Strategy/Implementation Plan for Reducing the Prevalence of Household Garbage Burning (Barrel Burning) in Rural Areas of the Great Lakes

Burn Barrel Subgroup
Dioxins/Furans Workgroup
Great Lakes Binational Toxics Strategy

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1. Background

- In many parts of North America, urban as well as rural, people burn their domestic garbage on their residential properties. In agricultural areas, feed bags and other commercial waste packaging are also burned. The garbage is commonly burned in a 55-gallon steel drum or "burn barrel". Other terms for this practice are "backyard burning" or "open burning". Recent studies (EPA 1999) have indicated that this practice, which is more prevalent in rural areas, is a significant anthropogenic source of dioxins and furans.

- The term "household garbage burning" is intended to represent the on-site (in or outside a home) burning of residential solid waste. It is typically burned in woodstoves, fireplaces, outdoor boilers, or in a barrel or pit in the backyard.

- The United States Environmental Protection Agency (EPA) Dioxin Re-Assessment estimates that 19 percent of total quantifiable annual releases for 1995 of dioxins/furans are generated by residential burning of household garbage. This figure is supported by EPA emission tests on the burning of household/commercial waste in barrels. The Lake Superior Lake-wide Management Plan (LaMP) has identified this source as a priority target for achieving zero emissions. Environment Canada's February 2001 Inventory of Releases of Dioxin identifies Burn Barrels as the third largest source (nationally) behind conical burners and medical waste incinerators; and also fourth (in Ontario) behind medical and hazardous waste incinerators, and iron sintering. As control of incinerators is realized, then the relative percent generated from burn barrels is expected to increase and become the dominant source of dioxins/furans. When Maximum Achievable Control Technology (MACT) standards for municipal waste incinerators come into use in the U.S., "burn barrels" will become the largest remaining source of dioxin, emitting around 10 times more dioxin nationally than MACT controlled municipal incinerators and other small municipal incinerators.

- For dioxin, the pathway into humans is generally not from breathing the smoke from a neighbour's waste fire. The air-to-leaf pathway for dioxin, followed by bioconcentration in animal fat is generally accepted by the scientific community as the predominant pathway to most humans. For other pollutants, such as fine particulates and polyaromatic hydrocarbons, inhalation is the pathway of greatest concern. Since the majority of dioxin intake to humans comes from food sources

(especially animal fats and dairy products), then dioxin emissions from open burning of household and commercial waste impact a wide population when they land on feed crops and are concentrated in the bodies of farm animals. Because of the predominant distribution of burn barrels and farm open dumping sites in agricultural areas, their burning may contribute a disproportionate amount of the overall dioxins in meat/dairy foods.

- There is generally enough chlorine in the waste stream, even from natural materials such as salt and wood, to generate dioxins when garbage is burned. The smoldering, high particulate combustion of open burning offers ideal conditions for dioxin formation.

- There is no single activity, short of eliminating this practice of burning, that can significantly reduce the dioxin emissions by the magnitude that is required. At the same time, reducing the overall amount of garbage burned (i.e. by recycling) can reduce emissions.

- Emissions of other air pollutants associated with burn barrels include volatile organics (such as benzene), fine particulate matter (PM10) and poly aromatic hydrocarbons (PAH) (such as benzo(a)pyrene), and heavy metals. For many of these other pollutants, the principal pathway into humans is directly from inhalation of smoke from burning garbage. The resulting ash from the burning can also contain toxics.

- Open burning of garbage burning contributes to wild fires that destroy forests and can also destroy structures (e.g. houses). For example, the uncontrolled burning of debris is the largest source of wildfires in the state of Wisconsin

- There are many types of uncontrolled burning. Types such as burning grasslands, sugar cane fields, agricultural burning of crop stubble, slash, etc. are outside the boundaries of this strategy. Solutions for agricultural burning may be very different than for burn barrels. At the same time small scale commercial burning of waste materials will be addressed under this strategy.

- Various studies have been undertaken to assess the prevalence of barrel burning. "The Summary Report on Burn Barrels: a survey of residents of Northeast Minnesota and Northwest Wisconsin", January 2000, commissioned by the Western Lake Superior Sanitary District (WLSSD) indicated 28% of residents polled (rural and fringe of city populations) burned their garbage. A Canadian survey, based on the WLSSD survey was carried out in March 2001. The "Household Garbage Disposal and Burning - Ontario Survey" indicated that 24% of rural and small city residents polled burned their garbage. Of those that burned garbage, they were as likely to burn in a woodstove or open pit as in a barrel. The studies also assessed people's attitudes as to why they burn garbage, and what would convince them to stop burning. In both surveys, a large minority indicated that nothing would stop them from burning garbage. Based on this information, there is recognition that enforcing

regulations is required along with education and alternatives to burning. There is no technological fix, such as burn barrel design or separation of waste for burning - the solution, in very simple terms, is for people to stop burning garbage.

- Based on this information, the Dioxins/Furans Workgroup of the Great Lakes Binational Toxics Strategy (GLBTS) concluded that burn barrels are a significant source category and ought to be targeted for reduction under the GLBTS.

- In order to commence work on achieving reductions, a Burn Barrel Subgroup was formed in April 2000. This strategy document lays out the proposed course of action for the Subgroup for the development and implementation of a Burn Barrel Campaign.

2. Goals

- Achieve a significant reduction in the release of dioxins/furans into the environment by reducing the practice of residential burning of garbage within the Great Lakes Basin (with the eventual goal of virtual elimination of dioxin from burn barrels).

- In recognition of the fact that long range transport of dioxins/furans does occur, and animal-fat based food products move across long distances, a further goal is to share the knowledge and tools developed by the Burn Barrel Subgroup for other jurisdictions that lie outside the Great Lakes Basin.

3. Reduction Strategy - Education, Infrastructure, Enforcement

- Given the nature of the barrel burning phenomenon, the strategy focuses on the ways and means of changing the behaviour of individuals. Three elements have been found that will influence a person's decision to burn their wastes on-site or manage them in a more appropriate manner: **education**, **infrastructure**, and **enforcement**. The relative mix of elements will differ locality to locality, but all three elements will be needed for effective implementation of the strategy.

    - It is necessary to first raise awareness about the burn barrel problem and then change behaviors. Behaviour = burning; Change = stopping burning. Over the long-term, attitude change is the most important element toward eliminating residential garbage burning.

    - Without attitude change, the development of additional infrastructure or the imposition of regulations that ban the burning of garbage will fail to address the needed behavioural change. Conversely without viable alternatives to burning, people will be unable or unwilling to change their behavior.

    - Ultimately, it will be the decision of local jurisdictions to implement backyard burning and on-site disposal reduction programs. Providing clear direction

through Federal, State, Provincial and Tribal/First Nations' assistance and supporting legislation will be a determining factor in the overall success of these programs.

3.1 Education:

- Previous burn barrel reduction programs identified education as playing a key role in successful reduction. Successful programs have used a variety of techniques to educate residents.

- The real challenge is to determine what approach will work best for a given area and applying the right combination of actions. Educational messages can then be tailored to local audiences to maximize effectiveness. Messages will evolve over time as the general awareness in a community becomes more widespread.

- Education materials need to be designed to target two main different audiences: i) Public Officials/ Decision Makers , and ii) the Public.

3.1.1 Educating the Public Officials

- Messages will need to focus on the drafting, implementation and enforcement of laws and regulations; health impacts; alternatives to burning and infrastructure needs.

- A key element in developing infrastructure is convincing decision-makers that burn barrels are a problem; therefore outreach to local levels of government is essential.

- A key element in enforcing regulations against backyard trash burning is educating the legal enforcement agencies, such as District Attorneys, to be aware of the environmental as well as the nuisance aspects of the issue. Also, education needs to be provided to a broad spectrum of local inspection and enforcement authorities, who are sensitive to and capable of enforcement (i.e. health inspectors, fire inspectors, police officers, by-law enforcement officers).

3.1.2 Educating the Public

- There are three main types of public audiences: 1) Those who burn garbage; 2) Those who don't burn garbage and who live in rural areas where the practice occurs, or who live in cities but have a cottage/cabin in an area where the practice occurs; and 3) Those who don't burn garbage, who live in cities and have no awareness of the issue.

- Messages for those who burn garbage will need to focus on the perspective of the burners. Messages such as: Burning garbage has health effects; is breaking the law (where laws exist); has aspects of social responsibility; is a fire hazard; etc.; along with waste disposal alternatives to burning.

- Information needs to reach the non-burners, as those who oppose burning will be the ones applying pressure on public officials, working to support local waste management infrastructure, and promoting attitude change informally within the community.

3.2 Develop Infrastructure

- A key element is providing a reasonable alternative to burning, such as collection and disposal/recycle.

- Review of existing infrastructure, identify gaps and discuss cost options to municipalities for improved services for garbage and recycling pickup, and easily accessible garbage and recycling drop-offs.

- Counties that have been successful in setting up a comprehensive collection system, even in the more rural areas, do so by determining the locations that don't have service options and constructing rural drop-off locations for waste, recyclables, and problem materials.

- Incentives can be used initially to overcome the threshold resistance to using alternatives to burning.

- The incentive of discounted garbage service for six months through a county-wide "Burn Barrel Buy Back" program, along with an informational/educational campaign telling residents that it was illegal to burn garbage (together with reasons why they shouldn't burn or bury their wastes) was the right combination for a successful campaign in one Minnesota county.

- The WLSSD burn barrel survey provides information that landfill fees may be a deterrent for some users.

3.3 Establish / Enforce Regulations

- In the WLSSD survey and Environment Canada survey, around a third of the respondents who admitted burning garbage indicated that there was nothing that would cause them to stop burning. In these cases, a regulation against burning, backed up by effective enforcement may be the only deterrent.

- Experience in various jurisdictions shows that effective regulations on banning garbage burning require a clear unambiguous statement to the public about enforcement.

- Obtain the support of the local enforcement organizations. Regulations need to be easily enforceable.

- Regulations can only be effective after people are educated about the burn barrel problem, and viable alternatives to burning are provided. This comment is based on the experience in various local or state jurisdictions where garbage burning bans are in place, but are not enforced, or are essentially unenforceable due to prevailing attitudes by both citizens and governments.

- Regulation "models" are a starting point for discussions with local decision-makers for regulation development.

- Strengthen existing regulations by closing loopholes.

- Consistent enforcement of regulations on related industries (e.g. haulers - for types of recycled materials picked up) may also be required.

4. Implementation Plan (Generic)

- Conduct outreach and education campaign to decision-makers first.
    - Regulatory Agencies in the Great Lake States/ Province
        - Canada - Ontario
        - U.S. - Minnesota
            - Wisconsin
            - Michigan
            - Ohio
            - Illinois
            - Indiana
            - Pennsylvania
            - New York
        - Tribes/First Nations
        - Sheriffs/District attorneys / Crown Attorneys
        - Counties and Municipalities

    - "Associations of Municipalities" (Association of Counties, Council of Mayors, etc.) within each state/province. Subsequently invite them to be outreach partners to the public. The approach:
        - identifies potential opportunities, problems and partners.
        - facilitates early discussions on existing infrastructure and potential improvements
        - facilitates the tailoring of messages to suit local audiences.
        - provides the opportunity for partnerships for solution development.

- By working with the "Associations of Municipalities", we immediately reach a wide audience of potential partners or at least an audience of interested "observers" rather than targeting only a few municipalities and undertaking "pilots" that are not "visible" to the many other municipalities. "Observers" will therefore be aware of

ongoing projects in other municipalities thereby increasing likelihood of their future involvement.

- A prevalence survey may be required in order to demonstrate to decision-makers that burn barrels are a problem in their jurisdiction. However, wherever possible, the case will be made using existing surveys (e.g. WLSSD survey, Environment Canada survey).

- Develop education messages, materials, and outreach strategies. The WLSSD has hired a contractor to do this work. This contract should be supported/funded by interested partners so that the Burn Barrel Subgroup can use this as the main vehicle for developing generic messages, materials, and outreach strategies that can be used by the Subgroup in any of the Great Lakes jurisdictions.

- Deliver messages through local groups. It is preferable to use local environmental or community groups (e.g. Rotary Club) or agencies (e.g. Public Health Office). Funding grants will be necessary to achieve this. Provide local groups with a strategy for implementing a local reduction project; strategy would include:
    - education/outreach messages/tools for these local groups to use (tailor messages to suit local audience).
    - generic list of infrastructure development options as a starting point for discussions with local decision-makers.

4.1 Messages

(Each message may be presented differently to the different target groups)

- barrel burning is harmful to human health and the environment
- children's health can be affected by dioxin
- promote recycling
- promote composting
- promote reduction of waste
- promote regulations/incentives to reduce unnecessary packaging (i.e. less waste generated, less waste burned) at the state or national level'
- promote regulations to ban burning (state/provincial or local)
- fire hazard
- need to provide infrastructure alternatives for waste

4.2 Educational Tools

- as much as possible tools should be prepared binationally, focused on a "Great Lakes Campaign"
- brochures, fact sheets, website, videotapes, use local TV/ radio to air videotape and/or pre-taped interviews with local opinion leaders who agree with our goals, public service announcements, local newspaper articles/interviews/advertisements

4.3 Infrastructure Options

- Target paper recycling since >90% of materials burned is paper and cardboard wastes.

- Also ensure recycling is available for other materials burned , i.e. plastics.

- Recycling generates revenues that help offset program costs.

- Convenient drop-off sites for garbage and/or recyclables (e.g. in remote "camp" areas, drop-offs could be established on key highways/routes leading from these areas; for rural areas, establish at key crossroads; in both cases, periodic pick-up would occur (as warranted by usage and cost factors) for delivery to regional landfills or regional recycling centres such as may exist in a nearby city)

- List of alternatives to burning garbage (also include alternatives to burning of brush/leaves, i.e. chipping of branches, composting leaves)

4.4 Partners

- Contract with organizations such as the Recycling Council of Ontario (RCO) and parallel organizations in the Great Lake States to undertake the outreach to the "Association of Municipalities" or individual municipalities. The RCO has credibility with municipalities and expertise in developing waste management solutions.
- Fire chiefs, fire inspectors
- local environmental groups
- local community groups
- local agencies (public health, fire department, sanitation)
- LaMP and Remedial Action Plan (RAP) public advisory committees
- private haulers
- waste management companies, recycling companies
- First Nations/Indian Tribes
- Ministry of Agriculture and Rural Affairs, Ministry of Natural Resources (parallel organizations in the Great Lake States)
- schools; science teachers

4.5 Reduction Tracking

- establish baseline hauler usage or volumes in key regions, then track usage over time (i.e. rural transfer stations. Also have to take into account community growth)

- in regions where burn barrel reduction campaigns have been undertaken, re-do burn barrel surveys after 2-3 years, or targeted drive-by barrel-count surveys.

4.6 Other projects

- Pursue Federal legislation (EPA), Environment Canada
- National survey (U.S.) to determine the type and extent of state laws governing backyard burning and on-site disposal and the magnitude from state-to-state
- Develop "model" regulation on banning garbage burning at the house/cottage/camp.
- Collect and compile a listing of key research and resources (hard copy and web-.based)
- Apply dioxin emission findings to national burn barrel estimates to determine impact

5. Role of the Burn Barrel Subgroup

- "Connect-the-dots" to create a coordinated campaign by linking separate campaigns, partners, information sources, and funding sources. Individual campaigns strengthened by fact that a larger campaign is underway within the Great Lakes Basin.
- exchange of information and ideas
- leveraging/pooling of financial resources (e.g. joint funding of projects such as WLSSD education/outreach contract)
- development of generic set of messages, materials, tools, implementation options that can be used in any jurisdiction
- outreach to other states that are not currently represented in the Subgroup, as a means of coordinating a Basin-wide campaign.
- Reporting dioxin reduction under the GLBTS.

6. Synopsis of Existing Information

See the following websites which contain background information, references, education materials and links to many other sites

www.openburning.org (Trash and Open Burning in the Great Lakes - the GLBTS burn barrel subgroup site)

www.epa.gov/msw/backyard (USEPA website on backyard burning)

http://www.dnr.state.wi.us/org/caer/ce/ob/index.htm (Wisconsin Department of Natural Resources site on Open Burning)

http://www.epa.state.il.us/community-relations/fact-sheets/burn-barrels/index.html (Illinois Environmental Protection Agency site on backyard burning)

6.1 Backyard Burning Research List

- Western Lake Superior Sanitary District (WLSSD) Summary Report on Burn Barrels (Public Patterns/Perceptions Survey)
- Western Lake Superior Sanitary District (WLSSD) Burn Barrel Dioxin Test (1992)
- EPA (Two Rivers) Emission Characteristics of Burn Barrels (1994)
- EPA Evaluation of Emissions from the Open Burning of Household Waste in Barrels (1997) and subsequent papers on the study and new data
- EPA Dioxin Inventory
- North American Commission for Environmental Cooperation (NACEC) Nunavut Dioxin Source Study
- Open Burning of Waste in Rural Areas: Extent, Impact, and Solutions (1993)
- Health Effects of Exposure to Emissions from Open Burning of Brush and Garbage
- EPA Field Test of Open Burning of Pesticide Bags in Farm Fields (1991)
- Public Health Implications of 1990 Air Toxics Concentrations across the US (1998)

6.2 Fact Sheets, Resources, Commentary, and Articles

(Many of these and others are available on the www.openburning.org site)

- *Reducing Backyard Burning and On-site Disposal* OEA Guide (1996)
- *Burn Barrel Buy Back (4B's) Strategy* Guide
- *Waste Not, Burn Not!* Video (Feb 1996) (Minnesota)
- *Did You Know? Don't Burn Your Garbage* Flyer
- *Burn Barrels Are Unhealthy* Fact Sheet
- *If You Burn There's Something You Should Know* Newspaper Ads
- Backyard Burning Radio Spots
- Backyard Burning Educational Curriculum
- Burn Barrel Educational Poster Display
- *Dr. Paul Connett on Health Impacts of Burn Barrels* Video (Nov 2000)
- Backyard Burning pdf. brochure by New York Legislative Commission on Solid Waste
  http://workonwaste.org/burn.htm
-Burning Household Waste - a source of air pollution in Michigan:
  http://www.deq.state.mi.us/aqd/publish/burnhousehold.htm
- *New Hampshire Dioxin Reduction Strategy*. - contains a description of the barrel burning contribution to dioxin, and New Hampshire's strategy for burn barrels.
  http://www.des.state.nh.us/ard/dioxin/strategy.pdf

7. Information Gaps/ Controversies

- Whether the pathway for dioxin into humans can be through direct breathing of smoke from burning garbage at home.

- Prevalence and regional variability of the practice of burning garbage.

- The subgroup will continue to review scientific issues (such as the effect of PVC content in waste) as new data and analysis becomes available and will re-evaluate the strategy as needed.