



— BUREAU OF —  
RECLAMATION

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# Oil as a Waste: Hazardous? Recycle It? PCB?

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# Categories of Oil Usage in U.S. Bureau of Reclamation (BOR) Facilities

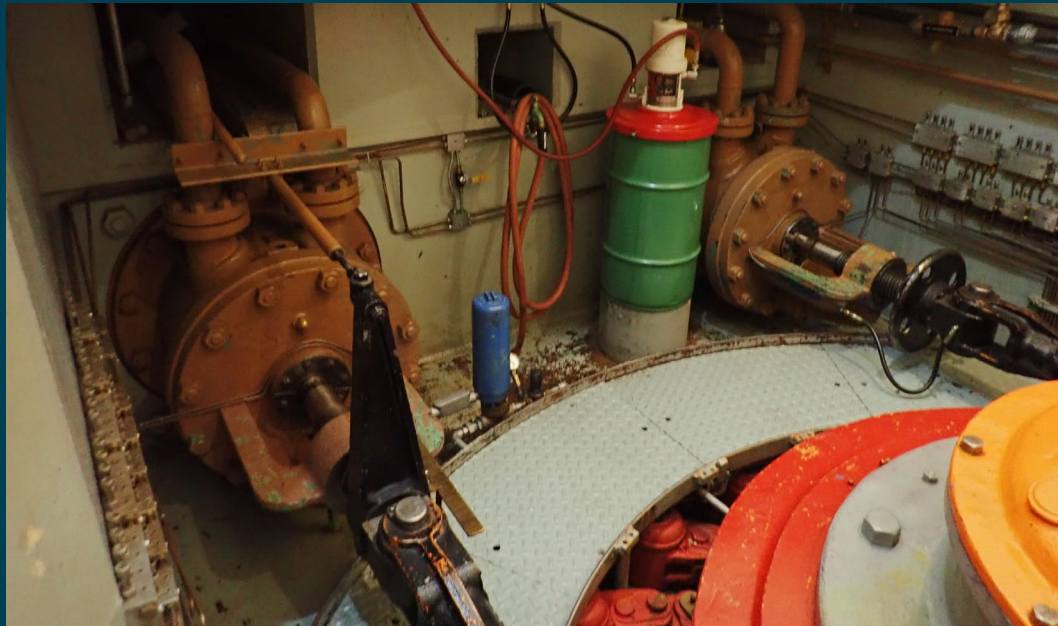
1. Mechanical
2. Electrical





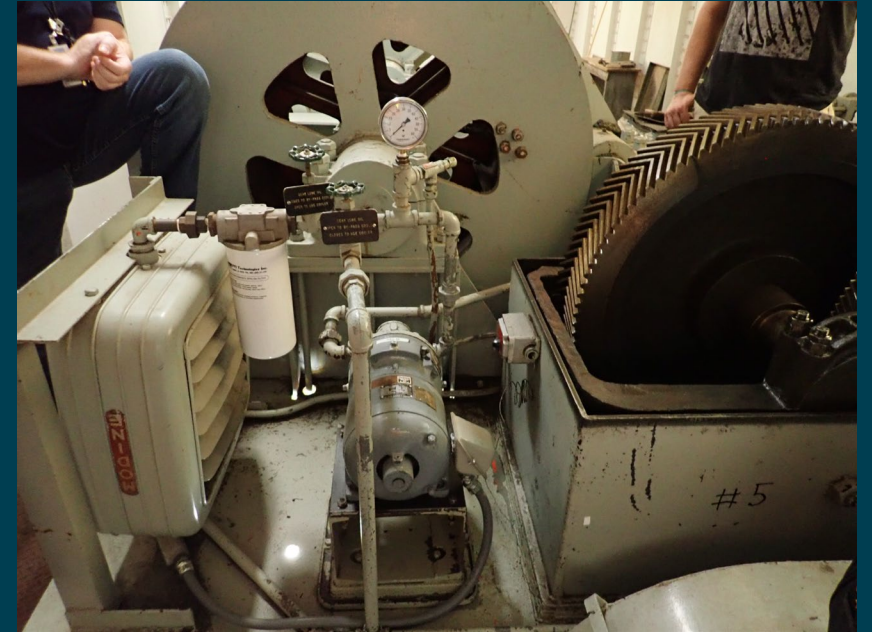
# Mechanical Equipment using Oil:

1. Turbine Speed Governor (right).
2. Turbine speed governor, in the turbine pit (below).



# Mechanical Equipment using Oil cont:

3. Cranes hoists (right) (lifting mechanism for the crane)
4. Elevators (below)





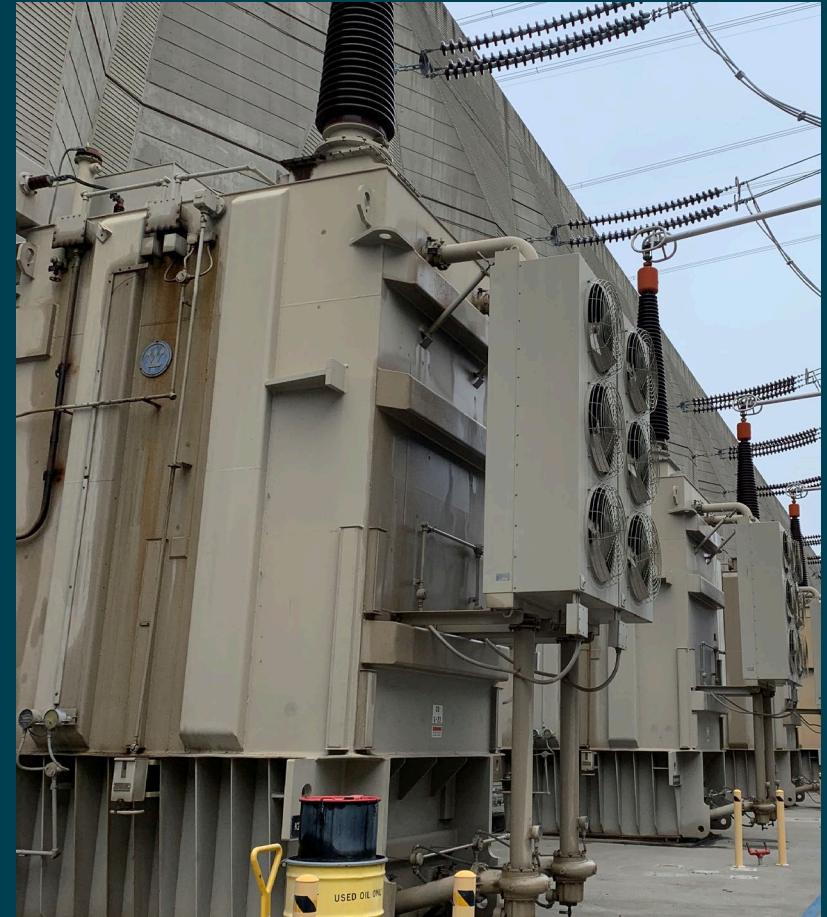
# Mechanical Equipment using Oil cont:

5. Gate actuators (below left).
6. Hydraulic Press (below right).
7. Anything that uses hydraulics is likely using oil as the fluid.



# Electrical Equipment using Oil:

1. Transformers (right).
2. Transformer bushings (bottom, look for sight glass).





# Electrical equipment using Oil cont:

3. Breakers (bottom).
4. Oil used to insulate electrical equipment e. g. capacitors.



# What are the Waste Categories for Oil?

1. Used Oil Specifications (40 CFR Part 279.11, Table 1)
  2. Hazardous Waste (fails criteria listed in 40 CFR Part 279.11, Table 1 excluding PCBs).
  3. Polychlorinated Biphenyls (PCBs), 40 CFR Part 761, part of the Toxic Substances Control Act (TSCA, 40 CFR 700-799).
    1. Note there's a reference to PCBs in Oil, 40 CFR Part 761.20(e).
- Note that the above listed are federal regulations, **state regulations** may be more restrictive, WA and CA come to mind...





# Used Oil (40 CFR Part 279)

Oil must meet these standards to be recycled, not burned.

Table 1, 40 CFR Part 279.11	
Constituent/property	Allowable level
Arsenic	5 ppm max.
Cadmium	2 ppm max.
Chromium	10 ppm max.
Lead	100 ppm max.
Flashpoint	100 °F min.
Total halogens	1,000 ppm / 4,000 ppm max.
PCBs	< 2 ppm, 2 – 49 ppm, >= 50 ppm



# Used Oil Specifications (40 CFR Part 279.11)

Table 1, 40 CFR Part 279.11	
Constituent/property	Allowable level
Arsenic (As)	5 ppm max.
Cadmium (Cd)	2 ppm max.
Chromium (Cr)	10 ppm max.
Lead (Pb)	100 ppm max.
Flashpoint	100 °F min.
Total halogens	1,000 ppm / 4,000 ppm max.
PCBs	< 2 ppm, 2 – 49 ppm, >= 50 ppm

Most mechanical hydraulic systems **fail for metals** unless:

- The oil has been filtered, either by an inline system or removed, filtered, and re-added.





# Used Oil Specifications cont.

Constituent/property	Allowable level
Flashpoint	100 °F min.
Total halogens	1,000 ppm / 4,000 ppm max.
PCBs	< 2 ppm, 2 – 49 ppm, >= 50 ppm

Flashpoint: the minimum temperature at which a liquid gives off vapor within a test vessel in sufficient concentration to form an ignitable mixture with air near the surface of the liquid (source: [www.OSHA.gov](http://www.OSHA.gov)).



# Used Oil Specifications cont.

Constituent/property	Allowable level
Flashpoint	100 °F min.
Total halogens	1,000 ppm / 4,000 ppm max.
PCBs	< 2 ppm, 2 – 49 ppm, >= 50 ppm

## Flashpoint examples:

- Low Flashpoint (gives off vapors easily).
  - Gasoline: -40 °F / -40 °C.
- High Flashpoint (doesn't give off vapors easily).
  - Motor oil (10W40): 446 °F / 230 °C.
  - 80W90 oil: 415 °F / 213 °C.





# Used Oil Specifications cont.

Constituent/property	Allowable level
Flashpoint	100 °F min.
Total halogens	1,000 ppm / 4,000 ppm max.
PCBs	< 2 ppm, 2 – 49 ppm, >= 50 ppm

Halogens: fluorine, chlorine, bromine, iodine.

Halogenated solvents (degreasers): methylene chloride, TCA, TCE, PCE.

- Typically found in work shops (machine, auto, electrical, your garage maybe).



# Used Oil Specifications cont.

Constituent/property	Allowable level
Flashpoint	100 °F min.
Total halogens	1,000 ppm / 4,000 ppm max.
PCBs	< 2 ppm, 2 – 49 ppm, >= 50 ppm

- Oil Containing Total Halogens:
  - Less than 1,000 ppm total halogens = passes.
  - Greater than 1,000 ppm but less than 4,000 ppm = maybe.
    - Presumed to be a hazardous waste unless proven otherwise, by testing or process knowledge (40 CFR Part 279.44).
    - Haven't seen this at BOR.
  - Greater than 4,000 ppm = fails. It's hazardous waste.
- BOR tends to be in the "less than 1,000 ppm" range.





# Used Oil Specifications cont. / TSCA

Constituent/property	Allowable level
Flashpoint	100 °F min.
Total halogens	1,000 ppm / 4,000 ppm max.
PCBs	< 2 ppm, 2 – 49 ppm, >= 50 ppm

## PCBs in oil:

- Domestic manufacturing was banned in 1979.
- Many of BOR's electrical facilities **pre-date** this.
- Note: **PCBs can and do leach into and out of their metal containers. It's not the fault of the PCB fairy.**



# Used Oil Specifications cont. / TSCA

Constituent/property	Allowable level
Flashpoint	100 °F min.
Total halogens	1,000 ppm / 4,000 ppm max.
PCBs	< 2 ppm, 2 – 49 ppm, >= 50 ppm

## PCBs in oil:

- **>=50 ppm**, it's PCB containing and is regulated for disposal under TSCA. It has to be sent directly to an EPA approved incinerator or Treatment, Storage, and Disposal Facility (TSDF) which then sends it to the incinerator.



# Used Oil Specifications cont. / TSCA

Constituent/property	Allowable level
Flashpoint	100 °F min.
Total halogens	1,000 ppm / 4,000 ppm max.
PCBs	< 2 ppm, 2 – 49 ppm, >= 50 ppm

PCBs in oil ( $\geq 50$  ppm):

- EPA's TSDF list:
  - <https://www.epa.gov/pcbs/list-approved-polychlorinated-biphenyl-pcb-commercial-storage-and-disposal-facilities>



# Used Oil Specifications cont. / TSCA

Constituent/property	Allowable level
Flashpoint	100 °F min.
Total halogens	1,000 ppm / 4,000 ppm max.
PCBs	< 2 ppm, 2 – 49 ppm, >= 50 ppm

## PCBs in oil cont:

- If the oil has PCBs  $\geq 2$  ppm (called the “quantifiable level”):
  - Can be sold for energy recovery (burning as a fuel).
  - May but **doesn't have** to go to a PCB incinerator.
  - **HOWEVER** check your state regulations!! These may be more restrictive.





# Used Oil Specifications cont. / TSCA

Constituent/property	Allowable level
Flashpoint	100 °F min.
Total halogens	1,000 ppm / 4,000 ppm max.
PCBs	< 2 ppm, 2 – 49 ppm, >= 50 ppm

## PCBs in oil, Containers:

- Containers (e. g. transformers, breakers) which once held PCB containing oil may still leach out PCBs.
  - Your nice, clean, non-PCB oil ends up contaminated.
  - There is no cleaning method for this.



# How to know which category your oil falls into:

## Get it tested!

Constituent/property	Lab Test
Metals (arsenic, cadmium, chromium, lead)	EPA SW-846 Method 6010
Flashpoint	ASTM D92
Total halogens	EPA SW-846, Method 8120 or 8260
PCBs	EPA SW-846 Method 8082



# Best Management Practice Suggestions:

1. Dispose of old oil. Don't leave it around.
2. If possible, filter the oil which lengthens the life of the oil and the equipment because filtering removes contaminants.



# Best Management Practice Suggestions cont:

## 3. Segregate and mark oil containers which don't meet the Used Oil Specifications.

- If contamination is added to a Used Oil, the Used Oil is now contaminated.
- You can add Used Oil to contaminated oil but now you have LOTS more of your more expensive contaminated oil to dispose of.

This label is  
for storage  
only.

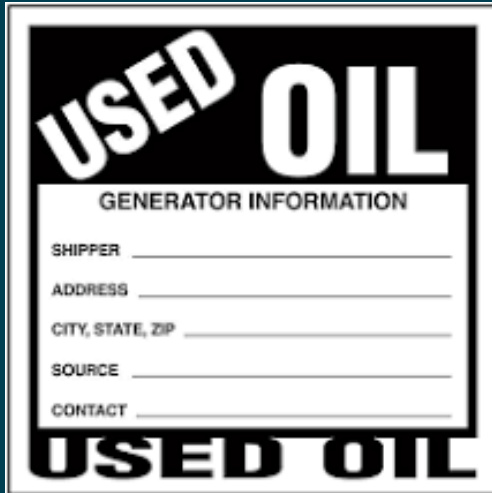


Typical roll of duct tape is 60 yards long. If you use 1 ft per label, that's 180 labels...





# Label Examples:



**USED OIL**

GENERATOR INFORMATION

SHIPPER \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY, STATE, ZIP \_\_\_\_\_

SOURCE \_\_\_\_\_

CONTACT \_\_\_\_\_

**USED OIL**



**HAZARDOUS WASTE**

ACCUMULATION  
START DATE \_\_\_\_\_

CONTENTS \_\_\_\_\_

**HANDLE WITH CARE!**  
CONTAINS HAZARDOUS OR TOXIC WASTES



**HAZARDOUS WASTE**

STATE AND FEDERAL LAW PROHIBIT IMPROPER DISPOSAL.  
IF FOUND, CONTACT THE NEAREST POLICE OR PUBLIC SAFETY  
AUTHORITY, THE U.S. ENVIRONMENTAL PROTECTION AGENCY  
OR THE CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL.

GENERATOR INFORMATION:

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_ PHONE \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

WASTE IDENTIFICATION NO. \_\_\_\_\_

RCRA ID NO. \_\_\_\_\_

DOT HAZARDOUS ID NO. \_\_\_\_\_

DOT HAZARDOUS ID NO. \_\_\_\_\_

DOT HAZARDOUS ID NO. \_\_\_\_\_

CONTENTS, COMPOSITION:

PHYSICAL STATE: ☐ SOLID ☐ LIQUID ☐ GASEOUS ☐ OTHER \_\_\_\_\_

HAZARDOUS PROPERTIES: ☐ FLAMMABLE ☐ TOXIC ☐ CORROSIVE ☐ REACTIVE ☐ OTHER \_\_\_\_\_

**HANDLE WITH CARE!**

USE PROPER HANDLING AND STORAGE PROCEDURES

Label/Poster # \_\_\_\_\_



# Used Oil Summary:

Table 1, 40 CFR Part 279.11	
Constituent/property	Allowable level
Arsenic	$\leq 5$ ppm
Cadmium	$\leq 2$ ppm
Chromium	$\leq 10$ ppm
Lead	$\leq 100$ ppm
Flashpoint	$> 100$ °F
Total halogens	$< 1,000$ ppm
PCBs	$< 2$ ppm

Recycle as Used Oil. Pass Go, collect \$200 dollars.



# Used Oil Summary cont:

Table 1, 40 CFR Part 279.11	
Constituent/property	Allowable level
Arsenic	$\leq 5$ ppm
Cadmium	$\leq 2$ ppm
Chromium	$\leq 10$ ppm
Lead	$\leq 100$ ppm
Flashpoint	$> 100$ °F
Total halogens	$< 1,000$ ppm
PCBs	$\geq 2$ ppm, $< 50$ ppm

Disposal: Can go to a “off spec” oil burner but does not have to go to an EPA licensed PCB incinerator.



# Used Oil Summary cont:

Table 1, 40 CFR Part 279.11	
Constituent/property	Allowable level
Arsenic	$\leq 5$ ppm
Cadmium	$\leq 2$ ppm
Chromium	$\leq 10$ ppm
Lead	$\leq 100$ ppm
Flashpoint	$> 100$ °F
Total halogens	$< 1,000$ ppm
PCBs	$\geq 50$ ppm

Disposal: PCB containing fluid, must go to an EPA licensed PCB incinerator.





# Used Oil Summary cont:

Table 1, 40 CFR Part 279.11	
Constituent/property	Allowable level
Arsenic	> 5 ppm
Cadmium	> 2 ppm
Chromium	> 10 ppm
Lead	> 100 ppm
Flashpoint	> 100 °F
Total halogens	> 1,000 ppm
PCBs	< 2 ppm

Disposal: If any of the above in yellow are exceeded, it's a Hazardous Waste.





Thank you!

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## Cathodic Protection



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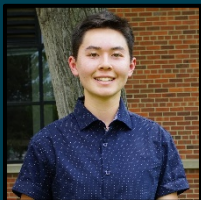
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