to lead or cadmium or mercury is delusional. Equivalent actions are possible and probable against specific uses of zinc, copper, steel, aluminum and any other metal that is dispersive in nature or is not significantly recaptured at the end of its useful life.

For further information please contact Brian Smith, by phone at: (613) 992-3784, by fax at: (613) 943-2079 or by E-Mail: Bsmith@nrcan.gc.ca

Handling Plastics in a Materials Recovery Facility: Optimization of Actual Operations (81 pages), a report focusing on the management of plastics in a Materials Recovery Facility (MRF). The objectives of the study included studying the impact of MRF design on sorting rates for different types of plastics under varying operational setups. Action plans were developed for five MRFs across Canada to help them improve productivity, improve product quality, and decrease overall program costs. More than 30 recommendations for improvement at five facilities were made, helping them realize significant cost savings in their day-to-day operations. The report describes the areas and processes involved in the study, highlighting easy ways for MRFs across the country to take advantage of similar cost-savings measures.

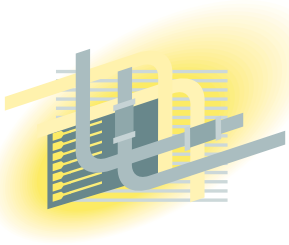
Best Practices Guide for the Collection and Handling of Polyethylene Plastic Bags and Film in Municipal Curbside Recycling Programs (27 pages) is a step-by-step guide on design and implementation of a successful curbside film recycling program. The guide includes a general discussion on the quality (specifications or standards) that the collected PE plastic bags and film must meet, household communication and education tips, best practices for PE plastic bags and film recycling, quality control, and a Troubleshooting Guide. Finally, the report contains an in-depth case study of source-separated collection of PE plastic bags and film that began in 1991 in the City of Peterborough, Ontario.

Processing Options for the Use of Curbside-Collected PE Bags and Film in Composite Applications in North America (27 pages), a report on research into lowering the cost of plas-

tic film recycling for use in composite products. Composite products combine plastics of different grades and types, primarily with wood fibre, but also with rubber, auto shredder fluff, fibre glass, or other plastics. EPIC undertook the evaluation of two air classification systems and four densification processes, and thus defined a "best" system. Four densification processes were evaluated: Pellet mill, Zerglomat-style agglomerator, Condux Unit, and Erema Continuous Agglomerator. In each of these processes, agglomeration takes place in the glass transition temperature range of the polymer rather than at the melt temperature. A suggested system for processing curbside-collected PE bag and film materials is presented.

The site features the following comprehensive fact sheets that are available for downloading:

- *The Plastics Industry at a Glance*
- *Working Toward Integrated Resource Management Solutions*
- *Integrated Resource Management: A Balanced Approach*
- *Weighing the Environmental Balance*
- *Plastic Packaging*
- *Biodegradation Won't Solve the Landfill Crunch*
- *Plastics Recycling Overview*
- *Plastics and the Environment, Myths & Facts*
- *Plastics & Source Reduction*
- *Plastic Bottles*
- *The Benefits of Plastic Grocery Bags and Retail Carry-out Sacks*
- *The Invisible R Reduction*
- *Plastics Recycling: Did you Know?*
- *Plastics Recycling: Building an Infrastructure*
- *The Beginning, The Middle ... No End to the Possibilities*
- *Plastics Degradability*



Metal Scrap Recycling

Nonferrous Metals Outlook
The Minerals and Metals Sector (MMS), Natural Resources Canada
in English at http://www.NRCan.gc.ca/mms/nfo-e.htm
in French at http://www.NRCan.gc.ca/mms/nfo-f.htm
Nonferrous metals are perpetually recyclable. However, the profitability of such endeavour is dependent on current and future prices of the recycled commodity. **Nonferrous Metals Outlook** is a timely summary of the market conditions and expectations for selected nonferrous metals. An overview of the relative contribution of these commodities to the Canadian economy is presented, along with a commodity-by-commodity summary of Canadian and world highlights and outlooks for consumption, production and prices. Currently three consecutive issues are available on-line: *December 1999*, *December 1998*, and *December 1997*. Each issue contains the following chapters: *Foreword*, *Introduction*, *Aluminum*, *Copper*, *Gold*, *Lead*, *Magnesium*, *Nickel*, *Zinc*, *Import and Export Tables*, and *The Canadian and World Economic Situation and Outlook*. The Minerals and Metals Sector (MMS) of Natural Resources Canada is the federal government's primary source of scientific and technological knowledge, as well as policy advice, of Canada's mineral and metal resources. It promotes the sustainable development and responsible use of Canada's mineral and metal resources.

Also of interest to recycling community is the **Canadian Minerals Yearbook** with detailed information on 66 different commodities from Aluminum, Anhydrite and Gypsum to Vanadium, Wollastonite and Zinc. It is also produced by the Minerals and Metals Sector (MMS) of Natural Resources Canada and also resides in English at *http://www.NRCan.gc.ca/mms/nfo-e.htm* and in French at *http://www.NRCan.gc.ca/mms/nfo-f.htm*

Mining and Metal Processing Waste

Minerals Engineering International Online
The International Internet Magazine for Mineral Processors and Extractive Metallurgists
http://www.min-eng.com/
Currently, many recycling professionals use mineral processing technology for waste utilization and recycling (e.g., paper recycling). In January 1999, *Minerals Engineering International Online* was launched to provide a central source of information for minerals engineers around the world. The following areas are covered: *Gravity Concentration, Comminution, Solid-liquid Separation, Electrometallurgy, Computer Applications, Froth Flotation, Biotechnology, Pyrometallurgy, Magnetic/Electrical Separation, Environmental, Consultancy, Sizing & Classification, Reagents, Analytical, Hydrometallurgy, Control & Instrumentation*, and *General*. Each area covers *Recent News*, *Product News*, *Research News*, *Conference Announcements*, *Conference Reports*, *Recently Refereed*

Publications, *New Patents*, and *Company Directory*. The site also contains numerous links to news about people and products in the area of mineral processing; plant operation; research; journals relevant in the field of Mineral Processing and Extractive Metallurgy (latest news on publications, abstracts of papers), Company Directory; Student resources; Books; Patents; Careers in minerals engineering and online Discussion.

Construction and Demolition

Fines Not Always Dandy
Goodrich M.
C&D Recycler ***1999****, Winter, 18-20 (Eng)*
The crushing or grinding of C&D material produces dust-sized residue particles, known as fines. Fines can clog machines, cause added wear and tear on equipment, and contribute to health problems of workers arising from inhalation of dust and potentially contaminated particles. There is currently a general lack of equipment designed to handle fines. The articles discusses common ways of dealing with fines and the options for their recycling, such as using the material for landfill cover, backfill, or as a road base.

Automotive Recycling

End Uses for Used Oil: A Market Perspective
Kress D.
Canadian Chemical News ***2000****, 52(1), 19-22 (Eng)*
This is the first of a series of three articles about the used oil industry. The series highlights the used oil thermal cracking process which converts used oil to distillate gas oil. In this paper the author defines used oil and specifies its composition. The author discusses the used oil collection system, its economic value, distribution, and end uses. The non-treated used oil is used for direct burning in small heaters. Four broad categories of used oil treatment are described in detail: reprocessing to residual replacement fuel oil, reprocessing to demetallized heavy distillate fuel oil, re-refining, and re-processing to thermally cracked distillate gasoil. Blending with crude oil is also mentioned.

Thermal Cracking of Used Oil to Produce Distillate Gasoil: A Process Overview
Kress D.
Canadian Chemical News ***2000****, 52(2), 29-32 (Eng)*
This article describes the thermal cracking process of waste oil conversion that transforms used oil to distillate gasoil. Gasoil is a petroleum middle distillate, also called diesel

Rubber Recycling 2000: A World Of Opportunity
Rubber Association of Canada,
Scrap Tire Management Council
October 11-13, 2000
Toronto, Ontario, Canada
Tel: (905) 270-8322
Fax: (905) 270-2640
E-mail: rac@inforamp.net

Pollutec 2000
16th International Exhibition Of Environmental Equipment, Technology And Services For Industry And Local Authorities
October 17-20, 2000
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In USA: Tel: 1-888-522-5001
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Fax: (703) 522-5005
http://www.pollutec.com/

Preventing The Waste Blues
2000 Fall Conference and Annual General Meeting
Recycling Council Of Alberta
October 18-20, 2000
Lake Louise, Alberta, Canada
Tel: (403) 843-6563
Fax: (403) 843-4156
E-mail: info@recycle.ab.ca
http://www.recycle.ab.ca

Fourth International Symposium On Recycling Of Metals And Engineered Materials
October 22-25, 2000
Pittsburgh, Pennsylvania, USA
Tel: 1-800-759-4867 (USA)
Tel: (724) 776-9000, ext. 243
Fax: (724) 776-3770

E-mail: mtgserv@tms.org
http://www.tms.org

WASTECON® 2000
Solid Waste Management In The New Millennium
Solid Waste Association of North America
October 23-26, 2000
Cincinnati, Ohio, USA
Tel: (301) 585-2898
Fax: (301) 589-7068, or (301) 585-0297
E-mail: wastecon@swana.org
http://www.swana.org

Mission Possible: Strategies For Sustainable Resources And Products
21st Annual Conference and Trade Show
Recycling Council of Ontario
October 24-26, 2000
Ottawa, Ontario, Canada
Tel: (416) 960-1025 ext.16
Fax: (416) 960-8053
E-mail: rco@rco.on.ca
http://www.rco.on.ca

ARC 2000 - Annual Recycling Conference
Society of Plastics Engineers
Plastics Recycling Division
November 7-10, 2000
Dearborn, Michigan, USA
Tel: (203) 740-5405
E-mail: jatremonte@4spe.org

Annual Convention & Exposition Automotive Recyclers Association
November 8-11, 2000
St. Louis, Missouri, USA
Tel: (703) 385-1001
Fax: (703) 385-1494
http://www.autorecyc.org/

The US Composting Council's 10th Annual Conference
November 12-15, 2000
Cleveland, Ohio, USA
Tel: (440) 989-2748

fuel, heating oil, furnace oil, and stove oil. It has a boiling range between 200°C and 360°C. The process of waste oil conversion starts with coarse screening, dehydration in a flash evaporator, cracking, distillation, and stabilization. Thermally cracked oil is itself unstable and has to be treated by one of the described methods: ROBYS™ Process, Chemical Stabilization Methods, and Hydrotreatment. The products of thermal process are: off-gases, naphtha, gasoil, heavy residual fuel, and ROBYS™ residue (if the ROBYS™ stabilization was employed). The author states that this thermal cracking technology is emerging as the technology of choice for progressive environmental services companies, since the product partially replaces virgin gasoil produced from crude oil.

Thermal Cracking Compared to Re-Refining of Used Oil
Kress D.
*Canadian Chemical News **2000**, 52(3), 20-23 (Eng)*
For both processes the article compares consumer acceptance, market size and competition, technology issues, by-products, and capital cost. The author states that the technology of thermal cracking is proven, manageable and understandable by engineering and industry professionals. Thermal cracking offers much greater flexibility in accepting a variety of different used oils, including waste heavy distillate fuel oils from refineries and certain marine industry waste fuels and oils. A thermal cracking plant starts to be profitable at a capacity of 30 000 tonnes per year. This is a great advantage, as smaller plants can be located near sources of used oil.

Canadian Association of Recycling Industries

POTENTIAL WASTE MANAGEMENT IMPACTS

By Leonard Shaw

BY THE END OF THE LAST CENTURY all the provinces and many municipal jurisdictions had hoped to reduce their solid waste by 50% from the levels of 1990. Most, if not all, failed to achieve that target. Many are now looking at modifications to their existing plans or are developing new ones that could impact recyclers.

The City of Edmonton, for example, has raised its monthly homeowner's tax (the monthly utility bill fee) by 60%, from $5 to $8 per month. The monthly utility bill fee funds all disposal-related activities which include a transfer station for garbage, the recyclables processing plant, the co-composting facility, landfill disposal and the leachate treatment plant. The extra revenue will presumably go towards new waste recovery and composting operations, which, it is hoped, will

help Edmonton become the first city in Canada to exceed the 50% waste diversion target.

In the Province of Québec, Bill 90, the amended Environment Quality Act, requires every municipality to adopt a waste management plan. Additionally, authority over manufacturers will be enhanced. For example, the bill could enforce product stewardship and require manufacturers to contribute to the cost of end-of-life recovery of their products and packaging. Whether this "recovery" is to be carried out by the manufacturers themselves or recyclers is uncertain.

Newfoundland has also recently amended its Waste Management Act. The role of the Multi-Materials Stewardship Board has been expanded to include the proposal and implementation aspects of programs in addition to the management of these programs, as in the past. Currently, stewardship programs for two recyclable products, used oil and tires, are under consideration.

The Province of New Brunswick has developed a discussion paper entitled "Waste Reduction and Diversion in New Brunswick". Apart from examining the roles and responsibilities of governments, solid waste commissions, and the private sector, it sets out potential directions for implementing future solid waste reduction and diversion strategies at the local, regional, provincial, and national levels. Of particular interest to recyclers are the sections on developing markets for recycled materials and on industry stewardship. One suggestion coming from the discussion paper is to form a marketing co-operative. This would be a comprehensive provincial network and would include solid waste commissions, redemption centres, and private recyclers. The co-operative would locate markets and arrange for sales and shipment of materials at home and abroad. It could participate in existing materials exchange networks and ensure a sufficient and stable flow of materials from generators to purchasers.

Legislating mandatory recycled content in specific products and packaging is being addressed, but the cost for the province to do this alone is prohibitive. A suggestion to champion such an approach at the Canadian Council of Ministers of the Environment (CCME) is also made. Similar industry stewardship programs, whether voluntary or mandatory, which include waste management expenditure in the costs of production, are suggested to encourage consumers to make wise purchasing and disposal choices.

These are only a few examples of potential changes. The new millennium will likely provide recyclers with either opportunities or challenges, depending on how involved and proactive they are in shaping the industry.

For further information regarding the above article, or for information on CARI's activities and membership, please contact Dr. Leonard Shaw. He may be reached by phone (613) 256-8533, or by fax (613) 256-8534.

Fax: (440) 989-1553
E-mail: admin@compostingcouncil.org
http://compostingcouncil.org/

Canadian Waste & Recycling Expo
November 29-30, 2000
Toronto, Ontario, Canada
Tel: 1-800-787-9328
Tel: 519-256-9434
Fax 519-256-9569
E-mail: stuart@exposition.com
http://www.exposition.com/events/

Construction Materials Recycling Association Conference
January 21-24, 2001
San Francisco, California, USA
Tel: (630) 548-4510
Fax: (630) 548-4511

25th Annual Meeting
Asphalt Recycling & Reclaiming Association
Asphalt Emulsion Manufacturers Association
Feb 21-24, 2001
San Diego, California, USA
Tel: (410) 267-0023
Fax: (410) 267-7546

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E-mail: enviro@starnet.com.eg
http://www.waste2001.com

Recycling and Reuse of Glass Cullet
Recovery and Recycling of Paper
Recycling and Reuse of Sewage Sludge
Recycling and Reuse of Used Tires
International Symposia
University of Dundee, Scotland, UK

March 19-20, 2001
Tel: +44 (0) 1382 344357
Fax: +44 (0) 1382 34816
E-mail: m.c.limbachiya@dundee.ac.uk
http://www.dundee.ac.uk/civileng/z/news.htm

2001 ISRI Annual Convention And Exposition
Institute of Scrap Recycling Industries
March 20-24, 2001
San Antonio, Texas, USA
Tel: (202) 737-1770
Fax: (202) 626-0900
http://www.isri.org/

AMERICANA 2001
The Pan-American Environmental Trade Show And Conference
RÉSEAU environnement
March 28-30, 2001
Montréal, Québec , Canada
Tel: (514) 270-7110
Fax: (514) 270-7154
E-mail: info@americana.org
http://www.americana.org

The 2001 World ITRA Expo
International Tire and Rubber Association
April 19-21, 2001
Nashville, Tennessee, USA
Tel: 1-800-426-8835
Tel: (502) 968-8900
Fax: (502) 964-7859
E-mail: itraef@itraef.com
http://www.itra.com

13th Annual EnviroExpo 2001
May 8-10, 2001
Boston, Massachusetts, USA
Tel: 1-800-543-5259
Tel: 617-489-3400
Fax: 617-484-2352
http://www.enviroexpo.com/

By Elizabeth Giziewicz

GREEN PAGES at **http://www.eco-web.com** is the Global Directory for Environmental Technology, developed by Services International based in Zurich, Switzerland. *GREEN PAGES* brings together manufacturers, engineering consultants, public organisations, industry associations, governments agencies, and information, audit, and financial services from 103 countries. The site is organised in 10 main chapters: *Environmental Information*, *Waste Water Treatment*, *Water Purification*, *Air Pollution Control*, *Waste Management*, *Recycling*, *Soil Rehabilitation*, *Noise Protection*, *Power Generation*, and *Energy Efficiency*. These are further divided into subsections. For example, *Recycling* contains *Material Recycling* (257 entries), *Material Transformations* (111 entries), *Resource Recovery* (211 entries), *Composting Processes* (146 entries), and *General Recycling Services & Misc*. (218 entries). *GREEN PAGES* also hosts an *Editorial* section with articles written by readers.

Corporations Supporting Recycling (CSR) works in partnership with provincial and municipal governments in the development of recycling as a sustainable and economically viable component of an integrated waste management system. Their Internet site is located at **http://www.csr.org/** The site contains a number of publications available to general public, such as:

- *The WDOLink, Waste Division Organization News*, a quarterly newsletter.
- The CSR Sheet: *Reported Spot Market Prices*, a monthly publication indicating Ontario market price trends for metals, glass, plastic, and fibre.
- *Municipal 3Rs in Ontario: 1998 Fact Sheet*, an annual publication produced jointly by CSR, the Ontario Ministry of the Environment, the Recycling Council of Ontario, the Association of Municipal Recycling Co-ordinators, and the Composting Council of Canada.
- Fact sheets: *Curbside Recycling in Ontario* and *The Evolution of Curbside Recycling*.

CSR's involvement in various Municipal Development Projects, Communication and Education Programs, Markets, and Technical Development are also described in detail.

Recycling Council of Ontario (RCO) has an Internet site at **http://www.rco.on.ca/**
The site is filled with a variety of information. Examples include:

- *3RSource On-Line* - A database of recycling companies, Ontario municipal waste management data, and environmentally preferable products and equipment, as well as abstracts of RCO's library documents . Access to an abridged version of the database is available free of charge, and full access is available by subscription.
- Various fact sheets on recycling, recyclable materials, and composting.
- RCO Event Proceedings.
- Several speeches, for example Nov. 3, 1999 - Notes for remarks by The Honourable Tony Clement Minister of the Environment Launching the Waste Diversion Organization.
- A calendar of environmental events.
- An extensive list of environmental links.