

HANDBOOK FOR THE MANAGEMENT OF USED

METALWORKING OILS

CONTAINING CHLORINATED PARAFFINS

January 1992

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HANDBOOK FOR THE MANAGEMENT OF USED METALWORKING OILS CONTAINING CHLORINATED PARAFFINS

EXECUTIVE SUMMARY

The Chlorinated Paraffins Industry Association (CPIA) has prepared this Handbook to promote the environmentally safe management of used metalworking oils and to describe the relevant regulatory requirements of the Federal Resource Conservation & Recovery Act (RCRA). This Handbook was prompted by requests from formulators and users of metalworking oils for information on the requirements for managing used oils containing chlorinated paraffins. Some users and waste management firms mistakenly believe that chlorinated paraffins cause a waste to be treated as a "RCRA *hazardous waste*." This is not the case since chlorinated paraffins are *not* listed by the US Environmental Protection Agency (EPA) as a hazardous constituent for the purpose of determining whether a waste is a *hazardous waste*. Additionally, EPA currently regulates used oils -- including used metalworking oils -- destined for energy recovery under special regulations that *excludes* such oils from stringent Federal *hazardous waste* regulations.

Chlorinated paraffins are straight-chain hydrocarbons that have been chlorinated. Chlorinated paraffins are classified according to their carbon-chain length and percentage of chlorination, with carbon-chain lengths generally ranging from C₁₀ to C₃₀ and chlorination from 40 to 70 percent. Although chlorinated paraffins are chlorinated hydrocarbons, they should not be confused with chlorinated solvents. Chlorinated solvents tend to have different physical and chemical properties than paraffins.

Chlorinated paraffins are used where the demand for chemical stability is high. Approximately 50 percent of the chlorinated paraffins produced in the United States are used as additives in metalworking lubricants. Chlorinated paraffins are also used as plasticizers and flame retardants.

The Handbook emphasizes the importance for generators of used oil to adopt waste minimization practices and describes general approaches for developing a waste minimization program. Waste segregation is especially encouraged since this is an easy and inexpensive method to minimize disposal costs. Waste segregation also reduces the possibility that *hazardous wastes* will contaminate the used oil, thus rendering the mixture ineligible for disposal as a *non-hazardous waste*.

Below are highlights of the handbook set out in a question-and-answer format.

1) **Q: Must used metalworking oils containing chlorinated paraffins be managed as hazardous wastes?**

A: No. Chlorinated paraffins are not listed by EPA as a hazardous constituent and therefore their presence does not require a used oil to be managed as a hazardous waste. Such oils may be managed as “non-hazardous” as long as they have not been mixed with hazardous wastes.

2) **Q: What Federal regulations govern the management of wastes, and in particular used metalworking oils containing chlorinated paraffins?**

A: Federal Resource Conservation & Recovery Act (RCRA) regulations govern the management and disposal of used oil. These regulations can be found in Title 40 Code of Federal Regulations (CFR) Parts 260-299. Of special interest are the used oil regulations found in Part 266.

3) **Q: How do State regulations affect the management of used oils?**

A: The impact of State regulations can be significant since some States have declared used oil a hazardous waste. Appropriate State agencies should be contacted to determine whether a State has adopted regulations that are different than the federal EPA.

4) **Q: What is the rebuttable presumption and how does it involve the 1,000 ppm total halogen concentration?**

A: The rebuttable presumption was created by the Federal regulations for managing used oils, and works in the following way: a used oil is presumed to have been mixed with hazardous wastes if the total halogen concentration exceeds 1,000 ppm. This presumption may be rebutted if it can be shown by chemical analysis or certification that the used oil has not been mixed with hazardous wastes. Since chlorinated paraffins are not on EPA’s list of hazardous constituents, documenting that a halogen level above 1,000 ppm is from chlorinated paraffins should successfully rebut the presumption.

5) **Q: Are there any specific methods for rebutting the presumption?**

A: The regulations are not specific on what constitutes a valid rebuttal of the hazardous waste mixing presumption. There are, however, a number of approaches that have been accepted by EPA.

1) Certification by the generator that the used oil has not been mixed with hazardous wastes.

2) Chemical analysis of a representative sample of the used oil documenting that certain halogenated hazardous substances are not present in significant amounts in the used oil.

3) A Material Safety Data Sheet confirming that the halogen level results from the presence of halogenated substances in the virgin oil.

Other methods of rebuttal may also be acceptable. Your used oil management company should be able to provide guidance in this area.

6) Q: What can be done to reduce the amount of hazardous waste a company generates?

A: Implementation of a waste minimization program can systematically identify opportunities for reducing the amount of hazardous wastes generated. One method of reducing hazardous waste is to segregate the hazardous and non-hazardous wastes, which has the immediate effect of reducing the volume of hazardous waste that needs to be disposed and therefore minimizing disposal costs. Information on waste minimization programs is available from various organizations including the Environmental Protection Agency, the Chemical Manufacturers Association and the Independent Lubricants Manufacturers Association.

7) Q: Are any new regulations being developed that may affect the management of used metalworking oils that contain chlorinated paraffins?

A: Yes. On September 17, 1991 EPA published its proposed rule for managing used oil. This proposal is intended to promote recycling, expand the applicability of the rebuttable presumption of hazardous waste mixing, and establish management standards for used oil. The proposed rule is intended to apply to all used oils including used oils containing chlorinated paraffins. The proposed rule is expected to be finalized in May 1992. Based on CPIA's current analysis, the rule should result in little change to the management of used metalworking oils containing chlorinated paraffins.

8) Q: What is the Chlorinated Paraffins Industry Association?

A: CPIA is a not-for-profit trade association whose mission is to collect, analyze, and disseminate information on chlorinated paraffins. CPIA members consists of the North American manufacturers and importers of chlorinated paraffins and includes: Dover Chemical Corporation; Ferro Corporation, Petroleum Additives; Occidental Chemical Corporation; and, Pioneer Americas, Inc.

HANDBOOK FOR THE MANAGEMENT OF USED METALWORKING OILS CONTAINING CHLORINATED PARAFFINS

I. INTRODUCTION

The Chlorinated Paraffins Industry Association (CPIA) has prepared this Handbook to promote the environmentally safe management of used metalworking oils and to describe the relevant regulatory requirements of the Federal Resource Conservation & Recovery Act (RCRA). While the topics addressed in this Handbook have general applicability to the management of used oils, the Handbook focuses on used metalworking oils containing chlorinated paraffins.

The CPIA is a not-for-profit trade association whose mission is to collect, analyze, and disseminate information on chlorinated paraffins. CPIA members consist of the North American manufacturers and importers of chlorinated paraffins and include: Dover Chemical Corporation; Ferro Corporation, Petroleum Additives; Occidental Chemical Corporation; and, Pioneer Americas, Inc.

This Handbook was prompted by requests from formulators and users of metalworking oils for information on the requirements for managing used oils containing chlorinated paraffins. An informal survey of users of metalworking fluids containing chlorinated paraffins revealed that some users and waste management firms mistakenly believe that chlorinated paraffins cause a waste to be treated as a "RCRA *hazardous waste*." As discussed in greater detail in Section III of this Handbook, this is not necessarily the case. Chlorinated paraffins are *not* listed by the US Environmental Protection Agency (EPA) as a hazardous constituent for the purpose of determining whether a waste is hazardous. Additionally, EPA regulates used oils -- including used metalworking oils -- destined for energy recovery under special regulations that *excludes* such oils from stringent Federal *hazardous waste* regulations.

Section II of the Handbook presents general information on the chemical and physical characteristics of chlorinated paraffins. Section III discusses the regulatory background for the management of used oils. Section IV describes waste management options for used metalworking oils, with special attention on the "rebuttable presumption" for used oil. Section V outlines pre-disposal practices that can facilitate cost-effective off-site management of used metalworking oils, including a general approach for arranging the shipment of used oils to waste management firms.

II. THE NATURE OF CHLORINATED PARAFFINS AND THEIR USE IN METALWORKING OILS

Chemistry Of Chlorinated Paraffins

Chlorinated paraffins are straight-chain hydrocarbons that have been chlorinated and have the general formula $C_xH_{(2x-y+2)}Cl_y$.

Chlorinated paraffins are classified according to their carbon-chain length and percentage of chlorination. The performance characteristics of chlorinated paraffins are a function of these two characteristics. Chlorinated paraffins may have carbon-chain lengths ranging from ten carbons (C_{10}) to thirty carbons (C_{30}) and chlorination from 40 to 70 percent.

Because of their high molecular weight, chlorinated paraffins have low vapor pressure when used in a normal working environment. Generally, chlorinated paraffins are water insoluble, but emulsifiable. Chlorinated paraffins can be blended with a wide variety of petroleum lubricating basestocks and other organic solvents.

Although chlorinated paraffins are chlorinated hydrocarbons, they should not be confused with chlorinated solvents. Chlorinated solvents tend to have different physical and chemical properties than paraffins. For example, the molecular weight (MW) of chlorinated solvents, such as carbon tetrachloride (MW = 154), tetrachloroethylene (MW = 166), and 1,2-dichlorobenzene (MW = 147) are generally lower than those of chlorinated paraffins, such as C_{23} , 43 percent chlorine, which has an average molecular weight of 560.

Chlorinated Paraffins In Metalworking Fluids

Chlorinated paraffins are used where the demand for chemical stability is high. The performance characteristics of chlorinated paraffins have led to their use as extreme pressure additives in metalworking fluids. At high temperatures, chlorinated paraffins react to form low-melting inorganic lubricant films on metal surfaces. This film prevents unwanted welding of metal parts, which makes chlorinated paraffins useful additives in cutting oils and high pressure lubricating oils. Approximately 50 percent of the chlorinated paraffins produced in the United States are used as additives in metalworking lubricants.

In addition to chlorinated paraffins, other additives may be included in metalworking oil formulations to improve certain favorable properties such as emulsification, bacterial control and corrosion control. These additives in many cases promote waste minimization by extending the life of the metalworking fluid.

III. OVERVIEW OF FEDERAL WASTE MANAGEMENT REGULATIONS RELEVANT TO USED METALWORKING OILS CONTAINING CHLORINATED PARAFFINS

The management of "solid wastes"¹, of which *hazardous wastes* are a subset, is governed at the Federal level by the Resource Conservation & Recovery Act (RCRA). Based on RCRA authority, EPA has established a comprehensive and stringent regulatory program to address the generation, transportation, treatment, storage, and disposal of *hazardous waste*. This section provides an overview of the RCRA regulations as they pertain to metalworking oils and the status of chlorinated paraffins in the federal program.

The RCRA Definition Of Hazardous Waste

The determination of whether a waste, such as used oil, is subject to RCRA's *hazardous waste* provisions begins with RCRA's regulatory definition of *hazardous waste*. A solid waste is deemed "hazardous" if it falls into any of the following categories:

- **Listed Hazardous Waste**²: The waste is from a specific or non-specific source that EPA has specifically listed as hazardous. For example, the following spent halogenated solvents are listed as part of "F002" *hazardous waste*: tetrachloroethylene, methylene chloride, 1,1,1-trichloroethane, and chlorobenzene.
- **Characteristic Hazardous Waste**³: The waste exhibits one of the hazardous characteristics of ignitability, reactivity, corrosivity, or toxicity. Ignitability and toxicity are of potential relevance for used oil. Ignitable is defined as waste that has a flash point below 140 °F. The toxicity characteristic is evaluated using a test known as the Toxicity Characteristic Leaching Procedure (TCLP), which determines the leachable concentrations of specific toxic chemicals. An exceedance of TCLP levels qualifies a waste as a *hazardous waste*.

¹ The term, "solid waste," is used in RCRA to refer to all types of wastes including traditional non-hazardous waste, such as municipal garbage and commercial refuse, as well as hazardous wastes. Furthermore, the word "solid" is a misnomer since the definition of solid waste includes liquid and semi-liquid material. Non-hazardous and hazardous wastes are regulated under separate parts of RCRA.

²40 CFR §261.3(a)(2)(ii).

³40 CFR §261.3(a)(2)(i).

A waste is also considered a *hazardous waste* if it is:

- **Mixed With Listed *Hazardous Wastes***⁴: A non-hazardous solid waste that is mixed with any quantity or concentration of a listed *hazardous waste* is considered hazardous.
- **Mixed With Characteristic *Hazardous Wastes***⁴: Mixtures of non-hazardous solid waste and characteristically *hazardous waste* that retain the hazardous characteristic are considered *hazardous wastes*. Conversely, when a non-hazardous solid waste is mixed with a characteristically *hazardous waste* so that the mixture no longer exhibits the hazardous characteristic, the mixture is no longer considered a *hazardous waste*. However, the latter case of mixing is considered *hazardous waste treatment*, and is subject to 40 CFR §§ 264 - 265, and 270.
- **Derived From *Hazardous Wastes***⁴: A solid waste that is derived from *hazardous waste* (e.g., incinerator ash from the incineration of *hazardous wastes*) is considered hazardous.

The RCRA *hazardous waste* program is intended to ensure that *hazardous wastes* are handled in a manner that protects human health and the environment and minimizes the release of hazardous constituents to the environment. If a waste is deemed hazardous, it must be comprehensively managed under RCRA Subtitle C regulations codified at Title 40 Code of Federal Regulations (CFR) Parts 124, and Parts 262, 263, 264, 265, 266, 268, and 270. The RCRA *hazardous waste* regulations are intended to manage *hazardous wastes* from "cradle-to-grave" (i.e., from generation through to its transportation, treatment, storage, and disposal). Generators are required to track, report, and keep records on the management of their *hazardous waste*, to limit the amount of waste they accumulate, and dispose of their *hazardous wastes* at permitted facilities.

Where possible, EPA authorizes qualified State governments to implement and enforce the RCRA regulations. In addition, many states have their own statutory authorities that may include provisions that are more stringent than Federal requirements. State-specific requirements should therefore always be reviewed for applicability. Some State regulations require that "used oil" be managed as a *hazardous waste*. The following States are among those that manage used oil as hazardous (Note: Each State's regulations should be examined closely since requirements can vary significantly between States):

⁴40 CFR §261.3. Note: On December 6, 1991, the U.S. Court of Appeals, D.C. Circuit vacated and remanded EPA's "mixture" and "derived from" rules. How this court decision will affect EPA's regulations will not be known for several months.

Arizona
California
Massachusetts
Minnesota
Missouri
New Jersey
New York
Rhode Island
Vermont

Chlorinated Paraffins In The RCRA Program

The presence of chlorinated paraffins in a waste, such as used metalworking oils, does not by itself make the waste hazardous. This is because the RCRA regulations do not consider chlorinated paraffins to be a hazardous constituent (*i.e.*, listed in 40 CFR §261, Appendix VIII). Furthermore, chlorinated paraffins do not contribute to the hazardous characteristics of ignitability, corrosivity, or reactivity, and are not among the chemicals that are evaluated in the Toxicity Characteristic Leaching Procedure⁵.

Small Quantity Generator

Since the requirements for generators are substantial, EPA exempts "small quantity generators" from much of the *hazardous waste* regulations. The generator category and regulatory status provided by the Small Quantity Generator (SQG) regulations⁶ are described in the Table below.

Regulatory Status of Generators Based On Monthly Volume of *Hazardous Waste* Generated

⁵See 40 CFR §266.40-44.

⁶See March 24, 1986 Federal Register, page 10146.

RCRA Generator Status	Monthly Generated Volume of Acute Hazardous Waste (kg)	Monthly Generated Volume of Hazardous Waste (kg)	Applicable Regulations
Conditionally Exempt Small Quantity Generator	1	<100	40 CFR §261.5
Small Quantity Generator	1	100 - 1000	40 CFR §262
Large Quantity Generator	>1	>1000	Full regulation under 40 CFR §§ 262-266, 270, 124, & RCRA §3010 notification

Title 40 CFR 261.5 requires Conditionally Exempt Small Quantity Generators (CESQGs) (*i.e.*, generators of less than 100 kg per month of *hazardous waste* and no more than 1 kg per month of acutely *hazardous waste*) to:

- 1) Determine whether their wastes are hazardous;
- 2) Send *hazardous wastes* to licensed treatment, storage, or disposal facility; and,
- 3) Accumulate no more than 1,000 kg of *hazardous wastes* or 1 kg of acutely *hazardous waste*.

Title 40 CFR 262 requires Small Quantity Generators (*i.e.*, generators of between 100-1000 kg of *hazardous waste* per month and no more than 1 kg per month of acutely *hazardous waste*) to:

- 1) Determine whether their wastes are hazardous;
- 2) Obtain an EPA identification number;
- 3) Store *hazardous wastes* on-site for no more than 180 days (270 days if the generator is more than 200 miles from the nearest licensed *hazardous waste* facility);
- 4) Comply with US Department of Transportation regulations for shipping wastes off-site;

- 5) Use a multi-part "round trip" Uniform *Hazardous Waste* Management Waste Manifest to accompany the waste to its final destination; and,
- 6) Maintain copies of manifests for three years.

IV. MANAGEMENT OPTIONS FOR USED METALWORKING OILS CONTAINING CHLORINATED PARAFFINS

Overview Of Management Options For Used Metalworking Oils

As outlined in the previous section, EPA has established stringent regulations to ensure the safe management of *hazardous wastes*. Because RCRA is concerned with minimizing wastes, however, EPA has issued specific regulations designed to facilitate the recycling of used oils.

The Federal regulations define "used oil" as "... any oil that has been refined from crude oil, used, and, as a result of such use, is contaminated by physical or chemical impurities⁷." Used oil has presented a unique problem to the RCRA program because, on the one hand, EPA wishes to promulgate protective used oil management regulations, but, at the same time, the Agency does not want to discourage the well established practice of recycling used oil. In recent years, EPA has grappled with the possibility of imposing the full burden of RCRA *hazardous waste* regulations on used oils, but the Agency fears that classifying used oil as *hazardous waste* would "stigmatize" used oil in such a way as to discourage recycling.

Currently, there are no comprehensive Federal regulations for the management (*e.g.*, storage, transportation) of used oil. There are, however, two Federal RCRA regulations that apply to used oils. The first specifies that "used oil that exhibits one or more characteristics of *hazardous waste* and is burned for energy recovery in boilers and industrial furnaces is subject only to the used oil fuel regulations.⁸ The other regulation specifies that "used oil that exhibits one or more characteristics of *hazardous waste* but is recycled in some other manner than being burned for energy recovery" is not subject to any of the RCRA *hazardous waste* regulations at 40 CFR 262 - 266, 268, 270, & 124).¹⁰ To

⁷See 40 CFR §266.40(b).

⁸ See 40 CFR §266.40-44.

¹⁰ See 40 CFR 261.6(a)(3)(iii).

determine the available management options and the applicable regulations that must be followed, the used oil must first be classified into one of the following categories:

- non-hazardous used oil (*i.e.*, used oil that does not exhibit a hazardous characteristic or is not mixed with *hazardous waste*);
- used oil exhibiting one or more of the RCRA hazardous characteristic; and,
- used oil that has been mixed with *hazardous wastes*.

Based on this classification the used oil may be:

- land disposed;
- recycled for energy recovery; or,
- rerefined.

The management options for used oil are summarized in the following flowchart.

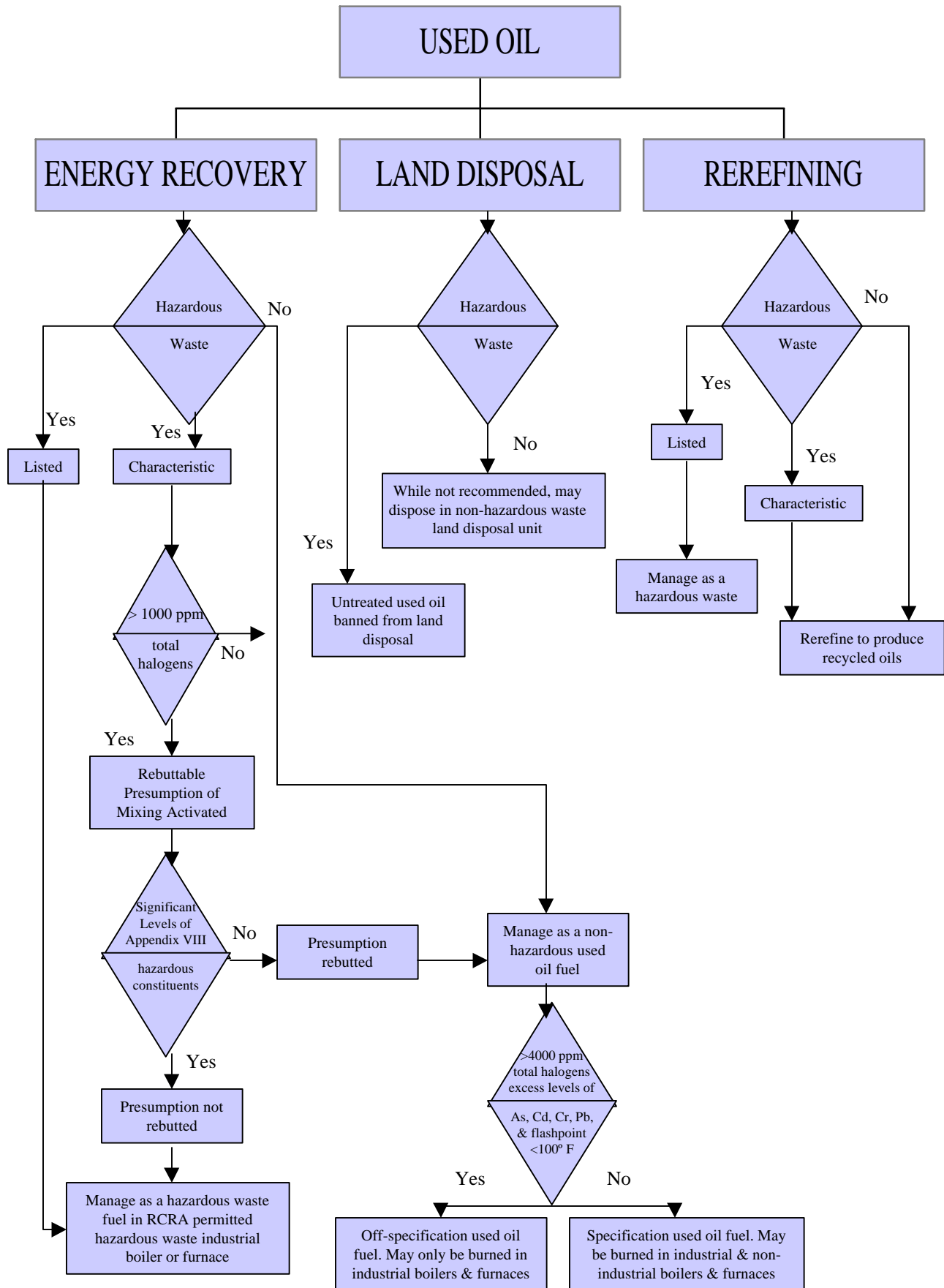
Managing Non-Hazardous Used Metalworking Oil

Non-Hazardous Used Metalworking Oil Destined For Land Disposal

There currently are no explicit federal limitations for disposing non-hazardous used oil in land disposal facilities. Except in special cases Federal regulations prohibit non-hazardous liquid wastes from being disposed in *hazardous waste* land disposal units¹¹, and EPA has proposed that this prohibition be extended to non-hazardous land disposal units. Additionally, the legal liabilities imposed by the Federal *hazardous*

¹¹See 40 CFR §264.314.

Used Oil Disposal: An Overview



waste cleanup statute, commonly known as "Superfund," could be extended to used oil generators if their used oil is associated with environmental contamination. For this reason, the land disposal of used oil is not generally considered an advisable option.

Non-Hazardous Metalworking Oils Recycled For Energy Recovery

Non-hazardous used metalworking oil may be recycled for energy recovery as a "used oil fuel" under a special set of regulations at 40 CFR §266.40-44. Used oil fuel includes "... any fuel produced from used oil by processing, blending, or other treatment¹²." There are currently no specific Federal regulations governing the management (*e.g.*, storage and transportation) of non-hazardous used oil prior to energy recovery. It should be noted, however, that persons marketing used oil fuel are required to meet standards¹³ for notification, analysis, recordkeeping, and storage.

Used oil fuel is classified into two categories: *specification* and *off-specification* used oil fuel. Regulations at 40 CFR §266.40(e) state that used oil fuels are "*specification* used oil fuel," unless it exceeds the following limits (described in the table below), in which case the used oil fuel is considered "*off-specification*."

¹²See 40 CFR §266.40(a).

¹³See 40 CFR §266.40-44.

Allowable Levels For *Specification* Used Oil Fuel

Constituent/Property	Allowable Level for Specification Used Oil Fuel
Total Halogens	4000 ppm maximum
Flash Point	100 °F minimum
Arsenic	5 ppm maximum
Cadmium	2 ppm maximum
Chromium	10 ppm maximum
Lead	100 ppm maximum

The regulations require that *specification* used oil fuel be burned for energy recovery in industrial or non-industrial boilers and furnaces, while *off-specification* used oil fuel may only be burned in permitted industrial boilers and furnaces (*e.g.*, cement kilns, coke ovens, blast furnaces, and smelters).

Since many used metalworking oils contain significant concentrations of chlorine, oftentimes attributed to the chlorinated paraffins in the metalworking fluid, the 4,000 ppm halogen limit is an important factor in determining where the used oil can be burned for energy recovery. Since there are only a limited number of industrial boilers and furnaces permitted to burn *off-specification* used oil fuel, the cost of this management option is usually higher.

Many facilities place limitations on the chlorine content of the oils burned because of concern of hydrogen chloride formation in air emissions and corrosion of the furnace and its emissions control equipment. There are, however, no restrictions on mixing non-hazardous used oil, so that a facility may "blend down" the chlorine concentration to a manageable level. This includes blending *off-specification* used oil fuel with *specification* used oils to below the 4,000 ppm halogen level so that the entire mixture is deemed to be *specification* used oil.

Non-Hazardous Used Metalworking Oil Destined For Rerefining

An alternative to burning used oil as fuel is to rerefine the oil. Rerefining is the reclamation of used oils for use as a variety of petroleum

products, such as motor oil and hydraulic fluid. As with used oil destined for energy recovery, there currently are no specific Federal regulations governing the management (*e.g.*, storage and transportation) of non-hazardous used oil prior to rerefining.

Managing Used Metalworking Oil Exhibiting A Hazardous Characteristic

To promote recycling, EPA has not applied stringent regulations to used oil that exhibits a hazardous characteristic (*i.e.*, ignitability, corrosivity, reactivity, or toxicity). In fact, used metalworking oil exhibiting a hazardous characteristic that is destined for recycling may be managed in much the same way as non-hazardous used oil.

Characteristically Hazardous Used Metalworking Oil Destined For Disposal

The land disposal restriction regulations, promulgated at 40 CFR §268, prohibits the land disposal of untreated waste exhibiting a hazardous characteristic. Because of the costs associated with treating used oil and complying with these regulations, many used oil generators do not dispose of their characteristically hazardous used oil on land. Additionally, the legal liabilities imposed by Superfund provide further rationale that land disposal is not an advisable option for characteristically hazardous used oil.

Characteristically Hazardous Used Metalworking Oil Recycled For Energy Recovery

Used metalworking oil that is hazardous solely because it exhibits a RCRA hazardous characteristic and recycled for energy recovery may be managed under the used oil fuel regulations at 40 CFR §266.40-44 and need not be managed as a RCRA *hazardous waste*.¹⁴ Such metalworking oils are subject to the ~~same regulations~~ as non-hazardous used oil destined for energy recovery.¹⁵ Furthermore, there currently are no specific Federal regulations governing the management (*e.g.*, storage and transportation) of characteristically hazardous used oil intended for recycling.

Characteristically Hazardous Used Metalworking Oil Destined For Rerefining

¹⁴ See 40 CFR 261.6(a)(2)(iii) and (3)(iii).

¹⁵ See 40 CFR 266.40 - 44.

If a characteristically hazardous used oil is recycled in some other way such as rerefining, then it is exempt from the RCRA *hazardous waste* regulations.¹⁶ As with used oil destined for energy recovery, there are no specific Federal regulations governing the management (*e.g.*, storage and transportation) of characteristically hazardous used oil that is intended for recycling.

Managing Used Oil Mixed With *Hazardous Waste*

Used oil that has been mixed with listed or characteristically¹⁷ *hazardous waste*, may **not** be managed as a used oil fuel, but must be managed as *hazardous waste*, and is subject to the full range of RCRA *hazardous waste* regulations. Used oil mixed with *hazardous waste*, however, may be managed under the "*hazardous waste fuel*" regulations at 40 CFR §266.30 - 35. *Hazardous waste* fuels are subject to full regulation under the RCRA *hazardous waste* program. In addition to the *hazardous waste* requirements for storage and transportation, *hazardous waste* fuels are restricted to being burned in industrial boilers and furnaces that are specifically permitted to burn *hazardous waste* fuels.¹⁸ Because of the stringency of these requirements, the costs associated with burning *hazardous waste fuel* are substantially greater than used oil fuel.

The Rebuttable Presumption Of *Hazardous Waste* Mixing

In establishing the RCRA regulations for burning non-hazardous and characteristically hazardous used oil fuel, EPA became concerned that *hazardous waste* generators might avoid RCRA *hazardous waste* regulations by mixing their *hazardous wastes* with used oil destined for energy recovery. During the course of the Federal rulemaking, EPA conducted a national survey of used oils and found that 87 percent of the used oil samples that exceeded 1,000 ppm total chlorine contained significant amounts of hazardous chlorinated solvents. As a result of this finding, EPA established a rebuttable presumption whereby:

¹⁶ See 40 CFR 261.6(a)(3)(iii).

¹⁷If a used oil has been knowingly mixed with characteristically hazardous waste, it is important to properly apply the RCRA "mixture rule" discussed in Section III.B. Mixtures of non-hazardous used oil and characteristically hazardous waste that retain the hazardous characteristic is considered a hazardous waste. Conversely, when a non-hazardous used oil is mixed with a characteristically hazardous waste so that the mixture no longer exhibits the hazardous characteristic, the mixture is no longer considered a hazardous waste and is regulated as a used oil. However, the latter case of mixing is considered hazardous waste treatment, and is subject to 40 CFR §§ 264 - 265, and 270. See 40 CFR 261.6(a)(2)(iii) and (3)iii.

¹⁸See 40 CFR §266.

During the course of the Federal rulemaking that established the used oil regulations, EPA conducted a national survey of used oils and found that 87 percent of the used oil samples that exceeded 1,000 ppm total chlorine contained significant amounts of hazardous chlorinated solvents¹⁹. As a result of this finding, EPA established a rebuttable presumption whereby:

... Used oil containing more than 1000 ppm of total halogens is presumed to be a hazardous waste because it has been mixed with halogenated hazardous waste listed in Subpart D of Part 261.

Emphasis added; see 40 CFR §266.40(c).

The preamble to the Federal Register notice finalizing the regulations for used oil destined for energy recovery, states that:

... a simple, objective test is needed to determine when used oil has been mixed with hazardous spent halogenated solvents (or other halogenated waste) in order to avoid case-by-case confusion as to when mixing has occurred, and to aid in consistent enforcement of the regulation. To this end, EPA proposed, and is adopting today a rebuttable presumption as to when mixing with hazardous wastes has occurred.

Emphasis added; see November 29, 1985 Federal Register Page 49176.

While the total halogen test appears to provide a simple approach for detecting *hazardous waste* mixing, the implementation of the rebuttable presumption has engendered a serious misconception: that metalworking oils with a total halogen content exceeding 1,000 ppm must be managed as *hazardous waste*. As discussed in Section II, chlorinated paraffins are not solvents, and are not among the halogenated *hazardous wastes* in Part 261, Subpart D and therefore their presence, at any concentration, should not make a waste *hazardous*. In fact, as part of its used oil survey, EPA specifically examined metalworking fluids containing chlorinated paraffins and acknowledged that these oils will generally contain more than 1,000 ppm halogens. EPA clearly stated in the preamble to the final rule that they did not intend to have these oils be managed as *hazardous wastes*:

Metalworking oils can contain extreme pressure additives that are nonhazardous chlorinated paraffinic compounds that can result in organic chlorine levels of several percent. These organic chlorinated compounds are not toxic (i.e., they are not listed as constituents of hazardous waste in Appendix VIII of Part 261), and, thus, the hazard from incomplete combustion of these

¹⁹ November 29, 1985 Federal Register Page 49177.

compounds is not of concern.

Emphasis added; November 29, 1985 Federal Register Page 49177.

Because of insufficient discrimination by some used oil management companies, metalworking oils containing chlorinated paraffins have been inappropriately deemed as mixed with hazardous wastes. This has occurred despite specific EPA statements that used oil containing chlorinated paraffins need not be managed as *hazardous wastes*.

Rebutting The Presumption

Simply stated, the "rebuttable presumption" means that any used oil that exceeds the 1,000 ppm total halogen level is to be considered as if it were mixed with *hazardous waste* unless it can be documented that the used oil was not mixed with a *hazardous waste*. The following two sections outline common approaches to rebutting the presumption.

Identifying Appendix VIII Hazardous Constituents

Perhaps the most prevalent method for rebutting the presumption is to test for hazardous constituents listed in 40 CFR §261 Appendix VIII to show that they are not present in "significant concentrations." This strategy is derived from the example EPA provides at 40 CFR §266.40(c), which states:

Persons may rebut this presumption by demonstrating that the used oil does not contain hazardous waste (for example, by showing that the used oil does not contain significant concentrations of halogenated hazardous constituents listed in Appendix VIII of Part 261 of this chapter).²⁰

The preamble to the used oil final rule suggests that a "significant concentration" is when an Appendix VIII hazardous constituent exceeds 100 ppm. Listed below are Appendix VIII halogenated organic solvents that are typically evaluated for purposes of rebutting the presumption. A successful rebuttal is accomplished by showing that there is less than 100 ppm of each of the halogenated solvents present in the waste. These compounds are not a common component of metalworking fluids.

²⁰ See 40 CFR §266.40(c).

SELECTED HALOGENATED ORGANIC SOLVENTS
LISTED IN 40 CFR PART 261 APPENDIX VIII

Carbon Tetrachloride
Methylene Chloride
Trichloroethylene
Tetrachloroethylene
Chlorinated Fluorocarbons, NOS
Trichloromonofluoromethane
1,1,2-trichloro, 1,2,2-trifluoroethane
1,1,1-trichloroethane
1,1,2-trichloroethane
Chlorobenzene
1,2-dichlorobenzene
1,3-dichlorobenzene
1,4-dichlorobenzene

Using Material Safety Data Sheets

Another possible approach to rebutting the presumption is to document that the halogenated substance present in the waste oil were in the unused oil. A Material Safety Data Sheet (MSDS), for example, can be used to show the presence of a halogenated compound in a waste oil is the result of its being an ingredient in the unused oil. While this is not specifically described in EPA's regulations, it is an approach which has been used to rebut the presumption. If the MSDS for the metalworking oil indicates that a halogenated Appendix VIII compound is present as an ingredient in the unused oil in sufficient quantity to explain its concentration in the used oil, then the presumption would be rebutted since the compound did not arise from mixing with hazardous wastes. The presumption could also be rebutted if it could be documented that the halogen content arises from an ingredient that is *not* an Appendix VIII hazardous compound, such as chlorinated paraffins.

Summary: Must Used Metalworking Oils Containing Chlorinated Paraffins Be Necessarily Managed As A Hazardous Waste?

Answer: NO!

Used metalworking oil that contains chlorinated paraffins, even if the used oil exceeds the 1,000 ppm total halogens concentration, may

be managed as a used oil fuel or rerefined if any one of the following can be documented:

The used metalworking oil exceeds the 1,000 ppm total halogens concentration solely because of:

- a) *the presence of chlorinated paraffins or other halogenated compounds not listed on Appendix VIII; or,*
- b) *the used metalworking oil does not contain "significant concentrations" (i.e., more than 100 ppm) of hazardous constituents listed on Appendix VIII; or,*
- c) *the halogenated hazardous constituents (as listed on Appendix VIII) are ingredients of the virgin metalworking oil.*

Additionally, the used oil may qualify for management as a recycled used oil (*i.e.*, energy recovery or some other recycling method) rather than a *hazardous waste* if the oil is hazardous only because it exhibits a *hazardous waste* characteristic (*i.e.*, ignitability, toxicity, reactivity, and corrosivity).

Used Oil Regulations In Flux

On September 23, 1991 EPA published proposed revisions to its rules for regulating used oil. The proposed rule seeks to expand the applicability of the rebuttable presumption beyond just energy recovery. In addition, the proposed rule is intended to promote recycling and establish management standards for used oils and is not expected to adversely affect the management of metalworking oils containing chlorinated paraffins. The proposed rule is expected to be promulgated in its final form in May 1992. It is notable that in developing the proposed rule, EPA determined that used metalworking oils are not typically "hazardous," as defined by RCRA.

The Importance of Waste Segregation

Since the rebuttable presumption is intended to detect the mixing of used oil with *hazardous wastes*, it is essential that used oils be segregated from all other wastestreams, especially *hazardous wastes* and wastes containing constituents on 40 CFR Appendix VIII. If *hazardous wastes* are mixed with *non-hazardous wastes* (such as used oils qualifying to rebut the mixing presumption) the combined quantity of *hazardous* and *non-hazardous* waste is considered *hazardous*. Waste segregation is a simple way to minimize the likelihood that a company is managing no more *hazardous waste* than necessary.

Waste segregation generally facilitates used oil management because:

- 1) The characterization of the used oil is simplified;
- 2) The chances of failing to rebut the *hazardous waste* mixing presumption are minimized; and,
- 3) The used oil will be disposed in a cost-effective manner.

In establishing a waste segregation program, companies should comprehensively review their use of metalworking fluids and any associated operations to minimize contamination. Possible sources of contamination include: inadvertent mixing by employees, contamination of the metalworking fluid sump with chemicals used in other parts of the operation, and mislabeled containers.

V. WASTE MINIMIZATION AND SUGGESTED PRE-DISPOSAL PRACTICES TO FACILITATE THE MANAGEMENT OF USED OILS CONTAINING CHLORINATED PARAFFINS

The emphasis of this Handbook thus far has been on the disposal of used metalworking oils containing chlorinated paraffins. We now turn to a critical aspect of waste management: minimizing the amount of used metalworking oils generated. Waste minimization is an opportunity for companies to simultaneously improve their production efficiency while reducing its environmental impact. While it is not possible to eliminate the disposal of spent metalworking oils, companies can nevertheless substantially reduce waste oil generation by either reducing its toxicity, volume, or both.

What is Waste Minimization?

Waste minimization is the elimination or reduction of waste that is generated and would otherwise be treated or disposed. In its manual entitled Waste Minimization Opportunity Assessment Manual, EPA described two general classes of waste minimization techniques: source reduction and recycling & reuse. Examples of these are listed below:

Source Reduction

- Minimize loss of product during processing
- Eliminate sources of leaks & spills
- Separate hazardous from *non hazardous wastes*
- Install or modify equipment to produce minimal or no waste
- Maintain strict equipment preventive maintenance program
- Detect loss of production materials by tracking all raw materials
- Improve material receiving, storage, and handling practices

Recycling & Reuse (Off-site & On-site)

- Return wastes to original process
- Exchange wastes as a raw material substitute for another process
- Reclaim wastes as a by-product or for resource recovery

What Are The Benefits Of Waste Minimization?

Because waste minimization can substantially reduce disposal expenses and potential liabilities, waste minimization has become an integral part of many firms' production processes. For metalworking processes, many of the waste minimization techniques involve lengthening the useful life of the metalworking oil by improving the oil's integrity. Improving an oil's integrity can result in:

- Less Down Time For Lubricant/Coolant Replacement
- Longer Machine Life
- Reduced Maintenance & Repair
- Improved Machining Tolerances
- Improved Product Quality
- Better In-Process Corrosion Protection

Regardless of a firm's size, there are compelling benefits associated with minimizing waste oil generation, including:

Decreased Waste Management Costs
Greater Production Efficiency
Savings In Raw Material & Lower Production Costs
Potential Reduction In On-Site & Off-Site Environmental Liability
Improved Image In The Community and Among Employees

General Approaches For Assessing Waste Minimization Opportunities

The following are suggested steps for assessing opportunities and selecting options for waste minimization.

Step I: Recognize Need To Minimize Waste

Step II: Planning & Organization

Get Management Commitment
Set Overall Assessment Program Goals
Organize Assessment Team

Step III: Waste Minimization Assessment

Collect & Process Facility Data
Set Priorities for Assessment Targets
Review Data & Inspect Site
Develop Options
Screen & Select Options For Detailed Analysis

Step IV: Feasibility Analysis

Technical Evaluation
Economic Evaluation
Select Options For Implementation

Step V: Implementation

- Justify Projects & Obtain Funding
- Equipment Installation
- Implementation of Procedures
- Evaluate Performance

Opportunities For Reducing The Generation Of Used Metalworking Oils

There is a wide range of approaches that can be used to reduce the generation of used metalworking oils. Several approaches are suggested below consistent with typical metalworking processes and the general waste minimization strategy outline above.

Improve Fluid Management

One management approach for reducing waste is the proper maintenance of metalworking fluid to extend its useful life. This is especially applicable for metalworking coolants that are recirculated in a closed system. The proper maintenance of metalworking fluid should focus on keeping the coolant free from contamination. This includes using water that is within the standards recommended by the metalworking oil formulator for diluting the concentrated metalworking fluid (*e.g.*, deionized water, water within a specific hardness range); minimizing the contamination of the metalworking fluid by metal particulates and other chemicals used in the workplace; and reducing or eliminating bacterial growth in the coolant system.

Another important aspect of the proper management of metalworking fluid is controlling the loss of fluid in the production process. This would include the control of leaks in the coolant circulation system; recovery of excess metalworking fluid drained from the workpiece after it has been machined; and minimizing residue on the workpiece.

Treatment Of Used Metalworking Oils

Another waste minimization approach is the treatment of used metalworking oils to reduce its volume, toxicity, or both prior to disposal. Such treatment typically involves the separation of the oil and water phases so that the aqueous phase, which usually comprises the major portion of used metalworking oils, can be discharged to a Publicly Owned Treatment Works (POTW) in compliance with a facilities discharge

restrictions. The remaining organic phase can then be shipped off-site for disposal by a used oil management firm.

The treatment processes available for used oil management are generally classified into primary, secondary, and tertiary treatment. Each treatment category represents a progressively greater level of volume or toxicity reduction. Primary treatment includes the removal of tramp oil (*i.e.*, free oil) and particulates (*e.g.*, metal fines, debris) from the used metalworking oil. The processes typically used at this stage are skimming, settling, and filtration. Secondary treatment includes: evaporation (expensive, so not good for high volumes); phase separation using acid alum or polymers; and, dissolved air floatation (too costly for small to medium facilities). An intermediate expensive process is ultrafiltration, which is especially good for volume reduction.

Tertiary treatment, which is used for the final "polishing" of the waste stream before discharge, includes biological treatment, activated carbon, and reverse osmosis. Large manufacturers lean to biological treatment because their high waste volumes make the capital expenditures cost-effective, while small facilities typically use activated carbon. Medium-sized facilities often find reverse osmosis to be the most cost-effective.

Waste Minimization Bibliography

There are several good publications which may be of value to formulators and users of metalworking fluids in designing a waste minimization program:

Waste Minimization and Wastewater Treatment of Metalworking Fluids, Independent Lubricant Manufacturers Association; Alexandria, VA, 1990.

US Environmental Protection Agency, Environmental Quality with Economic Benefits, Washington, DC, April 1990.

US Environmental Protection Agency, Waste Minimization in Metal Parts Cleaning, Washington, DC, August 1989.

US Environmental Protection Agency, Waste Minimization Opportunity Assessment Manual, Cincinnati, OH, July 1988.

General Arrangements With Used Oil Management Firms

Selecting A Used Oil Management Firm

Federal regulations have increased the need to manage used oil conscientiously. In the past, standard practice was to pick the most convenient or cheapest used oil hauler to cart away the waste. Now, however, even the smallest companies realize they can no longer follow this simplistic course. With the enactment of RCRA and the Comprehensive Environmental Recovery, Compensation, & Liability Act (CERCLA, also known as Superfund; the Federal *hazardous waste* cleanup statute), regulations have become complex, and the potential penalties so severe, that used oil generators should devote the necessary time to select a reputable waste management firm. The time invested in selecting a reliable used oil management company will reduce the potential for costly liabilities in the future.

In selecting a waste management firm, consider asking the following questions:

- 1) Does the company conduct its used oil operations (*i.e.*, storage, disposal, treatment, processing) in an environmentally safe manner in compliance with applicable regulations?
- 2) Does the company understand the RCRA rebuttable presumption of *hazardous waste* mixing?
- 3) What hazardous constituents does the company analyze for in the used oil?
- 4) What is the company's compliance record?
- 5) What is the extent of the company's insurance, especially for environmental liabilities?
- 6) What regulatory compliance support does the company provide to its customers?

These questions will assist in assessing a company's competence in handling used oil. The company's facility should also be visited to ensure that it is operated in an environmentally safe manner, in compliance with applicable regulations.

Knowing Your Used Oil

The selection of a suitable waste management firm will be enhanced by having a general familiarity with the chemical and physical properties of the used metalworking oil. There are two basic approaches to obtaining such an analysis. The first entails hiring a laboratory familiar with waste analysis. Lists of these labs may be obtained from a telephone book or from a State or Federal environmental agency. Laboratories familiar with waste analysis can provide guidance on the kinds of chemical and physical analyses that are most appropriate.

The second approach is to submit a representative sample of the waste oil to a waste management firm. The costs for this initial analysis is typically part of a one-time "application fee" that waste management firms charge for considering a waste for management. Based on the results of the analysis, a waste management firm will decide whether it can accept the used oil for disposal. The analysis performed will determine whether the waste oil can be managed as a *specification* or *off-specification* waste oil fuel and, if necessary (*i.e.*, the halogen content is more than 1,000 ppm), whether the *hazardous waste* mixing presumption can be rebutted.