The characteristics of waste fuel are also largely determined by the nature of its virgin state. The Canadian General Standards Board (CGSB) maintains a series of standards for gasoline and diesel fuels used in different applications in Canada[1] while the American Society for Testing and Materials (ASTM) Specification for Aviation Turbine Fuels D1655 defines the basic civil jet fuel specifications for Jet-A, Jet-A1 and Jet-B fuels[2]. When one of more of the components of the fuel blend falls outside of the acceptable range specified by these standards, the fuel is referred to as being 'off-specification' or 'off-spec', and is no longer suitable for its intended purpose. Off-specification may result from the introduction of impurities during the fuel's refining, transportation or storage, or through the loss of original properties through aging. Fuels that cannot be brought back into specification with the introduction of additives must be reused for other purposes, returned to refineries for re-refining or managed as a hazardous waste.

Flash point is the temperature at which enough hydrocarbon will evaporate from the fuel so as to burn in the presence of oxygen and an ignition source (i.e. spark). In other words, flash point provides an indication of how easy a fuel or oil will burn. Hydrocarbons with low flash points (i.e. gasoline) are more flammable than hydrocarbons with high flash points (i.e. automotive crankcase oil SAE30). Table 3 describes flash points for several common fuels and oils.

Table 3. Flash Points and Viscosity of Common Fuels and Oils

Fuel type	Flash Point (°C)	Viscosity (cSt[a])
Gasoline	-43	0.46 to 0.80 [b]
Jet B[3]	-1 to -23	1.3 [c]
Jet A and A1	>38	2 to 3.5 [b]
Fuel Oil No. 1 (kerosene)	38 to 72	2.39 to 4.28 [c]
Fuel Oil No. 2 (home heating oil, automotive diesel fuel)	52 to 96	3.0 to 7.4 [b]
Fuel Oil No. 4 (commercial heating oil, marine diesel fuel)	61 to 115	7.4 to 26.4 [c]
Fuel Oil No. 6 (Bunker C)	>65	97.4 to 660 [d]
Automotive Crankcase Oil SAE30	230	66.3 [e]
Freshwater		1.0038 [c]

a The centistoke (cSt) is the ratio of a liquid's absolute viscosity to its density.
b Determined at 15 °C
c Determined at 20 °C
d Determined at 50 °C
e Determined at 40 °C

[1] Examples of Canadian General Standard Board standards for fuels include:
CAN/CGSB 3.5 Automotive Gasoline
CAN/CGSB-3.517 Automotive Low-Sulfur Diesel Fuel
CAN/CGSB-3.520 Automotive Low-Sulfur Diesel Fuel Containing Low Levels Of Biodiesel Esters (B1-B5)
CAN/CGSB-3.16 Mining Diesel Fuel
CAN/CGSB-3.6 Regular Sulfur Diesel Fuel
CAN/CGSB-3.18 Diesel Fuel for Locomotive-Type Medium Speed Diesel Engines
CAN/CGSB 3-GP-11d Naval Distillate Fuel

[2] Jet A is used within Canada and the United States by domestic and international airlines. Jet B is rarely used except in parts of northern Canada where its lower freeze point and higher volatility is an advantage for handling and cold starting.
[3] Jet B is typically comprised of 35% kerosene and 65% naphtha.

Viscosity is a liquid's resistance to flow. A hydrocarbon with a low viscosity is 'thinner' and more likely to migrate away from the point of spillage than a hydrocarbon with a high viscosity. Low viscosity hydrocarbons are also more likely to leach through unfrozen soil towards groundwater or an adjacent water body. Besides the hydrocarbon's chemical composition, viscosity is also influenced by the temperature of the liquid. The lower the temperature, the higher the viscosity. Table 3 provides the viscosities of several common oils and fuels and compares them with freshwater.

2.2 Potential Effects on the Environment and Human Health

Used oil and waste fuel have historically been released to the environment through flaring, burning and fire practice, landfilling, indiscriminant dumping, accidental spills and through use as a dust control agent on roads. Burning and use in fire practices can lead to the release of unburned hydrocarbons, acid gases and metals that adhere to particulate matter in air (i.e. solid particles and liquid droplets) and eventually are deposited on soil and plants or in water. When hydrocarbons are released into water, a film of oil is initially formed on the surface where contaminants can be released and mixed with the water column and sediments. There are many ways oil can affect aquatic organisms ranging from coating the organism's skin, ingestion and absorption by surface breathing aquatic insects and tainting the flesh of fish, shrimp, clams and other edible organisms. The direct release of used oil or waste fuel to soil can lead to contaminants entering the environment through volatilization, adsorption to solid organic matter, leaching into groundwater, or through surface runoff to oceans, lakes, rivers and streams. Many different plant species are very sensitive to the toxic effects of oil, while others are more resistant.

The potential effects of used oil and waste fuel on human health is directly related to its physical properties and the types and levels of contaminants present. Highly volatile hydrocarbons are flammable and may present a risk of fire or explosion. Highly volatile hydrocarbons are also more likely to be inhaled into a person's lungs, which can result in inflammation of the tracheobronchial tree, bleeding from alveolar membranes and the displacement of oxygen. Repeated inhalation can affect the central nervous system eventually leading to lethargy, headaches and coma. Ingestion of hydrocarbons can result in irritation of the gastrointestinal tract, abdominal pain, vomiting and nausea.

Prolonged or repeated skin contact with used oil and waste fuel may cause severe irritation and dermatitis, and should be avoided. Heavy metals and other contaminants found in used lubricating oil may also be absorbed through the skin.

Heavy metals such as chromium, copper, lead, manganese, nickel and zinc are commonly found in used lubricating oil from friction wear on engine parts and can influence the effect the waste has on human health. Heavy metals can accumulate in the body and, although symptoms vary with the specific heavy metal, a person may be exhibiting metal poisoning if they experience any of the following: chronic pain throughout the muscles, tendons or other soft tissues of the body; a general feeling of discomfort, fatigue, and illness; forgetfulness and confusion; gastrointestinal complaints such as diarrhea, constipation, bloating, heartburn, and indigestion; dizziness; migraines and headaches; visual disturbances; or nervous system malfunctions including burning or numbness of the extremities.

Waste Management

Minimizing or avoiding the creation of pollutants and wastes can be more effective in protecting the environment than treating or cleaning them up after they have been created.[4]

3.1 Pollution Prevention

Pollution prevention is a term used to describe methods and practices that minimize or eliminate the generation of waste. Employing these methods only makes good sense as they help to reduce the hazards and costs associated with handling, storing, transporting, recycling, treating and disposing of the waste. They also help to reduce the impacts waste can have on the environment, human and worker health and safety and reduce the global emissions of greenhouse gases by minimizing the use of raw materials.

Generators can help prevent pollution and reduce their costs by implementing a range of waste reduction, reuse and recycling initiatives including changes to operational procedures, maintenance practices and raw material use. Several of these initiatives are identified below.

Reduce

- Purchase the right type of oil, lubricants and fuel and only the amount needed.
- Use re-refined, reconditioned or recycled oils and lubricants by choosing Ecologo certified products. A complete listing of environmentally-preferable products is available for downloading at http://www.ecologo.org/en/index.asp.
- Use longer lasting synthetic products or select oils and lubricants that provide for maximum operating life.
- Develop effective inventory controls and ensure the stored quantities of oils, lubricants and fuels are completely used before purchasing additional supplies.
- Establish and maintain equipment maintenance schedules that are consistent with the manufacturers' suggested schedule.

Reuse and Recycling

- Donate any excess unused oil, lubricant and fuel to reputable companies or individuals.
- Make an agreement with your supplier to return un-opened and undamaged containers of oil, lubricant and fuel.
- Purchase and install lubricating oil reconditioning equipment. While this form of recycling might not restore the oil to its original condition, it does prolong its useful life. Refer to section 3.7.1 *Reprocessing and Re-refining* for further information on reconditioning used lubricating oils.
- Purchase and install a certified appliance (i.e. incinerator, boiler or furnace) designed to safely burn used oil or waste fuel. Utilizing the oil's heating value can also reduce the purchase and consumption of other virgin fossil fuels. Refer to section 3.7.2 *Burning for Heat Recovery* for further information on the use of used oil and waste fuel appliances.
- Encourage small volume generators to deliver used oil and waste fuel to local collection centers, reusers or recyclers. Contact the Nunavut Department of Environment for the names of registered waste receivers and waste management facilities or your community government for alternative local reuse and recycling options.

[4] Source – Canadian Council of Ministers of the Environment.

- Large commercial and industrial generators of used oil and waste fuel should participate in national, provincial, territorial and local waste exchange programs or establish exchange accounts with approved recyclers and re-refiners.

Refer to the *Environmental Guideline for the General Management of Hazardous Waste* for a listing of Canadian waste exchanges and associations.

The *Workplace Hazardous Materials Information System* (WHMIS) is Canada's national hazard communication standard. WHMIS is administered in Nunavut by the Workers' Safety and Compensation Commission. Key elements of WHMIS are the provision of material safety data sheets (MSDS), container labeling and worker education and training programs. A MSDS is available from the chemical manufacturer and contains information on the properties of various oils, lubricants and fuels, along with instructions on their safe use and handling. Refer to the MSDS before purchasing or using oil and fuel products for the first time.

3.2 Storage

Storage refers to the maintenance of used oil and waste fuel while awaiting its reuse, recycling, transport or disposal. Storage is not acceptable for the long-term management of these wastes except under extraordinary circumstances and should be considered as a temporary measure only.

The type of storage method used depends upon the volume of wastes generated. Small volume household do-it-yourselfers should use leak-proof high density plastic jerry cans to store used oil and waste fuel until enough is accumulated to warrant transport to a local treatment or disposal facility. Moderate and large volume commercial and industrial generators should use metal drums or tanks to store used oil and waste fuel until treatment and disposal options are identified. Regardless of the storage method used, used oil and waste fuel should never be mixed with each other or other wastes as this will increase the complexities and costs of treatment and disposal.

Guidelines for the storage of excessive, unwanted or waste oil, lubricant and fuel are provided below:

- Never mix used oil and waste fuels with one another or different wastes (i.e. solvents, paints).
- Store used oil and waste fuel in its original container or another container certified by the Canadian Standards Association (CSA) for this purpose. Containers should be tightly sealed at all times, except when emptying or filling, to avoid spills.
- Small volumes of used oil and waste fuel should be stored in leak-proof high density plastic jerry cans while larger quantities should be stored in 16 gauge or lower steel drums.
- Containers should be sound, sealable and not damaged, rusting or leaking. If the container is leaking, carefully transfer the contents to another sound and sealable container or place the leaking container inside a larger leak-proof container.
- Each container must be clearly labeled to identify its contents – either "Used Oil" or "Waste Fuel". If used oil and waste fuel are being stored in an institutional, commercial or industrial location, the containers must also be labeled in accordance with the *Workplace Hazardous Materials Information System* (WHMIS).
- Place all labeled containers in a secure and clearly marked area which is separate from other waste to prevent its disposal with normal garbage. Access to the storage area should be controlled and the area should have secondary containment in accordance with the *Fire*

Prevention Act and *National Fire Code*. Spill response equipment should be located nearby to enable quick response in the event of an accident.

- Containers should be located so as to enable their physical inspection for damage or leakage and should be protected from the sun, weather and physical damage.
- Workers should be trained in the safe use, handling and shipping of used oil and waste fuel, be made aware of the importance of not mixing wastes, have access to material safety data sheets and be provided with personal protective equipment. Only trained personnel should have access to the designated storage area.
- Store used oil and waste fuel out of reach of children and pets and a safe distance away from potential sources of ignition. Children and other family members should be made aware of the risks and hazards associated with these wastes.
- Never store used oil or waste fuel in underground tanks as leaks cannot be easily identified.

If a commercial facility is used to store used oil and waste fuel for periods of 180 days or more or the total quantity of waste stored on-site at any one time exceeds the criteria set out in the *Environmental Guideline for the General Management of Hazardous Waste*[5], the facility must be registered with the Department of Environment as a hazardous waste management facility. Copies of registration forms are available at http://env.gov.nu.ca/programareas/environmentprotection/forms-applications or by contacting Nunavut's Department of Environment. Refer to the *Environmental Guideline for the General Management of Hazardous Waste* for additional information on the registration process.

In accordance with the *Spill Contingency Planning and Reporting Regulations* that have been adopted under Nunavut's *Environmental Protection Act*, no person may store used oil and waste fuel in an aboveground facility where the storage capacity of the facility equals or exceeds 20,000 litres unless a spill contingency plan has been prepared and filed with the Chief Environmental Protection Officer. Refer to the *Regulations* or contact Nunavut's Department of Environment for further information on contingency planning and spill reporting requirements.

3.3 Transportation

All used and unused oils, lubricants and fuels are regulated as dangerous goods under the *Transportation of Dangerous Goods Act* when they have a flash point of less than 61°C. Used oil and waste fuel may be subject to additional transportation requirements if the product is regulated as a dangerous good and is intended for disposal or recycling, or if the used oil or waste fuel contains metal wear particles, organic compounds or other contaminants that exceed the concentrations as set out in Schedule 5 of the federal *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations*. In these cases, the oil or fuel must also be transported as a hazardous waste[6].

Under the *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations* and the *Interprovincial Movement of Hazardous Waste Regulations*, a consignment of hazardous waste must be accompanied by a completed waste manifest when the waste is intended for disposal or recycling and is transported in a quantity greater than five litres or five kilograms. An exception to the manifesting requirements is applied when the used oil and waste fuel is either household in origin or is

[5] The criterion for Class 3 Flammable Liquid waste is 4000 litres and the total aggregate quantity is 5000 litres or kilograms.
[6] In response to the 2007 federal government direction on streamlining regulation in Canada, the alignment of requirements under the *Interprovincial Movement of Hazardous Waste Regulations* and *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations* is being undertaken by Environment Canada.

being returned directly to the supplier for any reason. In other words, household do-it-yourselfers do not have to complete a waste manifest to transport used oil or waste fuel to a local collection centre and institutional, commercial and industrial owners are exempt from manifesting if the product is being returned to the supplier because it is defective (i.e. off-specification) or was purchased in surplus quantities. In both case, all other requirements as set out in legislation and the Guideline must be complied with.

Given the difficulties associated with precisely characterizing used oil and waste fuel, consideration should be given to the following:

- Assume the flash point and levels as set out in Schedule 5 of the *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations* are exceeded and transport the waste as a hazardous waste. The Regulations and Schedule 5 can be downloaded from Environment Canada's web site at http://www.ec.gc.ca/lcpe-cepa/eng/regulations/detailReg.cfm?intReg=84.
- Submit a representative sample of the used oil or waste fuel to an accredited laboratory for testing to determine whether the flash point and contaminant levels are exceeded.

Waste manifest forms are available in Nunavut from the territorial Department of Environment. Completion instructions are included on the reverse side of each manifest. Further information on manifesting can be obtained by referring to the *Environmental Guideline for the General Management of Hazardous Waste* or Environment Canada's *User's Guide for the Hazardous Waste Manifest*.

When used oil and waste fuel has been determined to be a hazardous waste, its classification, packaging, labeling and placarding must also conform to the federal and territorial *Transportation of Dangerous Goods Act* and *Regulations*. Schedule I of the *Regulations* classifies used oil and waste fuel as follows:

Shipping Name:	WASTE Diesel Fuel; Fuel Oil; Gas Oil; or Heating Oil Light Classification: 3 Product Identification Number: UN1202 Packing Group: III Special Provisions: 82 and 88
Shipping Name:	WASTE Gasoline; Motor Spirit; or Petrol Classification: 3 Product Identification Number: UN1203 Packing Group: II Special Provisions: 17, 82 and 88
Shipping Name:	WASTE Kerosene Classification: 3 Product Identification Number: UN1223 Packing Group: II
Shipping Name:	WASTE Petroleum Distillates N.O.S.; or Petroleum Products N.O.S. Classification: 3 Product Identification Number: UN1268 Packing Group: I, II or III

Shipping Name:	WASTE Ethanol and Gasoline Mixture with more than 10% Ethanol Classification: 3 Product Identification Number: UN3475 Packing Group: II Special Provisions: 17, 82 and 88
Shipping Name:	WASTE Environmentally Hazardous Substance, Liquid, N.O.S.[7] Classification: 9 Product Identification Number: UN3082 Packing Group: III Special Provisions: 16

When used oil and waste fuel is determined to be a hazardous waste, its transport by air must conform to the *International Air Transport Association* (IATA) *Dangerous Goods Regulations* and *International Civil Aviation Organization* (ICAO) *Technical Instructions*. When being transport by marine, it must conform to the *International Marine Dangerous Goods Code*. Further information on transporting wastes by air or marine can be obtained by contacting Transport Canada or by referring to the appropriate Transport Authority.

All hazardous waste generators, carriers and receivers must be registered with the Nunavut Department of Environment before handling the waste. A unique registration number is assigned to each registrant through the registration process, which enables completion of the manifest document. Copies of registration forms are available at http://env.gov.nu.ca/programareas/environmentprotection/forms-applications or by contacting Nunavut's Department of Environment. Refer to the *Environmental Guideline for the General Management of Hazardous Waste* for additional information on the registration process.

A listing of registered hazardous waste generators, carriers, receivers and management facilities in Nunavut is available by contacting Nunavut's Department of Environment.

3.4 Spill Response and Cleanup

Spills of used oil and waste fuel can affect soil, groundwater and surface water quality if they are not cleaned up quickly and properly. Spills of gasoline and other highly flammable waste fuels can also present a fire or explosion hazard if sources of ignition are not immediately eliminated.

Taking preventative actions such as ensuring proper handling and storage, training personnel and preparing a spill contingency plan, is the most effective way of reducing the potential environmental and safety hazards and costs associated with spills. When a spill does occur, the waste should be contained as quickly as possible. Small spills on land or impermeable surfaces (i.e. concrete floors) can be recovered using absorbent materials. Underlying and surrounding soil and snow that become contaminated may need to be excavated. All reasonable efforts should be made to prevent spills from entering floor drains, groundwater or surface water bodies as containment and cleanup then becomes very difficult and costly. All cleanup materials, recovered waste and contaminated soil and snow must

[7] UN3082 should be used whenever concentrations as set out in Schedule 5 of the federal *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations* are exceeded.

be disposed of properly. Contact the Nunavut Department of Environment or local community government for available treatment and disposal options.

All spills of hazardous materials must immediately be reported to the NWT/Nunavut 24-Hour Spill Report Line at (867) 920-8130 in accordance with the *Spill Contingency Planning and Reporting Regulations*. The local fire department, police, and health and environmental officials should also be notified once initial containment efforts are complete.

3.5 Mixing or Blending with Other Materials

It is good practice to avoid mixing wastes, either intentionally or through poor storage and management practices. Mixing used oil and waste fuel with other hazardous or non-hazardous materials makes management and disposal of the mixture more complicated and costly. Also, how the resulting mixture is regulated can vary greatly depending upon the type of material that is mixed with the used oil or waste fuel. In these cases, it may be necessary to contract an accredited laboratory to analyze the resulting mixture to determine its characteristics and how it should be regulated.

The best means to avoid mixing used oil and waste fuel with other materials is to segregate the various types of waste during storage. The degree of segregation would depend on the amount and variety of used oil and waste fuel generated. The following segregation categories should be pursued:

- Engine lubrication oils
- Unwanted or off-specification fuels
- Hydraulic oils including brake and power steering fluids
- Other oily wastes including oily fluids, oil-in-water emulsions, greases and solvents

No person should blend or dilute used oil or waste fuel with unused hydrocarbons for the purpose of lowering the concentration of metal wear particles, organic compounds or other contaminants so as not to exceed the concentrations as set out in Schedule 5 of the federal *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations*.

Some materials are incompatible with used oil and waste fuel. In this case, mixing could result in a fire, explosion or chemical reaction. It could also make it more difficult and costly to find a registered carrier and receiver willing to accept the mixture for transport, treatment and disposal.

3.6 Used Oil Filters

Filters may contain significant quantities of used oil after being taken out of service. These filters should be managed in the same way as the used oil they contain and are subject to the storage, transportation, disposal and other requirements described in the Guideline.

When used oil is drained or removed from a filter so there is no visible sign of free-flowing oil left behind, the filter is no longer subject to the Guideline and can be disposed of as regular garbage. The used oil should be removed from the filter by puncturing the filter dome and gravity draining it for at

least 24 hours[8] or by crushing the filter either pneumatically or hydraulically in a commercially available crusher. A combination of both draining and crushing is considered to be the best practice.

Used oil that is removed from a filter must be managed in accordance with the applicable legislation and the Guideline.

Figure 1 – Example of a Used Oil Filter Crusher

3.7 Recycling, Reuse and Disposal

There are many environmental, economic and resource conservation benefits to reusing and recycling used oil and waste fuel, and many different ways to achieve it. Used oil can be reprocessed or reconditioned so as to conserve the lubricating properties of the oil, prolong its operating life and reduce the consumption of virgin oils. It can also be reused to utilize its heating value. Waste fuel can be returned to re-refiners to be remade into useful fuel products, brought back into specification through the introduction of fuel additives or, like used oil, be used for space heating or other uses. Disposal is less desirable from an environmental and resource conservation point of view and should be considered only where practical alternatives are not available.

3.7.1 Reprocessing and Re-refining

In most cases, the basic lubricating properties of oil are not lost through its normal use, but are simply altered though breakdown of additives, the addition of metals and solids from friction wear on engine parts and contamination with unburned fuel combustion products. During reprocessing, relatively simple treatments such as settling, dehydration, filtration, centrifugation and coagulation are used to remove the contaminants. While reprocessing cannot produce a lubricating product that is comparable to virgin oil, it can clean the oil to the extent necessary for less demanding applications. Used lubricating oils that have been mixed with other products generally cannot be reprocessed using these techniques and therefore, **the segregation of used oil stocks is essential.**

Figure 2 – Example of Used Oil Reconditioning Equipment

Waste fuel that has lost its original properties through aging can sometimes be reconditioned through the introduction of specific fuel additives. The owner or person in charge, management or control of off-specification fuel should contact the Petroleum Products Division of the Department of Community and Government Services for further information and advice.

[8] Drain time may be reduced by 'hot draining' or maintaining the filter at or near the engine's operating temperature for 12 hours.

Unlike reprocessing, re-refining technologies are designed to fully restore the original properties of the used oil and waste fuel. These processes are industrial in nature and involve the treatments used for reprocessing followed by other techniques such as demetalization, distillation, stripping, clay contacting, solvent extraction and hydrogenation. There are currently no re-refiners located in Nunavut. Used oil or waste fuel that is intended for re-refining would need to be transported to a re-refinery located in southern Canada.

3.7.2 Burning for Heat Recovery

Used oil and waste fuel may be burned in a variety of combustion appliances including boilers, furnaces, space heaters, engines, incinerators and cement kilns. For the purpose of the Guideline, discussion will focus on furnaces and boilers because of their ability to recover heat energy and their relative popularity in northern Canada.

Figure 3 – Example of an Air-atomizing Used Oil Furnace

The most common types of used oil and waste fuel appliances are the vaporizing pot and air-atomizing burners. The major difference is that the fuel evaporates into the combustion chamber in a vaporizing pot fuel burner while microscopic fuel particles are formed in an air-atomizing burner by forcing the fuel through a nozzle and spraying it into the combustion chamber. The vaporizing pot burner is most suited to small applications while the air-atomizing burner can be used in a wide range of applications.

Studies show that design of the burner and feedstock quality greatly influences the environmental performance of the appliance. In general, the vaporizing pot burner retains most of the feedstock metals in the ash residues, while air-atomizing burners release most of the metals up the stack. Conversely, emission levels of unburned organic compounds are higher from vaporizing pot burners than from air-atomizing burners. Other studies show that large commercial boilers generally emit lower levels of pollutants than small boilers and furnaces because operators of large units usually pretreat the fuel feedstock (i.e. settling, centrifugation, vacuum distillation or solvent extraction) and have more consistent operating conditions. Other important factors when considering the design and installation of a waste oil burner is height of the stack and the number of appliances already operating in the area.

Used oil and waste fuel should only be burned using boilers or furnaces that have been certified and approved for that purpose by the Canadian Standards Association (CSA), Underwriters' Laboratories of Canada (ULC) or another certified testing agency acceptable to the Fire Marshal. In all cases, combustion gases must be vented directly to the outside ambient air. Appliances that are not certified or installed in accordance with manufacturers' specifications may represent significant environmental, fire and personal health and safety risks.

As described above, the quality of the burner feedstock is one of the greatest determinants of emissions quality. For this reason, no person should burn used oil or waste fuel, either with or without heat recovery, when the undiluted levels of metals, halogens and polychlorinated biphenyls (PCBs) exceed those described in Table 4.

Table 4. Maximum Levels of Impurities in Used Oil and Waste Fuel Burner Feedstock[9]

	Maximum Concentration (parts per million)	
Impurity	**Used Oil**	**Waste Fuel**
Cadmium	2	2
Chromium	10	10
Lead	100	100
Total Organic Halogens (as chlorine)	1000	1500
Polychlorinated Biphenyls	2	2
Ash Content		0.6% by weight

Used oil and waste fuel feedstock should not be blended or diluted with other hydrocarbons for the primary purpose of meeting the maximum levels of impurities.

Written records of appliance operation should be kept by the operator. These records should include when and how much used oil or waste fuel feedstock was burned. The quantity and quality of feedstock obtained from any off-site sources should be recorded separately along with any repairs and maintenance performed on the equipment. An Inspector may require the owner or person in charge, management or control of the used oil or waste fuel to obtain a representative sample of the feedstock, have it analyzed by an accredited laboratory and the results submitted to the Inspector.

Used oil and waste fuel appliances should not be operated on property that is zoned residential or, if the property is not zoned, on property in an area that is used primarily for residential purposes.

Bottom ash and other solid residue collected from the appliance is suitable for burial when it meets the criteria set out in Table 1 of the *Environmental Guideline for Industrial Waste Discharges into Municipal Solid Waste and Sewage Treatment Facilities* or in accordance with land use permits and water licenses issued by Nunavut's co-management boards and Aboriginal Affairs and Northern Development Canada. When the residue meets the criteria and is to be disposed of into a municipal landfill, consent from the local community government must first be obtained. Bottom ash not meeting the criteria is considered to be a hazardous waste and must be managed in accordance with the *Environmental Guideline for the General Management of Hazardous Waste*.

Any person who purchases or operates a used oil or waste fuel appliance is strongly encouraged to register the appliance with the Nunavut Department of Environment. Voluntary registration enables the Department to better manage used oil and waste fuel by maintaining an up-to-date inventory of certified appliances operating in Nunavut. Appendix 4 includes a copy of the registration form. The owner or operator may obtain an original form and registration user's guide by contacting Nunavut's

[9] Adopted from the Northwest Territories' Used Oil and Waste Fuel Management Regulations (2004).

Department of Environment or by downloading the documents through the Department's web site. There is no fee for registering the used oil or waste fuel appliance[10].

Open burning used oil and waste fuel should be avoided because of the inefficient destruction of the waste, limited control over the combustion process and fire hazards. Waste fuel may only be openly burned for the purpose of practicing fire fighting under the direct supervision of a trained firefighter when the practice is conducted in accordance with a standard operating procedure. In all cases, the minimum volume of waste fuel needed to initiate the practice burn should be used and the primary purpose for its use should not be for its disposal.

3.7.3 Disposal

Once in the environment, the hydrocarbons that make up the base oil or fuel, the additives and many of the contaminants that are introduced through usage can significantly impair the quality of local soil, water, vegetation, fish and wildlife resources. For this reason, used oil and waste fuel should never be used as a dust suppressant on local roads, discharged directly to the ground, a lake or watercourse or sewage lagoon, open burned or placed in a landfill. Used oil should also never be used for fire practice although small quantities of waste fuel can be used under the direct supervision of a trained firefighter.

Reprocessing and burning for heat recovery in a certified appliance are the safest, most environmentally responsible and cost effective local options for managing used oil. Businesses and industries that routinely generate large quantities of used oil (i.e. automotive service garages, trucking and aviation companies, heavy equipment operators) should implement one of these options or arrange to transport their waste to a local collection center, reprocessor or registered used oil or waste fuel appliance owner. Small generators and household do-it-yourselfers should donate used oil to local businesses that operate reprocessing or registered burning appliances, where the businesses accept such wastes.

Large generators of waste fuel should investigate the possibility of bringing off-spec fuel back into specification with the introduction of additives before other disposal options are considered.

Where local reprocessing or reuse options are not available, used oil and waste fuel that is generated by commercial, industrial, institutional or government operations should be safely stored until it can be transported to a commercial recycler, re-refiner or registered hazardous waste receiver. Names of Canadian recyclers and disposal companies are available by contacting the waste management exchanges and associations listed in Appendix 10 of the *Environmental Guideline for the General Management of Hazardous Waste*.

Some communities in Nunavut are implementing programs aimed at collecting and safely storing used oil and waste fuel from homeowners and household do-it-yourselfers as part of their garbage collection programs. Residents wishing to locally dispose of used oil, waste fuel and other hazardous waste should contact their local community government for other disposal options.

Consideration will be given by Nunavut's Department of Environment to management methods that differ from instructions provided in the Guideline where it can be demonstrated that the proposal would result in an equivalent level of environmental protection.

[10] Registration of a used oil or waste fuel appliance does not remove the owner's obligation to comply with all other applicable municipal, territorial and federal statutes, regulations, standards, guidelines and by-laws. Further guidance on hazardous waste planning can be found in the *Environmental Guideline for the General Management of Hazardous Waste*.

Conclusion

Used oil and waste fuel are two of the most common and widely generated hazardous wastes in Nunavut. Used lubricating and hydraulic oils are generated by a wide variety of commercial and industrial sectors including automotive and heavy equipment servicing, marine and aviation transportation, electrical generation and mining. Household do-it-yourselfers also generate smaller quantities of used oil by self-servicing their automobiles, ATVs, snowmobiles and boat motors. Waste fuel is also generated by a wide variety of residential, institutional, commercial and industrial users of fuel products.

The *Environmental Guideline for Used Oil and Waste Fuel* is an introduction to the management of these wastes. It provides information on the characteristics of used oil and waste fuel, their effects on the environment and human health and guidance on proper storage, transportation, spill response and cleanup, reuse and disposal.

Familiarity with the Guideline does not replace the need for the owner or person in charge, management or control of used oil and waste fuel to comply with all applicable federal and territorial legislation and municipal by-laws. The management of these wastes may also be controlled through permits and licenses issued by Nunavut's co-management boards, Aboriginal Affairs and Northern Development Canada and other regulatory agencies. These permits and licenses must be complied with at all times.

For additional information on the management of used oil and waste fuel, or to obtain a list of available guidelines, go to the Department of Environment web site or contact the Department at:

Environmental Protection Division
Department of Environment
Government of Nunavut
Inuksugait Plaza, P.O. Box 1000, Station 1360
Iqaluit, Nunavut X0A 0H0

Telephone: (867) 975-7729
Fax: (867) 975-7739
Email: EnvironmentalProtection@gov.nu.ca
Website: http://env.gov.nu.ca/programareas/environmentprotection

References

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Government of Nunavut. Consolidation of Regulation R-068-93 Spill Contingency Planning and Reporting Regulations. 1993.
http://env.gov.nu.ca/sites/default/files/Spill%20Planning%20and%20Reporting%20Regs.pdf

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http://env.gov.nu.ca/node/82#Guideline Documents

Government of Nunavut Department of Environment. Environmental Guideline for Industrial Waste Discharges into Municipal Solid Waste and Sewage Treatment Facilities. 2011.
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Government of the Northwest Territories, Department of Renewable Resources. Inventory of Waste Oil Volumes Generated in the Western Northwest Territories. 1990.

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State of Connecticut Department of Environmental Protection. Used Oil Fact Sheet #4 – Materials Containing or Otherwise Contaminated with Used Oil. 2005.
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Transport Canada. Transportation of Dangerous Goods Regulations.

APPENDICES

APPENDIX 1 - *ENVIRONMENTAL PROTECTION ACT*

The following are excerpts from the *Environmental Protection Act*

1. "Contaminant" means any noise, heat, vibration or substance and includes such other substance as the Minister may prescribe that, where discharged into the environment,
   (a) endangers the health, safety or welfare of persons,
   (b) interferes or is likely to interfere with normal enjoyment of life or property,
   (c) endangers the health of animal life, or
   (d) causes or is likely to cause damage to plant life or to property;

   "Discharge" includes, but not so as to limit the meaning, any pumping, pouring, throwing, dumping, emitting, burning, spraying, spreading, leaking, spilling, or escaping;

   "Environment" means the components of the Earth and includes
   (a) air, land and water,
   (b) all layers of the atmosphere,
   (c) all organic and inorganic matter and living organisms, and
   (d) the interacting natural systems that include components referred to in paragraphs (a) to (c).

   "Inspector" means a person appointed under subsection 3(2) and includes the Chief Environmental Protection Officer.

2.2 The Minister may
   (a) establish, operate and maintain stations to monitor the quality of the environment in the Territories;
   (b) conduct research studies, conferences and training programs relating to contaminants and to the preservation, protection or enhancement of the environment;
   (c) develop, co-ordinate and administer policies, standards, guidelines and codes of practice relating to the preservation, protection or enhancement of the environment;
   (d) collect, publish and distribute information relating to contaminants and to the preservation, protection or enhancement of the environment;

3. (1) The Minister shall appoint a Chief Environmental Protection Officer who shall administer and enforce this Act and the regulations.

   (2) The Chief Environmental Protection Officer may appoint inspectors and shall specify in the appointment the powers that may be exercised and the duties that may be performed by the inspector under this Act and regulations.

5. (1) Subject to subsection (3), no person shall discharge or permit the discharge of a contaminant into the environment.

   (3) Subsection (1) does not apply where the person who discharged the contaminant or permitted the discharge of the contaminant establishes that
   (a) the discharge is authorized by this Act or the regulations or by an order issued under this Act or the regulations;
   (b) the contaminant has been used solely for domestic purposes and was discharged from within a dwelling house;
   (c) the contaminant was discharged from the exhaust system of a vehicle;

(d) the discharge of the contaminant resulted from the burning of leaves, foliage, wood, crops or stubble for domestic or agricultural purposes;
(e) the discharge of the contaminant resulted from burning for land clearing or land grading;
(f) the discharge of the contaminant resulted from a fire set by a public official for habitat management of silviculture purposes;
(g) the contaminant was discharged for the purposes of combating a forest fire;
(h) the contaminant is a soil particle or grit discharged in the course of agriculture or horticulture; or
(i) the contaminant is a pesticide classified and labelled as "domestic" under the *Pest Control Products Regulations* (Canada).

(4) The exceptions set out in subsection (3) do not apply where a person discharges a contaminant that the inspector has reasonable grounds to believe is not usually associated with a discharge from the excepted activity.

5.1. Where a discharge of a contaminant into the environment in contravention of this Act or the regulations or the provisions of a permit or license issued under this Act or the regulations occurs or a reasonable likelihood of such a discharge exists, every person causing or contributing to the discharge or increasing the likelihood of such a discharge, and the owner or the person in charge, management or control of the contaminant before its discharge or likely discharge, shall immediately:
(a) subject to any regulations, report the discharge or likely discharge to the person or office designated by the regulations;
(b) take all reasonable measures consistent with public safety to stop the discharge, repair any damage caused by the discharge and prevent or eliminate any danger to life, health, property or the environment that results or may be reasonably expected to result from the discharge or likely discharge; and
(c) make a reasonable effort to notify every member of the public who may be adversely affected by the discharge or likely discharge.

6. (1) Where an inspector believes on reasonable grounds that a discharge of a contaminant in contravention of this Act or the regulations or a provision of a permit or license issued under this Act or the regulations has occurred or is occurring, the inspector may issue an order requiring any person causing or contributing to the discharge or the owner or the person in charge, management or control of the contaminant to stop the discharge by the date named in the order.

7. (1) Notwithstanding section 6, where a person discharges or permits the discharge of a contaminant into the environment, an inspector may order that person to repair or remedy any injury or damage to the environment that results from the discharge.

(2) Where a person fails or neglects to repair or remedy any injury or damage to the environment in accordance with an order made under subsection (1) or where immediate remedial measures are required to protect the environment, the Chief Environmental Protection Officer may cause to be carried out the measures that he or she considers necessary to repair or remedy an injury or damage to the environment that results from any discharge.

APPENDIX 2 – GOVERNMENT CONTACTS

Government of Nunavut

Environmental Protection Division
Department of Environment
Inuksugait Plaza
P.O. Box 1000, Station 1360
Iqaluit, Nunavut X0A 0H0
Telephone: (867) 975-7729 Fax: (867) 975-7739

Motor Vehicles Division
Department of Economic Development and Transportation
P.O. Box 10
Gjoa Haven, Nunavut X0B 1J0
Telephone: (867) 360-4615 Fax: (867) 360-4619

Workers' Safety and Compensation Commission
P.O. Box 669
Baron Building/1091
Iqaluit, Nunavut X0A 0H0
Telephone: 1-877-404-4407 (toll free)
Fax: 1-866-979-8501

Department of Community and Government Services (all Divisions)
P.O. Box 1000, Station 700
4th Floor, W.G. Brown Building
Iqaluit, Nunavut X0A 0H0
Telephone: (867) 975-5400 Fax: (867) 975-5305

Office of Chief Medical Health Officer of Health
Department of Health and Social Services
P.O. Box 1000, Station 1000
Iqaluit, Nunavut X0A 0H0
Telephone: (867) 975-5774 Fax: (867) 975-5755

Government of Canada

Aboriginal Affairs and Northern Development
P.O. Box 2200
Iqaluit, Nunavut X0A 0H0
Telephone: (867) 975-4500 Fax: (867) 975-4560

Environment Canada (NWT and Nunavut)
5019 52nd Street
Yellowknife, Northwest Territories X1A 1T5
Telephone: (867) 669-4730 Fax: (867) 873-8185

Department of Transport – Road, Rail, Marine, Air
P.O. Box 8550
344 Edmonton Street
Winnipeg, Manitoba R3C 1P6
Telephone: 1-888-463-0521 (toll free)
Fax: (204) 983-8992 Road, Rail and Marine
Fax: (204) 983-1734 Air

Fisheries and Oceans Canada – Eastern Arctic Area
4th Floor - 630 Queen Elizabeth
P.O. Box 358
Iqaluit, Nunavut X0A 0H0
Telephone: (867) 979-8000
Fax: (867) 979-8039
Email: nunavuthabitat@dfo-mpo.gc.ca

APPENDIX 3 – USED OIL FURNACE AND BOILER MANUFACTURERS

The listing of used oil furnace and boiler manufacturers provided in this Appendix is not meant to be exhaustive or complete. Other manufacturers may offer similar products.

The Nunavut Department of Environment does not promote or endorse the specific products and services offered by the listed companies. Any person considering the purchase of a used oil furnace or boiler should first consult the manufacturer or other qualified persons with expertise in used oil furnaces and boilers.

Clean Burn Furnaces
http://www.cleanburn.com

EcoHeat Omni
http://www.econoheat.com

EnergyLogic (formerly Black Gold)
http://www.energylogic.com/products/waste-oil-heaters

Firelake Manufacturing
http://www.firelakemfg.com

INov8 International Incorporated
http://www.inov8-intl.com

Lanair waste oil-fired heaters and boilers
http://www.lanair.com/lanairproducts/index.php

Reznor Group
http://www.reznorheaters.com

APPENDIX 4 – REGISTRATION FORM: USED OIL AND WASTE FUEL APPLIANCE

A copy of the Used Oil and Waste Fuel Appliance registration form and user's guide is available by contacting the Nunavut Department of Environment or by downloading the documents at http://env.gov.nu.ca/programareas/environmentprotection. Although registration is voluntary, it enables Nunavut's Department of Environment to better manage used oil and waste fuel by maintaining an up-to-date inventory of certified appliances operating in Nunavut.

Instructions

1. The following information must be provided in order to register a used oil or waste fuel appliance and obtain a registration number. Incomplete applications will be returned to the applicant.
2. Completed registration forms are to be forwarded to the Environmental Protection Division, Department of Environment, Government of Nunavut, Box 1000, Station 1360, Iqaluit, Nunavut, X0A 0H0. Electronic registration forms are preferred and may be forwarded to EnvironmentalProtection@gov.nu.ca.
3. Use additional pages to provide information as required.
4. Applicants should refer to the accompanying user's guide for further assistance on completing the generator registration form.
5. There is no fee for registering a used oil or waste fuel appliance with the Department of Environment.

Section 1 - Identification

Applicant (Legal Name) _____

Mailing Address _____

_____ Postal Code _____

Principle Contact Person _____ Title _____

Phone _____ Email _____

Section 2 – Description of Operation

General Type of Business _____

Site Location(s) Where the Waste is Generated _____

_____

_____

Make, Model and Size of the Appliance _____

_____

Section 4 - Certification

I certify that the information provided on this form is correct, accurate and complete.

Signature of Contact Person _____ Date (dd/mm/yy) _____

Print Name of Contact Person _____ Title _____

Phone _____ Email _____

For Department Use Only
Appliance Registration Number NUA# _____ Approved by _____ Date _____

Appendix H: Environmental Guideline for Waste Batteries

Environmental Guideline for

Waste Batteries

Department of Environment
Government of Nunavut

APEX Geoscience Ltd.

GUIDELINE: WASTE BATTERIES

Original: January 2002
Revised: January 2011

This Guideline has been prepared by the Department of Environment's Environmental Protection Division and approved by the Minister of Environment under the authority of Section 2.2 of the *Environmental Protection Act*.

This Guideline is not an official statement of the law and is provided for guidance only. Its intent is to increase the awareness and understanding of the risks, hazards and best management practices associated with waste batteries. This Guideline does not replace the need for the owner or person in charge, management or control of the waste to comply with all applicable legislation and to consult with Nunavut's Department of Environment, other regulatory authorities and qualified persons with expertise in the management of waste batteries.

Copies of this Guideline are available upon request from:

Department of Environment
Government of Nunavut
P.O. Box 1000, Station 1360, Iqaluit, NU, X0A 0H0
Electronic version of the Guideline is available at http://env.gov.nu.ca/programareas/environmentprotection

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Bottom Left and Right: Public Domain

Table of Contents

Appendices

Introduction

Batteries come in many different shapes, sizes and voltages. There are two basic categories of batteries in use: *non-rechargeable*, which are designed to be used once and discarded, and *rechargeable*, which can be recharged and used many times. Non-rechargeable batteries, such as the common alkaline battery, use a *dry cell* where the electrolyte is immobilized as a paste. This enables the battery to be operated in a random position. These batteries are commonly used in household items such as flashlights, calculators, toys, cameras and remote control devices. Rechargeable batteries use either a *dry cell* or *wet cell*. Wet cell rechargeable batteries have a liquid electrolyte and are commonly used by consumers in automobiles, ATVs and snowmobiles, and by industry in large uninterruptable power supplies and for telecommunications standby power. Dry cell rechargeable batteries can be used in many of the same consumer products as non-rechargeable batteries.

Approximately 671 million, or 95%, of the 707 million consumer and industrial batteries sold in Canada in 2007 were non-rechargeable. Of this total, 418 million were alkaline, 188 million were carbon-zinc and 65 million were button cell batteries. Sales of rechargeable batteries were approximately 37 million. Of this total, 16.5 million were nickel-cadmium, 6.4 million were nickel-metal-hydride, 2.8 million were lithium ion and 10.6 million were lead-acid batteries (EC, 2009).

The *Environmental Guideline for Waste Batteries* (the Guideline) provides information on the types, uses and potential environmental and human health effects of waste batteries and guidance on their proper storage, transportation and disposal. It is not an official statement of the law. For further information and guidance, the owner or person in charge, management or control of waste batteries is encouraged to review all applicable legislation and consult the Department of Environment, other regulatory agencies or qualified persons with expertise in the management of waste batteries.

The *Environmental Protection Act* enables the Government of Nunavut to implement measures to preserve, protect and enhance the quality of the natural environment. Section 2.2 of the *Act* provides the Minister with authority to develop, coordinate, and administer the Guideline.

1.1 Definitions

Battery	One or more electrochemical cells capable of storing and transforming chemical energy into electrical energy.
Commissioner's Land	Lands that have been transferred by Order-in-Council to the Government of Nunavut. This includes roadways and land subject to block land transfers. Most Commissioner's Land is located within municipalities.
Contaminant	Any noise, heat, vibration or substance and includes such other substance as the Minister may prescribe that, where discharged into the environment, (a) endangers the health, safety or welfare of persons, (b) interferes or is likely to interfere with normal enjoyment of life or property, (c) endangers the health of animal life, or (d) causes or is likely to cause damage to plant life or to property.

Dangerous Good	Any product, substance or organism included by its nature or by the *Transportation of Dangerous Goods Regulations* in any of the classes listed in the schedule provided in the *Transportation of Dangerous Goods Act*.
Electrolyte	A gel or liquid that is capable of conducting electricity.
Environment	The components of the Earth and includes (a) air, land and water, (b) all layers of the atmosphere, (c) all organic and inorganic matter and living organisms, and (d) the interacting natural systems that include components referred to in paragraphs (a) to (c) above.
Minister	The Minister of Environment of the Government of Nunavut.
Qualified Person	A person who has an appropriate level of knowledge and experience in all relevant aspects of waste management.
Responsible Party	The owner or person in charge, management or control of the waste.
Transport Authority	The statute and regulations controlling the management of hazardous waste under that mode of transport. These include (a) Road and Rail - *Transportation of Dangerous Goods Act* (Canada) and *Regulations; Interprovincial Movement of Hazardous Waste Regulations* and *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations*. (b) Air – *International Air Transport Association (IATA) Dangerous Goods Regulations* and *International Civil Aviation Organization* (ICAO) *Technical Instructions;* and (c) Marine – *International Maritime Dangerous Goods Code* (IMDG).
Waste Battery	A battery that is no longer wanted or is unusable for its intended purpose and is intended for storage, recycling or disposal.

1.2 Roles and Responsibilities

1.2.1 Department of Environment

The Environmental Protection Division is the key environmental agency responsible for ensuring parties properly manage waste batteries and will provide advice and guidance on their management. Authority is derived from the *Environmental Protection Act*, which prohibits the discharge of contaminants to the environment and enables the Minister to undertake actions to ensure appropriate management measures are in place. Although programs and services are applied primarily to activities taking place on Commissioner's and municipal lands and to Government of Nunavut undertakings, the *Environmental Protection Act* may be applied to the whole of the territory where other controlling legislation, standards and guidelines do not exist. A complete listing of relevant legislation and guidelines can be obtained by contacting the Department of Environment or by visiting the web site at http://env.gov.nu.ca/programareas/environmentprotection.

1.2.2 Generators of Waste Batteries

The owner or person in charge, management or control of waste batteries is known as the responsible party. In general, the responsible party must ensure batteries are properly and safely managed from the time they are manufactured to their final disposal. This is referred to as managing the waste from cradle-to-grave. Information on the general management of hazardous waste in Nunavut, including generator, carrier and receiver responsibilities, can be obtained by referring to the *Environmental Guideline for the General Management of Hazardous Waste*.

Contractors may manage unwanted or waste batteries on behalf of the responsible party. However, the responsible party remains liable for ensuring the method of management complies with all applicable statutes, regulations, standards, guidelines and local by-laws. If the contractor does not comply with the requirements of the *Environmental Protection Act* and is charged with a violation while managing the waste, the responsible party may also be charged.

1.2.3 Other Regulatory Agencies

Other regulatory agencies may have to be consulted regarding the management of waste batteries as there may be other environmental or public and worker health and safety issues to consider.

Workers' Safety and Compensation Commission

The Workers' Safety and Compensation Commission is responsible for promoting and regulating worker and workplace health and safety in Nunavut. The Commission derives its authority from the *Workers' Compensation Act* and *Safety Act* which require an employer to maintain a safe workplace and ensure the safety and well being of workers.

Department of Community and Government Services

The Department of Community and Government Services is responsible under the *Commissioners' Lands Act* for the issuance of land leases, reserves, licenses and permits on Commissioner's Lands. The Department, in cooperation with communities, is also responsible for the planning and funding of municipal solid waste and sewage disposal facilities in most Nunavut communities.

Department of Health and Social Services

Activities related to the handling and management of waste batteries may have an impact on public health. The Office of the Chief Medical Officer of Health and Regional Environmental Health Officers should be consulted regarding legislated requirements under the *Public Health Act*.

Department of Economic Development and Transportation

The Motor Vehicles Division of the Department of Economic Development and Transportation is responsible for the safe transport of hazardous waste and other dangerous goods by road through administration of the *Transportation of Dangerous Goods Act*. The Department is also responsible under the *Motor Vehicles Act* for driver licensing and various other vehicle and road safety matters.

Environment Canada

Environment Canada is responsible for administering the *Canadian Environmental Protection Act* (CEPA) and for regulating the interprovincial and international movement of hazardous waste under the *Interprovincial Movement of Hazardous Waste Regulations* and *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations*. Environment Canada is also responsible for administering the pollution prevention provisions of the federal *Fisheries Act* and owns the EcoLogo initiative, which is designed to help consumers and industry make more environmentally conscious purchasing decisions.

Indian and Northern Affairs Canada

Indian and Northern Affairs Canada is responsible under the *Territorial Lands Act* and *Nunavut Waters and Nunavut Surface Rights Tribunal Act* for the management of federal lands and waters, including the impact waste batteries may have on the quality of these lands and waters.

Local Municipal Governments

The role of municipal governments is important in the proper local management of waste batteries. Under the Nunavut Land Claims Agreement, municipalities are entitled to control their own municipal disposal sites. Unwanted waste may be deposited into municipal landfill sites and sewage lagoons only with the consent of the local government. The local fire department may also be called upon if a fire or other public safety issue involving batteries is identified.

Co-management Boards and Agencies

Co-management boards and agencies established under the Nunavut Land Claims Agreement have broad authority for land use planning, impact assessment and the administration of land and water. Activities involving the management and disposal of waste batteries may be controlled through the setting of terms and conditions in plans, permits and licenses issued by the Nunavut Water Board and other co-management boards and agencies.

Types, Uses and Potential Effects of Batteries

2.1 Types and Uses

Batteries are classified into two broad categories: *non-rechargeable* and *rechargeable*.

Non-rechargeable batteries, also known as primary batteries, can produce electrical current immediately upon being inserted into a device and are intended to be used and discarded. They are commonly used in portable devices that have a low current drain, are used only intermittently or are used well away from an alternative electrical power source (i.e. a wall plug-in or portable generator). Non-rechargeable batteries cannot be safely recharged since the active materials may not return to their original form and the chemical reactions may not be easily reversible. Common types of non-rechargeable batteries include alkaline, carbon-zinc and button cell. All non-rechargeable batteries are dry cell batteries.

Figure 1 – Common Consumer Batteries
Source: Public Domain

Rechargeable batteries, also known as secondary batteries, are sold in a discharged state and must be charged prior to use. These batteries are designed to be repeatedly charged by applying an electric current, which reverses the chemical reactions that occur during use. The oldest type of rechargeable wet cell battery is the common lead-acid battery used to start cars, trucks, snowmobiles and ATVs. These batteries are heavy because they contain large quantities of lead and can provide significant peak electrical current. A semi-solid electrolyte has replaced sulphuric acid in newer lead-acid batteries to prevent spillage. Other rechargeable batteries include several portable dry cell types including nickel-cadmium, nickel-metal-hydride and lithium-ion. Nickel-cadmium batteries currently have the largest share of the dry cell rechargeable market although nickel-metal-hydride and lithium-ion batteries have begun to replace them in many applications because of their higher capacity.

Table 1 describes the most common batteries in use and their applications.

2.2 Potential Effects on Environment and Human Health

Modern batteries contain a variety of corrosive and poisonous materials (i.e. electrolytes and heavy metals including lead, cadmium and nickel). Some older batteries also contain mercury, although in the 1990s manufacturers started to eliminate or reduce the amount of mercury found in their batteries. These contaminants can leach into water and soil from batteries that have been disposed of in landfills or abandoned on the land. Contact with the corrosive electrolytes can cause chemical burns to eyes and skin while heavy metals can bioaccumulate[1] and biomagnify[2] in living organisms, affecting these organisms and those that prey upon them.

[1] The accumulation over time of metals and other persistent substances within an organism from both biotic (i.e. other organisms) or abiotic (i.e. land, air and water) sources.

Table 1. Common Batteries and Their Applications

Battery Type	Description	Common Applications
	Non-rechargeable (Primary)	
Alkaline	Sizes: AAA, AA, C, D, 6V and 9V. Alkaline batteries contain zinc and manganese with an electrolyte of potassium hydroxide or sodium hydroxide. Both electrolytes are strongly alkaline.	Flashlights, clocks, calculators, toys, smoke detectors, remote controls
Carbon-Zinc	Sizes: AAA, AA, C, D, 6V and 9V. Carbon-zinc batteries contain zinc and manganese with an electrolyte solution of ammonium chloride and zinc chloride. Ammonium chloride is a severe eye irritant and zinc chloride is corrosive.	Flashlights, clocks, calculators, toys, smoke detectors, remote controls, garage door openers
Button Cell – Silver-Oxide, Lithium, Alkaline, Zinc-Air	Various sizes. Button cell batteries are single cells shaped like a squat cylinder. Numerous types of button cells exist and may contain zinc, lithium, manganese, silver and other metals. Mercuric-oxide button cells are no longer available due to the toxicity and environmental hazards associated with mercury.	Watches, hearings aids, toys, cameras, pagers, remote controls, greeting cards
	Rechargeable (Secondary)	
Vehicle Lead-Acid	Sizes: 6V and 12V. Lead-acid batteries contain lead and a sulphuric acid electrolyte. The battery can contain between 60 and 75% lead, by weight. Sulphuric acid is a strong oxidizing agent and can cause severe skin burns or irritation upon contact.	Cars, trucks, motorcycles, snowmobiles
Sealed Lead-Acid	Sizes: 2V, 6V and 12V. Commonly referred to as the 'maintenance-free battery', sealed lead-acid batteries are similar to the vehicle lead-acid battery except the case is sealed. Safety valves allow venting of gas during charge and discharge.	Video cameras, power tools, wheelchairs, ATVs, computer power backup systems
Nickel-Cadmium (NiCd)	Sizes: AAA, AA, C, D, 6V and 9V. Nickel-cadmium batteries contain cadmium and nickel oxyhydroxide with a potassium hydroxide electrolyte. The electrolyte is strongly alkaline.	Flashlights, toys, cellular phones, handheld power tools
Nickel-Metal-Hydride (NiMH)	Sizes: AAA, AA, C, D, 6V and 9V. Nickel-metal-hydride batteries are similar to nickel-cadmium batteries except the cadmium has been replaced with a hydrogen-absorbing metal alloy. NiMH batteries have 2-3 times the capacity of an equivalently sized NiCd battery.	Flashlights, toys, cellular phones, power tools, computer packs
Lithium-Ion	Various sizes. Conventional lithium-ion batteries contain graphite and one of several different lithium metal oxides. The electrolyte is a lithium salt in an organic solvent. Pure lithium reacts vigorously with water to release gases.	Calculators, cameras, laptop computers, computer memory back-up systems

* The progressive buildup of metals or other persistent substances through successive trophic levels – meaning that it relates to the concentration ratio in the tissue of a predator as compared to that in its prey.

Charging a battery produces a small amount of hydrogen and oxygen. Overcharging can result in these gases being generated faster than they can escape from within the walls of the battery, resulting in an explosion. This process is known as 'gassing'. Explosions can also occur through the misuse or malfunction of a battery including attempting to charge a non-rechargeable battery or short-circuiting a high output lead-acid battery.

Small button batteries have also been known to be swallowed by children. Although the likelihood of the battery becoming lodged in the throat depends upon the child's age and size of the battery, caution should still be exercised around very young children. While in the digestive tract a battery's electrical discharge could burn the surrounding tissues.

Waste Management

Minimizing or avoiding the creation of pollutants and wastes can be more effective in protecting the environment than treating or cleaning them up after they have been created.[3]

3.1 Pollution Prevention

Pollution prevention is a term used to describe methods and practices that minimize or eliminate the generation of waste. Pollution prevention strategies for waste batteries include the following:

Reduce

- Check to see if you already have the right batteries on hand before purchasing more.
- Consider replacing non-rechargeable batteries with rechargeable batteries.
- Look for batteries that have less heavy metals and mercury by reading the label and choosing Ecologo certified products. A complete listing of environmentally-preferable products is available for downloading at http://www.ecologo.org/en/index.asp.
- Avoid accidental discharge by preventing the battery terminals from contacting conductive (i.e. metal) materials. This includes removing the batteries from equipment when the equipment will not be used for extended periods of time.
- Keep batteries cool and dry when not in use. Battery life can be extended further by storage at low temperature (i.e. in a refrigerator) as this slows the chemical reactions. Batteries must be returned to room temperature to achieve their maximum voltage.
- Rechargeable lithium and nickel-cadmium batteries should be stored at 40% state-of-charge while nickel-metal-hydride can be stored at any state to extend their operational life. Lead-acid batteries should always be stored at full charge.

Reuse

- Service lead-acid batteries regularly (i.e. electrolyte levels).
- Charge rechargeable batteries using a charger specifically designed for the size and type of battery.
- Donate unused batteries to others including local theatres, schools, clubs, churches or Hunters and Trappers Associations.
- Make an agreement with your supplier to return un-opened or unused batteries.

Recycle

- Send unwanted or spent batteries to registered recyclers. The Rechargeable Battery Recycling Corporation (RBRC) voluntary recycling program accepts nickel-cadmium, nickel-metal-hydride, lithium-ion and small sealed lead batteries at participating retailers across Canada. Check RBRC's web site at http://www.rbrc.org for the nearest drop-off location. The names of commercial and industrial battery recyclers can be obtained by contacting the waste exchanges and associations listed in Appendix 10 of the *Environmental Guideline for the General Management of Hazardous Waste*.

The *Workplace Hazardous Materials Information System* (WHMIS) is Canada's national hazard communication standard and is administered by the Workers' Safety and Compensation Commission. Key elements of WHMIS are the provision of material safety data sheets (MSDS), labeling instructions and worker education and training programs. MSDS are available from battery manufacturers and contain information on the properties of batteries, along with instructions on safe use and handling.

[3] Source – Canadian Council of Ministers of the Environment.

3.2 Storage

Storage refers to the maintenance of waste batteries while awaiting recycling, transport or disposal. Storage is not acceptable for the long-term management of waste batteries except under extraordinary circumstances and should be considered as a temporary measure only.

Unwanted or waste batteries should be stored in the following manner:

- Large quantities of unwanted wet cell (i.e. vehicle lead-acid, sealed lead acid) batteries should be placed on strong wooden pallets to keep the batteries off the ground and to make relocation with a forklift easier. Batteries should be stacked no more than 3 high and shrink-wrapped with plastic to stabilize the pallet. When stacking batteries, the battery terminals should be protected from short circuit by separating each layer using a non-conductive material, such as a sheet of plywood. When wet-cell batteries are individually stored and packaged for transport, the container must meet the requirements of the Canadian General Standards Board standard CGSB-43.150 (TC, 2010).
- Large quantities of unwanted dry cell batteries should be stored in sound and sealable containers. The containers should be located so as to be protected from sun, weather and physical damage.
- Each container must be clearly labeled to identify its contents. If waste batteries are being stored in an institutional, commercial or industrial location or if the batteries are being stored for transport, the containers must be labeled in accordance with the *Workplace Hazardous Materials Information System* (WHMIS) and relevant Transport Authority.
- Place all labeled containers in a secure and clearly marked area which is separate from other waste to prevent its disposal with normal garbage.
- Workers should be trained in the safe use, handling and shipping of waste batteries, have access to material safety data sheets and be provided with personal protective equipment. Only trained personnel should have access to the designated storage area.
- All types of batteries should be stored out of reach of small children and pets. Children and other family members should be made aware of the hazards associated with batteries.

Figure 2 – The Proper and Improper Storage of Lead-Acid Batteries
Source: Transport Canada

If a commercial facility is used to store hazardous waste for periods of 180 days or more or the quantity of waste batteries and other waste on-site at any one time exceeds the criteria set out in the *Environmental Guideline for the General Management of Hazardous Waste*[4], the facility must be registered with the Department of Environment as a hazardous waste management facility. Copies of registration forms are available at http://env.gov.nu.ca/programareas/environmentprotection/forms-applications or by contacting Nunavut's Department of Environment. Refer to the *Environmental Guideline for the General Management of Hazardous Waste* for additional information on the registration process.

3.3 Transportation

Not all types of waste batteries are subject to the *Transportation of Dangerous Goods Act*. For example, sealed lead-acid and vehicle lead-acid batteries that contain sulphuric acid electrolyte are classified as a dangerous good while household alkaline, nickel-cadmium, nickel-metal-hydride, silver-zinc and some small lithium batteries are not. If in doubt, contact the manufacturer or consignor to determine whether the battery is a dangerous good or simply assume it is and manage it accordingly. Section 3.3 *Transportation* applies only to batteries that are classified as being a dangerous good.

Waste batteries that are classified as being a dangerous good may also be a hazardous waste for the purpose of transportation, depending upon the quantity being transported. Under the federal *Interprovincial Movement of Hazardous Waste Regulations* and *Export and Import of Hazardous Waste and Recyclable Material Regulations*, no person may transport hazardous waste in Canada or internationally for purposes of disposal or recycling in a quantity greater than five litres or five kilograms unless it is accompanied by a completed manifest. Manifest forms are available from Nunavut's Department of Environment and completion instructions are included on the reverse side of each manifest. Further information on manifesting can be obtained by referring to the *Environmental Guideline for the General Management of Hazardous Waste* or Environment Canada's *User's Guide for the Hazardous Waste Manifest*.

When transporting waste batteries as a hazardous waste, the documentation, packaging, labeling and placarding must conform to the federal and territorial *Transportation of Dangerous Goods Act* and *Regulations*. Schedule I of the *Regulations* classifies waste batteries as follows:

Shipping Name:	WASTE Batteries, Wet, Filled with Acid Classification: 8 Product Identification Number: UN2794 Packing Group: III
Shipping Name:	WASTE Batteries, Wet, Filled with Alkali Classification: 8 Product Identification Number: UN2795 Packing Group: III

[4] The criterion for Class 4.3 Water Reactive Waste is 500 litres or kilograms, for Class 8 Corrosives and Class 9 Miscellaneous Waste is 1000 litres or kilograms and the total aggregate quantity is 5000 litres or kilograms.

Shipping Name:	WASTE Batteries, Wet, Non-Spillable Classification: 8 Product Identification Number: UN2800 Packing Group: III Special Provision: 39
Shipping Name:	WASTE Batteries, Dry, Containing Potassium Hydroxide Solid Classification: 8 Product Identification Number: UN3028 Packing Group: III
Shipping Name:	WASTE Lithium Batteries Classification: 9 Product Identification Number: UN3090 Packing Group: II Special Provision: 34
Shipping Name:	WASTE Batteries Containing Sodium or WASTE Cells Containing Sodium Classification: 4.3 Product Identification Number: UN3292 Packing Group: II

The transport of waste batteries in Canada or internationally by aircraft must conform to the *International Air Transport Association (IATA) Dangerous Goods Regulations* and *International Civil Aviation Organization* (ICAO) *Technical Instructions*, while transport by marine vessel must conform to the *International Marine Dangerous Goods (IMDG) Code*. Further information on transporting waste batteries by aircraft or marine vessel can be obtained by contacting Transport Canada or by referring to the appropriate Transport Authority.

Hazardous waste generators, carriers and receivers must be registered with the Nunavut Department of Environment. A unique registration number is assigned to each registrant through the registration process, which enables completion of the manifest document. Copies of registration forms are available at http://env.gov.nu.ca/programareas/environmentprotection/forms-applications or by contacting Nunavut's Department of Environment. Refer to the *Environmental Guideline for the General Management of Hazardous Waste* for additional information on the registration process.

A listing of hazardous waste generators, carriers, receivers and management facilities registered to operate in Nunavut is available by contacting Nunavut's Department of Environment.

3.4 Disposal

Unwanted or waste batteries must be properly recycled or disposed of. Heavy metals found in some types of batteries (i.e. nickel-cadmium, nickel-metal-hydride and lead-acid batteries) are toxic to wildlife and can contaminate food and water supplies. Sulphuric acid electrolyte spilled from lead-acid batteries is corrosive to skin, affects plant survival and leaches metals from other landfilled garbage. Other types of batteries (i.e. household alkaline and carbon zinc batteries) don't have a recycling method and can be disposed of in a landfill along with other household garbage. Table 2 describes disposal methods for common batteries.

Waste batteries that are generated in large quantities by commercial, industrial, institutional or government operations should be safely stored until they can be transported to a commercial recycler or registered hazardous waste receiver. Names of Canadian recyclers and disposal companies are available by contacting the waste management exchanges and associations listed in Appendix 10 of the *Environmental Guideline for the General Management of Hazardous Waste.*

Table 2. Disposal Methods for Common Batteries

Battery Type	Sizes Available	Disposal Method[5]
Alkaline	AAA, AA, C, D, 6V and 9V.	Dispose along with household garbage.
Carbon-Zinc	AAA, AA, C, D, 6V and 9V.	Dispose along with household garbage.
Button Cell – Silver-Oxide, Lithium, Alkaline, Zinc-Air	Various sizes.	Alkaline – Dispose along with household garbage. All other types – return to a licensed recycler.
Vehicle Lead-Acid	6V and 12V.	Return to a licensed recycler.
Sealed Lead-Acid	2V, 6V and 12V.	Return to a licensed recycler.
Nickel-Cadmium (NiCd)	AAA, AA, C, D, 6V and 9V.	Return to a licensed recycler.
Nickel-Metal-Hydride (NiMH)	AAA, AA, C, D, 6V and 9V.	Return to a licensed recycler.
Lithium-Ion	Various sizes.	Return to a licensed recycler.

Some municipalities in Nunavut are implementing programs aimed at collecting and safely storing household hazardous waste as part of their garbage collection programs. Residents wishing to locally dispose of waste batteries should contact their municipality for other disposal options.

Consideration will be given by Nunavut's Department of Environment to management methods that differ from instructions provided in the Guideline where it can be demonstrated that the proposal would result in an equivalent level of environmental protection.

[5] The Rechargeable Battery Recycling Corporation (RBRC) will accept nickel-cadmium, nickel-metal-hydride, lithium-ion and small sealer lead (up to 2 lbs or 1 kilogram each) batteries only. Check RBRC's web site at http://www.rbrc.org for the nearest drop-off location.

Conclusion

Batteries are classified into two broad categories: *non-rechargeable* and *rechargeable* and come in many different shapes, sizes and voltages. Non-rechargeable batteries use a *dry cell* where the electrolyte is immobilized as a paste and are commonly used in small household items such as flashlights, calculators, toys, cameras and remote control devices. Rechargeable batteries use either a *wet cell* or *dry cell*. Unlike dry cell batteries, wet cell rechargeable batteries have a liquid electrolyte and are commonly used where greater electrical current is required such as in automobiles, ATVs and snowmobiles and for large industrial uninterruptable power supplies. Rechargeable batteries can be used for many of the same applications as non-rechargeable batteries.

More than 700 million consumer and industrial batteries are sold each year in Canada. With current recycling rates estimated to be between 5 and 10%, more than 630 million spent or unwanted batteries are stored or disposed of each year in Canada alone. The *Environmental Guideline for Waste Batteries* is an introduction to the management of these wastes. It provides information on the characteristics of batteries, possible effects on the environment and human health and guidance on proper storage, transportation and disposal.

Familiarity with the Guideline does not replace the need for the owner or person in charge, management or control of waste batteries to comply with all applicable federal and territorial legislation and municipal by-laws. The management of batteries may also be controlled through permits and licenses issued by Nunavut's co-management boards, Indian and Northern Affairs Canada and other regulatory agencies. These permits and licenses must be complied with at all times.

For additional information on the management of waste batteries, or to obtain a listing of available guidelines, go to the Department of Environment web site or contact the Department at:

Environmental Protection Division
Department of Environment
Government of Nunavut
Inuksugait Plaza, P.O. Box 1000, Station 1360
Iqaluit, Nunavut X0A 0H0

Telephone: (867) 975-7729
Fax: (867) 975-7739
Email: EnvironmentalProtection@gov.nu.ca
Website: http://env.gov.nu.ca/programareas/environmentprotection

References

Environment Canada (EC). Battery Recycling in Canada 2009 Update, (2009).
http://www.ec.gc.ca/gdd-mw/default.asp?lang=en&n=52DF915F-1

Government of Nunavut, Department of Environment. Environmental Guideline for the General Management of Hazardous Waste, (2010).
http://env.gov.nu.ca/node/82#Guideline Documents

Government of Nunavut, Department of Environment. Environmental Guideline for Waste Batteries, (2002).

Rechargeable Battery Recycling Corporation (RBRC) Webpage.
http://www.rbrc.org

Transport Canada. Bulletin RDIMS #5872093 – Transporting Batteries, (2010).
http://www.tc.gc.ca/eng/tdg/publications-bulletins-transportingbatteries-1099.htm

APPENDICES

APPENDIX 1 - *ENVIRONMENTAL PROTECTION ACT*

The following are excerpts from the *Environmental Protection Act*

1. "Contaminant" means any noise, heat, vibration or substance and includes such other substance as the Minister may prescribe that, where discharged into the environment,
   (a) endangers the health, safety or welfare of persons,
   (b) interferes or is likely to interfere with normal enjoyment of life or property,
   (c) endangers the health of animal life, or
   (d) causes or is likely to cause damage to plant life or to property;

   "Discharge" includes, but not so as to limit the meaning, any pumping, pouring, throwing, dumping, emitting, burning, spraying, spreading, leaking, spilling, or escaping;

   "Environment" means the components of the Earth and includes
   (a) air, land and water,
   (b) all layers of the atmosphere,
   (c) all organic and inorganic matter and living organisms, and
   (d) the interacting natural systems that include components referred to in paragraphs (a) to (c).

   "Inspector" means a person appointed under subsection 3(2) and includes the Chief Environmental Protection Officer.

2.2 The Minister may
   (a) establish, operate and maintain stations to monitor the quality of the environment in the Territories;
   (b) conduct research studies, conferences and training programs relating to contaminants and to the preservation, protection or enhancement of the environment;
   (c) develop, co-ordinate and administer policies, standards, guidelines and codes of practice relating to the preservation, protection or enhancement of the environment;
   (d) collect, publish and distribute information relating to contaminants and to the preservation, protection or enhancement of the environment;

3. (1) The Minister shall appoint a Chief Environmental Protection Officer who shall administer and enforce this Act and the regulations.

   (2) The Chief Environmental Protection Officer may appoint inspectors and shall specify in the appointment the powers that may be exercised and the duties that may be performed by the inspector under this Act and regulations.

5. (1) Subject to subsection (3), no person shall discharge or permit the discharge of a contaminant into the environment.

   (3) Subsection (1) does not apply where the person who discharged the contaminant or permitted the discharge of the contaminant establishes that
   (a) the discharge is authorized by this Act or the regulations or by an order issued under this Act or the regulations;
   (b) the contaminant has been used solely for domestic purposes and was discharged from within a dwelling house;
   (c) the contaminant was discharged from the exhaust system of a vehicle;

(d) the discharge of the contaminant resulted from the burning of leaves, foliage, wood, crops or stubble for domestic or agricultural purposes;
(e) the discharge of the contaminant resulted from burning for land clearing or land grading;
(f) the discharge of the contaminant resulted from a fire set by a public official for habitat management of silviculture purposes;
(g) the contaminant was discharged for the purposes of combating a forest fire;
(h) the contaminant is a soil particle or grit discharged in the course of agriculture or horticulture; or
(i) the contaminant is a pesticide classified and labelled as "domestic" under the *Pest Control Products Regulations* (Canada).

(4) The exceptions set out in subsection (3) do not apply where a person discharges a contaminant that the inspector has reasonable grounds to believe is not usually associated with a discharge from the excepted activity.

5.1. Where a discharge of a contaminant into the environment in contravention of this Act or the regulations or the provisions of a permit or license issued under this Act or the regulations occurs or a reasonable likelihood of such a discharge exists, every person causing or contributing to the discharge or increasing the likelihood of such a discharge, and the owner or the person in charge, management or control of the contaminant before its discharge or likely discharge, shall immediately:
(a) subject to any regulations, report the discharge or likely discharge to the person or office designated by the regulations;
(b) take all reasonable measures consistent with public safety to stop the discharge, repair any damage caused by the discharge and prevent or eliminate any danger to life, health, property or the environment that results or may be reasonably expected to result from the discharge or likely discharge; and
(c) make a reasonable effort to notify every member of the public who may be adversely affected by the discharge or likely discharge.

6. (1) Where an inspector believes on reasonable grounds that a discharge of a contaminant in contravention of this Act or the regulations or a provision of a permit or license issued under this Act or the regulations has occurred or is occurring, the inspector may issue an order requiring any person causing or contributing to the discharge or the owner or the person in charge, management or control of the contaminant to stop the discharge by the date named in the order.

7. (1) Notwithstanding section 6, where a person discharges or permits the discharge of a contaminant into the environment, an inspector may order that person to repair or remedy any injury or damage to the environment that results from the discharge.

(2) Where a person fails or neglects to repair or remedy any injury or damage to the environment in accordance with an order made under subsection (1) or where immediate remedial measures are required to protect the environment, the Chief Environmental Protection Officer may cause to be carried out the measures that he or she considers necessary to repair or remedy an injury or damage to the environment that results from any discharge.

APPENDIX 2 – GOVERNMENT AND INDUSTRY CONTACTS

Government of Nunavut

Environmental Protection Division
Department of Environment
Inuksugait Plaza
P.O. Box 1000, Station 1360
Iqaluit, Nunavut X0A 0H0
Telephone: (867) 975-7729 Fax: (867) 975-7739

Workers' Safety and Compensation Commission
P.O. Box 669
Baron Building/1091
Iqaluit, Nunavut X0A 0H0
Telephone: 1-877-404-4407 (toll free)
Fax: 1-866-979-8501

Office of Chief Medical Health Officer of Health
Department of Health and Social Services
P.O. Box 1000, Station 1000
Iqaluit, Nunavut X0A 0H0
Telephone: (867) 975-5774 Fax: (867) 975-5755

Motor Vehicles Division
Department of Economic Development and Transportation
P.O. Box 10
Gjoa Haven, Nunavut X0B 1J0
Telephone: (867) 360-4615 Fax: (867) 360-4619

Department of Community and Government Services (all Divisions)
P.O. Box 1000, Station 700
4th Floor, W.G. Brown Building
Iqaluit, Nunavut X0A 0H0
Telephone: (867) 975-5400 Fax: (867) 975-5305

Government of Canada

Indian and Northern Affairs – Nunavut Region
P.O. Box 2200
Iqaluit, Nunavut X0A 0H0
Telephone: (867) 975-4500 Fax: (867) 975-4560

Department of Transport – Road, Rail, Marine, Air
P.O. Box 8550
344 Edmonton Street
Winnipeg, Manitoba R3C 1P6
Telephone: 1-888-463-0521 (toll free)
Fax: (204) 983-8992 Road, Rail and Marine
Fax: (204) 983-1734 Air

Environment Canada (NWT and Nunavut)
5019 52nd Street
Yellowknife, Northwest Territories X1A 1T5
Telephone: (867) 669-4730 Fax: (867) 873-8185

Industry

Rechargeable Battery Recycling Corporation
P.O. Box 236, Station E
Toronto, ON M6H 4E2
Telephone: (416) 535-9210
www.rbrc.org