Recycling End-of-Life Vehicles (ELVs) in Canadian Remote Communities

Linking the Canadian Auto Recyclers Environmental Code (CAREC) to ELV Processing in Remote Communities in Canada

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1. Introduction:

1.1 About CAREC

The Canadian Automotive Recyclers Environmental Code (CAREC) has emerged as a valuable resource for auto recyclers, regulators and interested stakeholders to better understand the issues surrounding the responsible retirement of end-of-life vehicles (ELVs) in Canada.

CAREC was written to provide automotive recyclers with a "plain language" summary of the Federal and Provincial environmental laws that pertain to the safe removal, storage and transportation of hazardous materials in End-of-Life Vehicles (ELVs). Go to http://carec.ca/carec-en-homepage.htm for a summary of the hazardous materials and the Federal and Provincial laws.

CAREC was developed by automotive recyclers for automotive recyclers and it is a very effective at promoting environmental compliance for automotive recyclers in urban and rural areas of Canada where ELVs have a positive value.

Unfortunately, ELVs accumulate in remote communities and because the cost of recycling exceeds the value of the parts and commodities the ELVs are abandoned and are not recycled.

The purpose of this document is to provide practical direction for the processing and crushing of ELVs in remote communities.

1.2 Definition of Remote Communities

A remote community is defined as a community where the cost of recycling an ELV is greater than the value of the parts and commodities in the ELV. In Canada, the factors that determine if a community is remote are the value of commodities, ELV processing costs and the transportation costs to recycling markets.

If the processing and transportation costs exceed the parts and commodity value of the ELV, the ELVs will not be recycled and will accumulate in the community until the economics change. The issues related to the management of ELVs becomes more extreme as the community is more remote with the artic providing the greatest challenges for the management of ELVs.

1.3 Related Publications – Summerhill Impact Guidebook

The recent publication by Summerhill impact on the management of ELVs in the artic is an excellent guidebook on the practical issues related to the recycling of ELVs in remote communities.

This is an excellent guide that will provide guidance to communities that want to take a leadership role in the removal of ELVs from their community.

2. Remote Community Issues and Opportunities

For a variety of logistical, financial and social reasons, ELVs accumulate in remote communities and because the ELVs have a negative value because the cost to process, crush and transport the ELVs to a steel recycler exceeds the value of the parts and commodities. As such, there is typically no recycling infrastructure for ELVs, few trained or experienced technicians and limited capacity to remove and store hazardous materials in remote communities.

The goal of this document is to:

- provide strategies for the recycling of ELVs in remote communities.
- identify additional hazards when recycling ELVs in remote communities;
- establish a practical Code of Practice for temporary or periodic removal of ELVs from remote communities;

2.1 Issues and Challenges in Remote Communities:

The recycling of ELVs in remote communities provides a variety of challenges over and above the recycling of ELVs in urban and rural settings. The following is a summary of the additional issues that must be taken into consideration when establishing a Code of Practice for the processing and crushing of ELVs in remote communities.

Bears

Remote communities will typically use the landfill / transfer station as the marshalling area for ELVs and these locations attract bears. Extreme caution must be used to avoid interactions and conflicts with bears.

Bad Roads, Ice Roads, No Roads!

Not all communities will have good public road access that the majority of Canadians enjoy.

For example, the community of Seton Portage has a very narrow and steep road with grades that exceed 20% while the community of St Theresa Point in Manitoba has winter road access only and may communities along the coastline only have barge access or bridges have weight restrictions. These access problems exacerbate the issues related to the management of ELVs and the hazardous materials in remote communities.

Damaged ELVs

ELVs that have been sitting in a community for many years are typically beaten up, vandalized and parts removed making the processing of ELVs before crushing more difficult and a higher safety risk. Extreme caution must be used by the contractors to handle the damaged ELVs while processing.

Limited Infrastructure, Equipment and Expertise.

The recycling of ELVs takes specialized equipment, knowledge and skills that will not normally be available in small remote communities. Contractors are not readily accessible and most expertise and equipment will need to be brought to the community to process the ELVs.

Weather

Canada has extreme and un-predictable weather including high precipitation and extreme cold and heat. Processing ELVs in remote communities will need to include contingency planning for extreme weather.

2.2 Linkage to Stewarded Products:

All provinces will have Stewardship Programs for the hazardous materials associated with ELVs: tires, used oils, mercury switches, lead-acid batteries and most provinces will have a stewardship program for antifreeze. Unfortunately no province has a stewardship program for refrigerants from ELVs.

In addition, there are Stewardship Programs for other products such as white goods, electronics, beverage containers etc. that may want to collaborate with a program designed to manage ELVs in remote communities.

Where possible, Stewardship Programs need to coordinate and collaborate so that the cost of recovering products from remote communities is efficient and cost effective for all parties.

2.3 Community Support:

The removal of ELVs from a remote community cannot occur without the support of the community and a community champion. The Summerhill Impact Guidebook is an excellent compilation of the guidelines for communities. Without the support of a remote community, the recycling of ELVs will not be successful.

3. Strategies for Remote Communities:

There are a number of considerations that will determine the best course of action for a remote community. Some of those considerations are:

- The ELVs are scattered through the community and the outlying areas. Some ELVs will have trees and shrubs growing through them, some will be burned and vandalized and some will be have parts removed;
- Accumulation rate is relatively slow – about 1 ELV for every 20 people in population is a rough estimate of the accumulation rate for ELVs;
- The remote communities are not situated near primary or secondary transportation corridors.

3.1 Phased Approach

The typical remote community does not have any recycling infrastructure; is not located on primary or secondary transportation routes; and, ELVs have been accumulating in the community for many years.

It is not uncommon for the number of ELVs in remote communities to exceed the population of the community.

The first phase of the ELV removal from a remote community is to conduct an inventory of the number of ELVs and establish a Marshalling area and start the process of towing the ELVs to the Marshalling area.

The second phase is the determination of the best solution to process and remove the ELVs from the community. If there is a large number of ELV a great distance from recycling infrastructure, it may be practical to send in a crusher and crew to process the ELVs in the community and then transport the crushed hulks out of the community.

If there are smaller quantities of ELVs and transportation distances are short, “picker trucks” or flat deck trucks maybe a better option to transport the ELVs to a community with a qualified automotive recycler.

In the case of the pilot project in Dease Lake, with 300 ELVs in the community and 7 hour drive to the closest qualified recycler, the best option was to send a bailer and crew to the community and then transport the crushed ELVs.

The third phase is to develop strategies to continually move the ELVs to the marshalling area where they are removed from the community to a qualified automotive recycler so that:

- the backlog of ELVs does not occur;
- ELVs do not get damaged and vandalized;
- Hazardous materials do not leak into the environment.

3.2 Centralized Coordination

Remote communities typically have a small population and as such they do not normally have:

- Expertise in processing ELVs and managing hazardous materials;
- Familiar with Federal and Provincial laws;
- Contacts with contractors and transport companies.

Consequently it is ideal if there can be a centralized coordinator for all remote communities in a region or Province. A centralized coordinator will help ensure that the processing and crushing of ELVs will be done to Federal and Provincial laws and that the processing, crushing and cleanup are completed in a cost efficient manner.

4. Applying CAREC in Remote Communities:

The application of CAREC in remote communities must recognize the logistical issues and challenges related to the processing and recycling of ELVs in remote communities while maintaining compliance to all Federal and Provincial laws.

The general principle of this document is that processing and crushing ELVs in remote communities is risky but inevitable given the accumulation of ELVs in some remote communities. Respecting the environment and environmental laws while being practical are the guiding principles for the processing of ELVs in remote communities.

When processing ELVs in remote communities, the basic requirements outlined in CAREC will apply; however, each recycling operation in remote communities will be different because:

- Infrastructure and expertise will be vary from community to community;
- processing areas will be temporary or periodic;
- storage and transportation logistics for hazardous materials will vary.

4.1 Administration

Training and Certification of Mobile Crew:

In some situations, the most practical solution for a remote community will be to contract with a company with a mobile crusher or bailer. For the pilot project in Dease Lake, the mobile crew and equipment was the best solution because of the large quantity of ELVs and the long distances to qualified recycling infrastructure.

The following are the types of equipment that will be needed by a mobile crew:

- equipment requirements:
    - crusher/bailer, loader, generator, air compressor;
    - A/C machine; barrels for used oil, antifreeze, brake fluid, gasoline/diesel; gas tank spike.
    - Spill kit and supplies.
- training requirements:
    - Refrigeration certification;
    - CAREC training;
    - CAREC certification for remote communities
- Insurance / Contingency Plan / Worker Safety requirements:
    - General Liability and Operational Insurance;
    - Contingency Plan for Mobile Operations;
    - Worker Health and Safety Insurance.

Reporting and Documentation:

Each remote operation will require adequate documentation. Note that some parts of the report must be completed by the Mobile Crew while other parts of the report can be completed after the Mobile Crew has left and the marshalling and processing areas are being inspected.

The data and information required are:

- number of ELVs processed and crushed;
- Vehicle Identification Numbers (VINs);
- quantities of hazardous materials recovered:
    - Crank case oil;
    - Other lubricants;
    - Antifreeze;
    - Lead-acid batteries;
    - Mercury Switches;
    - Refrigerants.
    - Tires.
- fate of hazardous materials;
- post-crush clean-up and inspection report.

The remote community will require ongoing monitoring and reporting of new ELVs that are left at the marshalling area – expect the accumulation rate of about 1 ELV per 20 population after the backlog is removed.

4.2 Process Areas

Marshalling Area

The local landfill or transfer station will frequently be designated by the remote community to be the marshalling area. Private property will be an option in some locations.

The choice of the marshalling area will bring a variety of challenges and opportunities. The benefits of the local landfill or transfer station are that all the ELVs, other metal products and other stewarded products will be in a central location. The challenges are that the landfill or transfer station is typically out of town, may not have power or security and is frequented by bears.

Recyclers on private property also provide benefits by having skilled personnel with better security and infrastructure. The downside of a private recycler is that they maybe a hoarder and create a mess that would defeat the purpose of the initiative for remote communities.

Because each remote community will be unique, the community needs to consider the best location for the marshalling of ELVs and utilize reliable local infrastructure and expertise where possible. Ideally, the Marshalling Area will be close to the areas where ELVs will be processed, crushed and hazardous materials will be stored.

Processing Area

The process area of a CAREC certified automotive recycler has a:

- covered roof to shed the rain and snow from the work area with a concrete pad to contain any spilled fluids;
- power and lights;
- safe and sturdy rack to place the ELV during processing.
- drums and tools to drain hazardous liquids such as crank case oil, antifreeze and stale gas;
- equipment (A/C machine, gas tank spike, generator, Loader);

In most remote communities, much of this basic infrastructure will not be present. As such, the processing area in a remote community must have the following features:

- area must be level and draining of fluids cannot proceed in the rain if the process area is not covered.
- Substrate must be at least semi-permeable to allow clean-up of spilled fluids. Clay or compacted snow could provide a temporary barrier that can be cleaned up at the completion of the

processing. A plywood floor with absorbent pads could also provide a suitable barrier over sand or crushed rock;
- Process area must be at least 30 metres away from a stream or wetland and runoff from process area must be able to be contained in the event of a large spill.

Given that most remote communities will have limited or no power, the following management of hazardous materials must be considered a minimum.

It is also recognized that ELVs that have been in the remote community for some time will be physically damaged, vandalized, burned, tires removed or had engines and transmissions removed. The processing of these damaged ELVs is extremely difficult and potentially unsafe and best efforts should be made to remove the remaining hazardous materials prior to crushing.

- The three primary fluids for draining before crushing are crankcase oil, antifreeze and stale gas – other fluids in transmissions and differentials are not practical to drain before crushing;
- Windshield washer fluid can be easily removed with suction and reused;
- Tires must be removed before crushing but because there will likely not be a tire machine on site, the tires can be left on the rims;
- Mercury switches are easily removed by a trained crew ;
- Refrigerants must be removed using a portable A/C machine by a licensed technician in accordance with the CAREC standards.

Crushing Area

Once the ELVs have been processed and the hazardous materials have been removed, the ELVs are ready for crushing or bailing before transportation.

The crusher or bailer will need to be modern with the ability to collect any fluids that will be recovered during the crushing process.

Because not all the fluids have been removed from some of the parts (eg differential fluid), the crusher must have the ability to collect any fluids that maybe liberated from the ELV during crushing. Normally, differentials and transmissions will not break during a crush, but if they do, the fluids must be collected. Normally, a crush of 100 well processed ELVs will generate about 20 litres of fluids during crushing.

Hazardous Materials Storage

All hazardous fluids must be stored with secondary containment in a secure location (including protection from bears) and the containers must be clearly labelled.

Lead-Acid batteries must be stored in a secure location with secondary containment. Lead-acid batteries should also be stored in a location that will not allow freezing of the electrolyte.

Tires must be stored in a central location for easy removal. Ideally the tires will be stored in a secure location to prevent vandalism and fires.

4.3 Hazardous Materials Management

The following practices must be applied in remote communities. The application of CAREC in remote regions was written with the understanding that:

- ELVs have become isolated in remote communities and must be removed otherwise the hazardous materials in the ELVs will eventually be released into the environment;
- Infrastructure an equipment is likely limited in remote communities and the processing and crushing of ELVs must be practical;
- Processing and crushing of ELVs is difficult in normal circumstances and remote communities have additional hazards and challenges.

Crank Case Oil:

- Ideally crank case oil will be stored separately from other lubricants to enable the oil to be burned in a used oil furnace in the community. The goal is to provide a fuel for the community in the winter plus reduce the cost of removal of used oil from the community.
- If the crank case oil is going to be used as a fuel, the oil must be stored separately and not be contaminated with stale gas or other lubricants.
- The storage requirements for crank case oil in the processing area must follow CAREC by being in secondary containment, secure and properly labelled.
- Used crank case oil to be used as a fuel is not subject to the Transportation of Dangerous Goods Act; however, transportation will be subject to Provincial Hazardous Waste Regulations;
- Barrels of used crank case oil should not be transported in quantities more than 220L at a time.

Antifreeze:

- Radiators must be drained prior to crushing;
- Antifreeze must be put in separate barrel that is labelled with secondary containment and security – especially security from bears and other wildlife that will ingest the antifreeze;
- Some antifreeze will remain in the block of the engine and may be partially recovered during crushing.

Stale Gas:

- Stale gas that cannot be reused on site must be drained by puncturing the gas tank spike;
- Stale gas must be stored in a separate labelled container that has secondary containment;

Fluids from Crusher / Bailer:

- Crushing or bailing an ELVs will generate additional fluids and water – about 20L per 100 ELVs;
- Modern machines will collect the runoff in separate containers or holding tanks;
- Crusher / Bailer fluids must be captured in a labelled container with secondary containment.

Lead-Acid Batteries:

- Used and fully discharged lead-acid batteries will have weak acid that can freeze and cause the battery casing to crack and the acid will leak during the next thaw;
- Lead-acid batteries must be removed and placed in a secure location that is protected from extreme freezing temperatures;
- Batteries must be transported as hazardous waste and a dangerous goods.

Windshield washer fluid:

- easily removed and reused by the community.

Mercury Switches:

- ABS and hood mercury switches are easily removed during processing assuming the ELVs are not badly damaged;
- The Mercury Switch Out Program provides adequate information on the location of the mercury switches;
- Switches should be removed and sent to the Mercury Switch Out Program for recycling.

Refrigerants:

Based on the two pilot projects, very few ELVs in remote communities will have refrigerants but there must be capacity to remove

refrigerants if found in ELVs. The following aspects apply for the removal of refrigerants in remote communities.

- The procedures for the removal of refrigerants is well documented in CAREC and the same procedures apply in remote communities;
    - Licensed technician to remove refrigerants;
    - Log book of ELVs with refrigerants;
    - Tracking of containers with recovered refrigerants to prove destruction of refrigerants.
- Portable A/C machines capable of R12 and HFC134a removal must be taken to the community in the event that ELVs will have residual refrigerants;
- R12 and HFC134a can be mixed together in a single container because the refrigerants will be sent for destruction.
- Container for refrigerants must meet Federal and Provincial requirements.

Tires:

CAREC applies to all tires on vehicles that were registered for public roads.

- Tires must be removed from the ELV before crushing.
- Tires can be left on rim for transportation to tire recycling;
- Tires should not be cut off of rims

4.4 Emergency Response, Worker Safety and Site Remediation:

There are many environmental and safety hazards when processing and recycling ELVs in urban areas. These hazards are exacerbated in remote communities plus the response to worker injury is problematic.

Safety

Worker safety is the first priority. Bears, handling damaged ELVs and uneven terrain with limited infrastructure are the additional concerns when working in a remote community. In addition, medial response to an injury will be limited.

Contamination

Small leaks and spills will occur during processing and crushing of ELVs – this is inevitable in ideal conditions and will occur in remote communities. The systems need to be in place for an adequate response to these small leaks and spills and ongoing cleanup of contaminated soil or snow after processing and crushing.

Spill Response

The biggest concern is a significant spill of hazardous fluids or a tire fire during storage or transportation. The processing crew needs to have training in emergency response plus have significant materials for spill response.

Requirements for processing in Remote Communities:

- Safety plan that summarizes the potential worker hazards at the site and available medial response in the community;
- Spill Response plan that summarizes the quantity of hazardous fluids expected on site, a site map of the processing and crushing area with proximity of streams and wetlands and required quantities of spill response equipment and materials;
- Appropriate training of workers and adequate 3rd party liability insurance.

4.5 Post Crushing Clean-Up and Evaluation:

The crushing of ELVs will generate broken glass, plastic and other debris as part of the crushing process.

Provisions must be made for the cleanup of the crusher location after all the ELVs have been crushed and transported. The material cleaned up from the crusher site will be benign and can be disposed in the landfill.

Soil and snow that is becomes contaminated can also be disposed as top cover in the landfill assuming that the oil content is less than 3%.

Following the completion of each clean-up of a remote community, a CAREC inspection should be done to ensure that the ELVs were processed in an adequate manner, that the hazardous materials have been removed from the site and there is feedback to the crew that conducted the processing and crushing of the ELVs.

Ideally, once a remote community has had its backlog of ELVs removed from the community, new ELVs will be moved to a central processing area so this cycle does not repeat itself every 15 to 20 years.