Environmental Programs

Special Waste Regulations

General Information on Waste Oil

Waste oil (or used oil) that has become unsuitable for its intended purpose due to the presence of impurities or the loss of original properties is regulated as a special waste in Yukon. This may include lubricating oil, hydraulic fluid, metal working fluid, and insulating fluid or coolant (e.g., transmission fluid). Any mixture containing waste oil in excess of 3% by weight is considered waste oil. If you generate, store, or handle waste oil, you will likely need a permit under the *Special Waste Regulations*. Please consult the "Special Waste Regulations – General Information" document for information on permitting.

Contaminated Waste Oil

Depending on how the oil was used or what it may have been mixed with, waste oil can contain differing amounts and types of contaminants, such as heavy metals, chlorinated solvents, gasoline, hydrocarbons, and glycols. For example, because lubricating oil is exposed to high temperatures and pressures inside an engine, it may contain metals from the wear and tear of engine parts (e.g., arsenic, cadmium, chromium) and small amounts of gasoline, antifreeze, and chemicals that come from gasoline burning inside the engine.

Any waste oil that exceeds the maximum concentration specified for one of more of the following contaminants is considered "contaminated waste oil." Waste oil containing contaminants in a concentration less than or equal to the concentration listed is "uncontaminated waste oil."

Table 1: Contaminant Standards

Contaminant	Maximum Concentration (mg/kg)	Test Method
Arsenic	5.0	EPA 3050B/3051 & 7060
Cadmium	2.0	EPA 3050B/3052 & 7000/7131
Chromium	10	EPA 3050B/3051 & 7000/7191
Lead	50	EPA 3050B/3051 & 7000/7421
Total organic halogens	1000	EPA 9020B or EPA 9022
PCBs	2.0	EPA 3540C/3541 & 8082

If you have reason to suspect that your waste oil may be contaminated, you must treat it as contaminated waste oil unless laboratory analytical testing proves otherwise. Analytical testing must be conducted by an accredited analytical laboratory in accordance with the test method(s) shown in Table 1 or an equivalent test method.

Waste oil that meets one or more of the following descriptions must be assumed to be contaminated. Furthermore, if your knowledge of how the waste was generated or handled

indicates that it may be contaminated, or if you do not know how the waste was generated and handled, you must assume that it is contaminated.

- Waste crankcase oil from piston engine aircraft or other aircraft using leaded aviation gasoline (avgas) (assumed to be contaminated with lead);
- Waste crankcase oil from vehicles using leaded gasoline (assumed to be contaminated with lead);
- Waste oil mixed with brake fluid or chlorinated solvents (assumed to be contaminated with organic halogens);
- Waste transformer oil that may contain PCBs (assumed to be contaminated with PCBs); or
- Waste oil mixed with transformer oil that may contain PCBs (assumed to be contaminated with PCBs).

As described in this guidance document, contaminated waste oil cannot be incinerated in a waste oil burner and can only be mixed with uncontaminated waste oil if analytical testing is conducted prior to mixing. Because contaminated waste oil is more costly and difficult to dispose of in a manner that is safe for human health and the environment, it is important that we take steps to prevent the generation of contaminated waste oil where possible. The following table describes potential sources of contamination in waste oil and why those contaminants pose a risk to human health and the environment:

Table 2: Contaminant Sources and Risks

Contaminant Name	Possible Sources	Human Health Risks	Environment and Other Risks
arsenic	engine wear	poisonous, carcinogenic, tumor causing, fumes toxic when heated	plant and soil impacts, carcinogenic to animals
cadmium	cadmium can be used to coat bolts, which wear with engine use and contaminate oil	suspected carcinogen, can be toxic	reduced plant growth/reproduction, toxic to some animals
chromium	engine wear, chromium is used to plate some piston rings, hexavalent chromium (Cr^{+6}) is most commonly used in engines	Cr^{+6} may cause skin ulcers, irritation of respiratory tract, fibrosis of lungs and various forms of cancer	cancer in animals, root and foliar damage to plants, mortality to aquatic fauna
lead	trace amounts are inherent in virgin oil, leaded gasoline, contamination from piston engine aircraft oil	lead is easily stored in organic matter, so it can be magnified up to food chain to humans and result in poisoning; early exposure to infants and unborn fetuses can result in developmental problems	root and foliar damage in plants, muscular atrophy, paralysis, internal lesions in waterfowl, liver, kidney and spleen impairment in mammals
organic halogens (chlorine)	inherent, contamination from addition of brake fluid, chlorinated solvents	May form hydrochloric acid in combustion, can be toxic by inhalation, eye and mucous membrane irritant	acid-rain forming, may accelerate boiler corrosion, leading to lower efficiency and greater release of all contaminants, ozone depletion
polychlorinated biphenyls	mixing with other contaminated oils (e.g., transformer oils)	toxic by ingestion, carcinogenic	persistent organic pollutant (POP) – does not break down and can be magnified and accumulated up the food chain; POPs tend to accumulate in polar regions

Incinerating Waste Oil

A common method of disposing of waste oil in Yukon is incinerating the waste oil in a certified burner. Incineration can turn the waste product into an affordable source of energy and allow waste oil to be disposed of in Yukon rather than being transported to a special waste disposal facility out of territory. It is estimated that more than 60% of the waste oil generated in Yukon is disposed of through burning in an approved furnace.

Waste oil may only be incinerated in a heater or furnace that has been approved by the Canadian Standards Association (CSA), the Underwriters' Laboratories (UL), or the Underwriters' Laboratories of Canada (ULC) for the incineration of waste oil. The incinerator must be installed, operated and maintained in accordance with the manufacturer's specifications.

Only uncontaminated waste oil may be disposed of through incineration because the contaminants present in the oil are released to the air when it is burned. If you have contaminated waste oil that you would like to dispose of by incineration, please see the section of this guidance document on "Mixing Contaminated and Uncontaminated Waste Oil." Furthermore, it is very important to ensure that you use waste oil that has not been mixed with any other substances. If antifreeze is mixed with the waste oil, it can clog the jets in your burner. If solvents or other flammable liquids are present in the waste oil, the flash point of the fuel will be increased, potentially resulting in a fire or explosion hazard. If your waste oil contains brake fluid or chlorinated solvents (e.g., methyl ethyl ketone), burning the waste oil will produce hydrochloric acid that can corrode parts of the furnace. Furthermore, incinerating any substance in your waste oil furnace that it is not designed to burn may void the manufacturer's warranty or your insurance.

If you incinerate waste oil in a waste oil furnace or heater, your permit under the *Special Waste Regulations* must specifically authorize this activity.

Mixing Waste Oil with Diesel Fuel

Another way to dispose of waste oil is to filter it and then mix it with diesel fuel for use in a diesel engine. This should only be done with waste oil generated from diesel vehicles to ensure that the resulting mixture is compatible with your diesel engine. To ensure that the diesel-waste oil mixture is suitable for use in a diesel engine and that the emissions from the mixture will not be harmful to human and environmental health, it is important that the following requirements are met:

- The waste oil must have been generated from a diesel vehicle;
- The waste oil must be uncontaminated;
- The waste oil must be filtered to a 10 micron maximum rating; and
- The concentration of waste oil in the waste oil-diesel mixture must not exceed 5% by volume (i.e., no more than 5L of waste oil per 95L of diesel fuel).

All filters and filter residue from filtering the waste oil must be handled and disposed of in accordance with the *Special Waste Regulations.* If you wish to dispose of waste oil in this manner, your permit under the *Special Waste Regulations* must specifically authorize the mixing of waste oil and diesel fuel.

Mixing Contaminated and Uncontaminated Waste Oil

If you have reason to suspect that your waste oil is contaminated, you must not mix the contaminated waste oil with uncontaminated waste oil unless you conduct analytical testing to determine the concentration of contaminants in both the contaminated and uncontaminated waste oil. Once you know the concentration of contaminants in both sets of waste oil, you will know how much uncontaminated waste oil needs to be mixed with the contaminated waste oil in order to meet the contaminant thresholds. However, it is not acceptable to mix uncontaminated waste oil with contaminated waste oil for the purposes of reducing the concentration of PCBs.

In order to determine how much uncontaminated waste oil to mix with the contaminated waste oil, you must use the following formula. The formula needs to be used once for each contaminant that exceeds the contaminant standards in Table 1. For example, if the contaminated waste oil is contaminated with lead and chromium, the formula will need to be used twice – once to determine the volume that needs to be added to reduce the lead concentration and a second time to determine the volume that needs to be added to reduce the chromium concentration. The larger of the two volumes determined by the formula is the amount of uncontaminated waste oil that needs to be added to the contaminated waste oil.

$$V_2 = V_1 \frac{(C_1 - S)}{(S - C_2)}$$

C_1 = Concentration of contaminant in the contaminated waste oil
V_1 = Volume of the contaminated waste oil to be mixed

C_2 = Concentration of contaminant in the uncontaminated waste oil
V_2 = Volume of the uncontaminated waste oil to be added

S = The maximum concentration of the contaminant allowed (use the values in Table 1).

Example: You have 200 litres of waste oil contaminated with 200 ppm of lead and 7 ppm of arsenic. The concentrations of cadmium, chromium, total organic halogens, and PCBs are all below the applicable standards. You have a large supply of uncontaminated waste oil, which contains 20 ppm of lead and 1 ppm of arsenic. You want to know how much uncontaminated oil (V_2) to add to the 200 L of contaminated oil in order to meet the allowable contaminant levels.

<u>First, we need to do the calculation for lead</u>:

V_1, the volume of contaminated oil, is 200 L.
S, the contaminant standard for lead, is 50 ppm (see Table 1).
C_1, the concentration of lead in the contaminated waste oil, is 200 ppm.
C_2, the concentration of lead in the uncontaminated waste oil is 20 ppm

$$V_2 = V_1 \frac{(C_1 - S)}{(S - C_2)}$$

$$V_2 = \frac{(200\ \text{L})\ (200\ \text{ppm} - 50\ \text{ppm})}{(50\ \text{ppm} - 20\ \text{ppm})}$$

$$= \frac{(200\ \text{L})\ (150\ \text{ppm})}{(30\ \text{ppm})}$$

$$= 1000\ \text{L}$$

Therefore, to meet the standard for lead, you would need to add 1000 L of uncontaminated oil to the 200L of contaminated oil.

Next, we need to do the calculation for arsenic:

V_1, the volume of contaminated oil, is 200 L.
S, the contaminant standard for arsenic, is 5 ppm (see Table 1).
C_1, the concentration of arsenic in the contaminated waste oil, is 7 ppm.
C_2, the concentration of arsenic in the uncontaminated waste oil is 1 ppm

$$V_2 = V_1 \frac{(C_1 - S)}{(S - C_2)}$$

$$V_2 = \frac{(200\ L)\ (7\ ppm - 5\ ppm)}{(5\ ppm - 1\ ppm)}$$

$$= \frac{(200\ L)\ (2\ ppm)}{(4\ ppm)}$$

$$= 100\ L$$

Therefore, to meet the standard for arsenic, you would need to add 100L of uncontaminated oil to the 200L of contaminated oil.

Since the 1000L of uncontaminated waste oil needs to be added to meet the standard for lead, this is how much uncontaminated waste oil you mix with the contaminated waste oil. Because you are adding more than the 100L required to meet the arsenic standard, the resulting concentration of arsenic in the mixed product will be less than 5ppm.

Spills

Spills of waste oil must be reported immediately to the
Yukon Spills Report Centre in Whitehorse at (867) 667-7244
(24 hour service), or an Environmental Protection Officer.
Collect calls are accepted.

For more information on the *Special Waste Regulations*, please contact:

Environmental Programs Branch (V-8)
Environment Yukon
Box 2703

Whitehorse, Yukon
Y1A 2C6

Phone: (867) 667-5683
Toll Free: 1-800-661-0408 extension 5683
Fax: (867) 393-6205
Email: envprot@gov.yk.ca
Web: www.env.gov.yk.ca

Copies of Yukon regulations may be viewed online at www.environmentyukon.gov.yk.ca/monitoringenvironment/ under the "Standards & Approvals" section, or at any Yukon Public Library, territorial agent, territorial representative or regional services office. You may purchase copies at the Inquiry Centre, Yukon Government Administration Building, 2071-2nd Avenue in Whitehorse, or by mail from the Subscriptions Clerk, Yukon Government Queen's Printer, Box 2703, Whitehorse, Yukon, Y1A 2C6 (phone (867) 667-5783 or toll free 1-800-661-0408 extension 5783).