

**TENNESSEE DEPARTMENT OF TRANSPORTATION
HAZARDOUS WASTE CHARACTERIZATION CORE PLAN**

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ACRONYMS AND DEFINITIONS

<i>CFR</i>	Code of Federal Regulations
CVAAS	Cold Vapor Atomic Absorption Spectrometry
EPA	U.S. Environmental Protection Agency
GC	Gas Chromatography
GFAA	Graphite Furnace Atomic Absorption
GC/MS	Gas Chromatography/Mass Spectrometry
ICP	Inductively Coupled Plasma
ICPMS	ICP Mass Spectroscopy
LDR	Land Disposal Restriction
MSDS	Material Safety Data Sheet
PK	Process Knowledge
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
SW-846	Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Third Edition, EPA Publication SW-846
TCLP	Toxicity Characteristic Leaching Procedure
TDEC	Tennessee Department of Environment and Conservation
TDOT	Tennessee Department of Transportation
TN Rule	Tennessee Hazardous Waste Rules and Regulations
TOX	Total Organic Halides
UHC	Underlying Hazardous Constituent
UTS	Universal Treatment Standards

DEFINITIONS

When used in this guidance document, the following terms have the meanings given below. Undefined terms have the same definitions as in the applicable governing regulations.

Generator	Any person, by location (i.e., garage facility), whose act or process produces hazardous or whose act first causes a hazardous waste to be subject to regulation identified or listed in 40 Code of Federal Regulations (<i>CFR</i>) 261 or Tennessee Hazardous Waste Rules and Regulations (TN Rule) 1200-1-11-.02.
Discharge	The accidental or intentional spilling, leaking, pumping, pouring, emitting, emptying, or dumping of hazardous waste into or onto any land or water.
Disposal	The discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or onto any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including groundwaters.
U.S. Environmental Protection Agency (EPA) Hazardous Waste Code	The identifying number (alpha-numeric, e.g., F003) used to identify a hazardous waste according to its characteristic content or source of generation 40 <i>CFR</i> 261, Subpart C and D or per TN Rule 1200-1-11-.02(3) and (4).
Hazardous Waste	<p>Generally, solid waste or combination of solid waste (see 40 <i>CFR</i> 261 or TN Rule 1200-1-11-.02) that, because of quantity; concentration; or physical, chemical, or infectious characteristics, may cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness or may pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.</p> <p>Specifically, hazardous wastes are defined by EPA in 40 <i>CFR</i> 261.3 and TN Rule 1200-1-11-.02(1)(a)1. (Note that the regulatory definition of a solid waste may have the physical form of liquid, solid, semisolid, or contained gas.)</p> <p>A solid waste is a hazardous waste if it is not excluded from regulation and meets one of the following requirements:</p> <ul style="list-style-type: none">• It exhibits a hazardous waste characteristic;• It is a listed hazardous waste;• It is a mixture of a solid waste and one or more listed hazardous wastes; or• It is a solid waste derived from the treatment of a listed hazardous waste.

Hazardous Waste (continued)	<i>Note:</i> Environmental media such as soil and groundwater are not solid wastes and, therefore, not subject to regulation. However, environmental media that is contaminated with a listed hazardous waste or exhibits a hazardous waste characteristic is considered to contain a hazardous waste. Such media must be managed as a hazardous waste until it is treated such that the hazardous waste is removed. This concept has been included in guidance provided by EPA and is known as the Contained in Rule or policy.
Incompatible Wastes	Hazardous or mixed wastes that are unsuitable for the following: <ol style="list-style-type: none"> 1. Placement in a particular device, unit, or facility because it may cause corrosion or decay of containment materials (e.g., container inner liners or tank walls). 2. Commingling with another waste or material under uncontrolled conditions because the commingling might produce heat or pressure; fire or explosion; violent reaction; toxic dusts, mists, fumes, or gases; or flammable fumes or gases. Commingling may constitute Resource Conservation and Recovery Act (RCRA) treatment. (Contact the Environmental Compliance Division for RCRA treatment evaluation).
Nonwastewaters	Wastes that do not meet the criteria for wastewater as defined in this document.
Representative sample	A sample of a population (e.g., waste pile, lagoon, groundwater) that can be expected to exhibit the average properties of that population.
Solid Waste	Solid wastes are defined at 40 <i>CFR</i> 262.2 and TNRule 1200-1-11-.02(3) as any material that is not excluded from regulation ¹ discarded by being abandoned, recycled, or inherently waste-like ² . Discarded materials include materials that are disposed of, burned or incinerated, used in a manner constituting disposal (i.e., applied or placed on the land), burned for energy recovery, reclaimed or accumulated speculatively. Solid waste includes solids, semi-solid, compressed gases, and liquids when discarded.
Underlying Hazardous Constituent (UHC)	UHC refers to any of the 216 constituents listed in 40 <i>CFR</i> 268.48, Table of Universal Treatment Standards (UTSs), except fluoride, vanadium, and zinc, which can reasonably be expected to be present at the point of generation of the hazardous waste at a concentration above the constituent-specific UTS.
Universal Wastes	Hazardous waste batteries, certain light bulbs and tubes, recalled or unused pesticides, and mercury-containing thermostats regulated under 40 <i>CFR</i> 273 and TNRule 1200-1-11-.12.
Wastewater	Wastes that contain less than 1% by weight total organic carbon and less than 1% by weight total suspended solids.

EXECUTIVE SUMMARY

This document provides the general guidance on how to properly characterize solid wastes generated within Tennessee Department of Transportation (TDOT) operations, including the characterization necessary for determining proper on-site accumulation and treatment, storage, and disposal at off-site commercial facilities. The Environmental Compliance Division within TDOT will support operational and facility generators in proper hazardous waste characterization.

Use of this general guidance will facilitate acceptance of Requests for Disposal and the development of specific Waste Management Characterization procedures that will be designed to ensure receiving facilities' Waste Acceptance Criteria are met.

Applicable Resource Conservation and Recovery Act regulations governing this guidance are found in 40 *Code of Federal Regulations (CFR)*, Parts 260 through 279 and Tennessee Hazardous Waste Rules and Regulations (TN Rule)1200-1-1-.01 to -.12.

1.0 SCOPE AND LIMITATIONS

The requirements of this plan are applicable to all TDOT facilities that generate hazardous wastes, universal wastes, and used oil. The following recyclable materials are not regulated as hazardous and are, therefore, only partially covered by this document: lead-acid batteries returned to the manufacturer, silver sludges, and other silver-bearing residues. However, the basic characterization principles described here can be used to characterize recyclable materials.

This plan does not address storage, treatment, or disposal of hazardous wastes. The requirements for the management (handling and storage) and disposal of hazardous wastes, universal wastes, and used oil are covered in the Core Plan for the Management of Hazardous Wastes and the Disposal Core Plan.

NOTE: This guidance document is not meant to be a recapitulation of any RCRA Permits, or federal and state regulations, nor is it intended to be a comprehensive compliance reference on the subject.

2.0 RESPONSIBILITIES

2.1 TDOT ENVIRONMENTAL COORDINATOR

The TDOT Environmental Coordinator has the overall responsibility for implementing the RCRA program. With respect to this plan, the TDOT Environmental Coordinator is responsible for the following:

- Issuance and control of this plan.
- Ensuring that the requirements of the plan conform to the relevant requirements of 40 *CFR* 261/TNRule 1200-1-11-.01, 40 *CFR* 262/TNRule 1200-1-11-.02, 40 *CFR* 273/TNRule 1200-1-11-.12, and 40 *CFR* 279/TNRule 1200-1-11-.11.
- Developing and issuing specific procedures for the characterization of hazardous waste, universal waste, and used oil that meet the requirements of this plan;
- Ensuring that TDOT Facility Managers establish a characterization program and implement procedures to meet the requirements of this plan.
- Periodic assessments of TDOT Facilities to ensure their compliance with this plan.
- Ensuring that TDOT Facility Managers are notified when regulation changes occur that result in a newly regulated waste under RCRA.
- Preparing budget requests and providing funding for the programs and activities required by TDOT facilities to implement the requirements of this plan.

2.2 FACILITY MANAGERS

Facility Managers at each TDOT facility are responsible for the implementation and operation of the facility RCRA program as required by this plan and other core plans, applicable procedures issued by TDOT Headquarters, and facility-specific procedures. With respect to the requirements of this plan, Facility Managers are responsible for the following:

- Ensuring proper characterization of wastes subject to this plan.
- Requesting assistance from the TDOT Environmental Coordinator when new wastes are generated or when questions regarding characterization arise.
- Maintaining all records necessary to support a hazardous waste characterization or recyclable material determination.
- Ensuring personnel training to ensure that waste materials are properly characterized.

3.0 GENERATOR DETERMINATIONS

This section presents the basic regulatory requirements applicable to hazardous waste generators as found at 40 *CFR* 262.11 and TNRule 1200-1-11-.03. This rule requires that generators who generate a solid waste must determine through process knowledge (PK) or analytical testing whether the waste is also a hazardous waste. If the waste is determined to be hazardous, the generator must refer to the appropriate regulations¹ and the TDOT Core Accumulation and Disposal Plans for possible exclusions or restrictions pertaining to management of the specific waste.

Specific requirements addressed include solid waste determination, hazardous waste determination; determination of applicable exemptions; determination of applicable Land Disposal Restriction (LDR) requirements; and characterization for acceptance by a treatment, storage, or disposal facility.

3.1 SOLID WASTE DETERMINATION

A solid waste, as defined in 40 *CFR* 261.2 and TNRule 1200-1-11.02(3), is any material that is discarded, disposed of, recycled, or burned or incinerated. These terms are further defined within the regulations. In general, when it is determined that a material is no longer useful or has served its intended purpose, the material shall be considered a solid waste. Materials that are determined to be solid wastes shall be evaluated by TDOT personnel to determine whether they are also hazardous wastes prior to actual disposition or recycling.

As stated in the definition section of this plan, a solid waste is any material that is discarded by being abandoned, recycled, or inherently waste-like. In order to determine if a material is a solid waste, TDOT Operations Managers must address the following items:

- Is the material excluded from regulation as a solid waste as discussed in Section 3.2 of this plan?
- Is the material to be discarded by being abandoned, recycled, inherently waste-like, or a military munition?

A material is discarded and a solid waste if it is being abandoned in one of the following manners:

- Disposed of (e.g., landfilled);
- Burned or incinerated; or
- Accumulated, stored, or treated prior to or in lieu of being disposed of, burned, or incinerated.

A material is a solid waste if it is recycled (or accumulated, stored, or treated prior to recycling) in one of the following manners:

- Used in manner constituting disposal (applied to or placed on the land);
- Used to produce or contained in products that are applied to or placed on the land;
- Burned for energy recover;
- Reclaimed; or
- Accumulated speculatively.

A material is a solid waste if it is inherently waste-like. Inherently waste-like materials are identified in 40 *CFR* 261.2(d) and TNRule 1200-1-11-02 (1)(b)4 that meet the listing criteria of hazardous waste numbers F020, F021, F022, F023, F026, and F028². Military munitions as defined at 40 *CFR* 266.202 and TNRule 1200-1-11-.09 are also solid wastes.

The regulations also state that material recycled in certain manners are not solid wastes. These include materials that are:

- Used or reused as ingredients in an industrial process to make a product provided the material is not being reclaimed;
- Used or reused as effective substitutes for commercial products; or
- Returned to the original process from which they are generated without first being reclaimed or placed on the land (e.g., used as feedstock).

The simplified determination process is provided in Appendix A of this plan.

3.2 SOLID AND HAZARDOUS WASTE EXEMPTIONS

The determination of a waste as a hazardous waste is based upon PK and/or testing of the waste. This information will be to determine whether the waste is excluded from regulation, exhibits a hazardous waste characteristic, or is a listed hazardous waste.

To determine whether a waste is excluded from regulation as a hazardous waste, PK based on answers to the following questions will be applied:

- What is the waste?
- From what process was the waste generated?
- How is the waste to be disposition?

This information will be used to determine the status of any discarded material with regard to the exemptions provided in 40 *CFR* 261.4 and TNRule 1200-1-11-.03(1)(d). These rules exempt certain materials from regulation as solid and/or hazardous waste. Examples of materials that are not solid wastes include domestic sewage, industrial wastewater discharges that are point source discharges subject to regulation under section 402 of the Clean Water Act, excluded scrap metal, and shredded circuit boards. In addition, the exclusions identify solid wastes that are not hazardous wastes such as household waste, used chlorofluorocarbon refrigerants from totally enclosed heat transfer equipment provided the refrigerant is reclaimed for further use, and non-terne plated used oil filters that are hot drained and not mixed with hazardous wastes. Exemptions for certain recycling activities are provided in 40 *CFR* 261.2(e) and TNRule 1200-1-11-.02 (1)(b)(5). These include use or reuse of a material as an ingredient in an industrial process to make a product, use or reuse as an effective substitute for a commercial chemical product, or returned to the original process from which the material was generated without first being reclaimed or land disposed.

In order to determine whether a waste is exempt for all or part of the regulatory requirements, each waste stream must be compared to the criteria found in 40 *CFR* 261.4 and TNRule 1200-1-11-.03(1)(d). If a waste is determined to meet one or more of the exemptions, appropriate documentation must be

developed that includes the rationale for the waste meeting the specific exclusion. The documentation shall be maintained by the Facility Manager for at least three years after the last date of generation and provided to the Environmental Coordinator.

3.3 HAZARDOUS WASTE DETERMINATION

All solid wastes shall be evaluated according to criteria set forth in 40 *CFR* 261.3 and TNRule 1200-1-11-.02(1)(c), which defines what constitutes a hazardous waste under the RCRA program. This evaluation shall be conducted using PK or analytical testing as specified in 40 *CFR* 262.11 and TNRule 1200-1-11-.03.

Solid wastes shall be evaluated against the listed waste criteria as stated in 40 *CFR* 261 and TNRule 1200-1-11-.02. PK shall be used, as appropriate, to determine whether a solid meets the listing criteria for wastes from nonspecific sources (F-listed), specific sources (K-listed), or discarded commercial chemical products, off-specification species, container residue, and spill response thereof (U- and P-listed). When PK is used to determine whether a waste is a hazardous waste, documentation of the determination will be maintained by the Facility Manager, and in cases in which a hazardous waste is generated at multiple TDOT facilities, the documentation will be maintained by the TDOT Environmental Coordinator.

3.3.1 Process Knowledge

Hazardous waste characterization may be based on the generator's PK of the waste stream (e.g., known constituents, known chemical or physical properties, known waste generation processes, known reactions), analyses of the waste stream, or a combination of both. For wastes that are received in the containers in which they were originally purchased/received, the basis for characterization will be generator information, container label, and material safety data sheet (MSDS).

Acceptable PK can be broadly defined to include knowledge that may be based on the historical knowledge of constituents that were specifically added or known not to be present in the waste matrix. PK can be used for a controlled process in which the generator knows the amount of each contaminant that went into the process and how much exited the process in the waste and in the product. PK may include detailed information on the waste obtained from existing published or documented waste analysis data or studies conducted on hazardous waste generated by processes similar to those that generated the waste. Partial PK of the process that produced the waste can also be used to limit the analytes that may be present in the waste, for testing purposes. When characterizing waste using PK all relevant information such as the description of the generating process and MSDS must be documented and maintained by the TDOT operation or Facility Manager.

The EPA provides the following list of situations in which it is appropriate to rely on PK:

- When determining whether wastes are listed wastes;
- When health and safety risks to personnel would result from sampling and analysis (e.g., potentially explosive D003 waste); and
- When the physical nature of the waste does not lend itself to taking a laboratory sample (e.g., debris). The agency notes that it may be necessary to use a combination of PK and laboratory analysis when determining the regulatory status of debris.

Using inclusive PK is a prudent way to minimize analytical cost. PK used to exclude a waste stream from RCRA regulation must be correct and may require a signed LDR notification and/or certification statement. See Appendix A of this document for flowcharts to assist in identifying when PK is sufficient for waste characterization.

3.3.2 Analytical Testing

In cases in which a waste has been determined to not meet any of the listed hazardous waste criteria, or where a listed waste may also exhibit a hazardous waste characteristic³, analytical testing of the waste shall be conducted. The purpose of the analysis is to determine whether the waste exhibits a hazardous waste characteristic. The testing shall be conducted to determine whether a waste exhibits the characteristic for ignitability (D001), corrosivity (D002), reactivity (D003), or a toxicity characteristic (D004-D0043).

An ignitable hazardous waste (D001) is a solid waste that is a liquid other than an aqueous solution containing less than 24 percent alcohol by volume and has a flash point of 140 degrees F. In addition, an ignitable hazardous waste is any non-liquid that is capable of spontaneous combustion at ambient conditions, an oxidizer, or ignitable compressed gas.

Corrosive hazardous waste (D002) is defined as a solid waste that is an aqueous solution and exhibits a pH of ≤ 2.0 or ≥ 12.5 . In addition, liquid also exhibits the characteristic of corrosivity if the solution corrodes steel (SAE 1020) at a rate greater than 0.250 inches per year using the NACE Standard TM-01-69.

Reactive hazardous wastes (D003) are solid wastes that are normally unstable, water reactive, capable of detonation when exposed to a strong initiating source, are forbidden explosives, or are cyanide or sulfide bearing wastes that when exposed to a pH between 2 and 12.5 can generate toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.

Toxicity characteristic hazardous wastes (D004 through D0043) are solid waste that, when using the Toxicity Characteristic Leaching Procedure (TCLP), the extract of the waste contains any of the contaminants listed in Table 1 of 40 *CFR* 261.24 and TNRule 1200-1-11-.02(3)(e). PK may be used to limit the analytical parameters of concern during characterization. For example, a hazardous waste listed for a characteristic would not require analysis for that characteristic. If PK is used in this manner, the TDOT Facility Manager shall document the rationale used to limit the sampling of any waste stream. After initial characterization is complete, additional sampling will not be conducted unless a change in the process generating the waste or materials used in the process occurs.

Testing of wastes shall be conducted in accordance with EPA testing procedures found in SW-846. Analysis for the toxicity characteristic of waste streams shall use the Toxicity Characteristic Leaching Procedure, as required in 40 *CFR* 261 and TNRule 1200-1-11-.02.

3.3.3 Residues of Hazardous Waste in Empty Containers

Containers that have been used to store or accumulate hazardous waste must meet the requirements of 40 *CFR* 261.7 and TNRule 1200-1-11-.02 or be disposed as the hazardous waste that they contained. A container is considered empty if all waste has been removed using commonly employed practices such as pumping, pouring, or aspirating, and no more than 2.5 centimeters (1 inch) of residue remains in the container or liner. If the container has a capacity of 110 gallons or less it may also be considered empty if no more than 3 percent by weight of the total capacity of the container remains in the container or inner liner. In the case of containers that have a capacity of greater than 110 gallons, the container may be

considered empty if no more than 0.3 percent by weight of the total capacity of the container remains in the container or inner liner.

Containers that have held a hazardous waste that is a compressed gas is empty when the pressure in the container approaches atmospheric.

Special requirements are associated with containers that have held acute hazardous wastes. In order for a container that has held such a material to be considered empty and not subject to regulation as a hazardous waste, the container must be triple rinsed using a solvent or solution capable of removing the commercial chemical product or manufacturing chemical intermediate.

3.4 CHARACTERIZATION OF USED OIL AND UNIVERSAL WASTES

For purposes of this plan, special wastes shall be recyclable used oil and universal wastes as defined at 40 *CFR* 279 (TNRule 1200-1-11-.11) and 273 (TNRule 1200-1-11-.12), respectively.

3.4.1 Used Oil

Characterization of used oil for recycling shall be conducted at TDOT facilities. This characterization does not apply to used oil mixed with characteristic or listed hazardous wastes as such mixtures must be managed as hazardous waste⁴. In order for used oil to be managed under the requirements in 40 *CFR* Part 279 and TNRule 1200-1-11-.11, the oil must be tested to ensure that it contains less than 1,000 ppm total halogens. The requirement also known as the rebuttable presumption for used oil states that used oil containing more than 1,000 ppm total halogens is presumed to be a hazardous waste. Demonstrating that the used oil does not contain hazardous waste by testing may rebut this presumption. In the case where used oil is found to contain greater than 1,000 ppm, total halogens additional analysis may be conducted to demonstrate that the used oil is not mixed with a hazardous waste.

If used oil generated at TDOT facilities is to be burned for energy recovery testing of the oil to determine whether it meets the specifications at 40 *CFR* 279.11 and TNRule 1200-1-11-.11(2)(b), it may be conducted. Used oil burned for energy recovery that is determined to be on-specification is not subject to the requirements found at 40 *CFR* Part 279 and TNRule 1200-1-11-.11⁵

Used oil generated at TDOT facilities shall be determined to be on- or off-specification. This determination shall be made by either testing the used oil or using PK, where applicable. Used oil that is not to be recycled shall be tested to determine whether it exhibits a hazardous waste characteristic as described in Section 3.3 of this plan.

3.4.2 Universal Wastes

Universal wastes include spent lead-acid batteries, fluorescent lamps, incandescent lamps, halogen lamps, mercury thermostats, and specific pesticides. The primary means of the characterization of universal wastes shall be process knowledge. Materials that constitute a universal waste when discarded are specified in 40 *CFR* Part 273 and TNRule 1200-1-11-.12. Due to the specific nature of these wastes, testing is not normally required unless the waste is mixed with or contaminated by a listed or characteristic hazardous waste. In the case of discarded pesticides, the TDOT Environmental Coordinator shall provide guidance to Facility Managers for possible classification as universal wastes. The standards found in 40 *CFR* Part 273 and TNRule 1200-1-11-.12 provide an alternative means to manage such

wastes. Universal wastes may also be managed as solid waste subject to the characterization requirements specified in Section 3.3 of this Plan.

3.5 LAND DISPOSAL RESTRICTIONS

All hazardous wastes generated at TDOT facilities shall be evaluated to determine whether they are restricted from land disposal by the LDR requirements. Facility managers may either test hazardous wastes to determine whether the treatment standards apply or consider all hazardous waste generated at their facility to be restricted and to exceed applicable standards. The LDRs require that hazardous waste be treated by a specific treatment method or be treated to specific contaminant concentrations prior to land disposal. If testing of the waste is conducted, documentation, including any sampling plans and analytical results, shall be maintained and copies provided to the TDOT Environmental Coordinator and maintained for at least three years. Specific analytes of concern for LDR determinations shall be those identified in 40 *CFR* 268 and TNRule 1200-1-11-.10 for each individual waste stream tested. The analytical procedures used shall be those approved EPA test methods found in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, EPA Publication SW-846, third edition, as amended. These analytical results are also required to comply with the generator certification/notification requirements included in the Hazardous Waste Core Disposal Plan.

The following items shall be addressed at the point of generation for each hazardous waste stream in order to complete waste characterization. Appendix A contains flowcharts for the identification of hazardous wastes and determination of LDRs.

- Is the waste stream a hazardous waste? Characteristic hazardous wastes and listed hazardous wastes are defined in 40 *CFR* 261, Subparts C and D (TNRule 1200-1-11-.02), respectively.
- Is the waste stream a mixture of a solid waste and hazardous waste?
- Is the waste stream derived from the treatment, storage, or disposal of a hazardous waste?
- What are the hazardous waste codes that apply? Is PK sufficient for RCRA characterization?
- Is the waste a wastewater or nonwastewater? (See definitions for these terms.)
- What LDR subcategory applies for each applicable waste code?
- For which constituents of concern (if any) must each waste code be analyzed? Generator PK may be used for this evaluation.
- For D001-D003 and D012-D043, this could include (depending on how the waste is to be disposed of) any underlying hazardous constituents (UHCs) per 40 *CFR* 268.48 and TNRule 1200-1-11-.10.
- For F001-F005 and F039, this would include any regulated hazardous constituents listed under the applicable waste code.

3.6 CHARACTERIZATION FOR WASTE ACCEPTANCE AT TREATMENT, STORAGE, OR DISPOSAL FACILITIES

Hazardous and universal wastes, and used oil generated at TDOT facilities shall be characterized in accordance with the Waste Acceptance Criteria of the receiving treatment, storage, disposal, or recycling facility. Hazardous or universal wastes or used oil shall not be offered for shipment until the waste has been approved for receipt by the receiving facility. All required waste analysis shall conform to the approved EPA test methods or the methods required by the receiving facility. Documentation of any waste analysis and acceptance of the waste by an off-site treatment, storage, or disposal facility or recycling facility shall be maintained by the Facility Manager and provided to the Environmental Coordinator. All such documentation shall be maintained for at least three years.

3.7 ORPHAN WASTE

TDOT sometimes obtains custody of wastes discarded along roadsides and TDOT right-of-ways (orphan waste). When this type of waste is identified, the required PK does not exist to characterize the waste as a hazardous waste, as described in Section 3.3. When this occurs, the Facility Manager and TDOT Environmental Coordinator shall test the waste to determine whether the waste exhibits a hazardous waste characteristic or unlisted. Analytical procedures used shall be those approved EPA test methods found in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, as amended. With regard to LDR and treatment, storage, and disposal facility acceptance, the management of the waste shall conform to the requirements of this plan.

4.0 RCRA WASTE ANALYSIS

As discussed in Section 3.3 of this plan, generator identification of RCRA waste constituents is based on applied knowledge of the hazardous characteristics of the waste and/or knowledge of the materials or processes used, analytical testing, or a combination of both. If the waste is unknown or is insufficiently characterized, chemical and physical analyses of representative samples must be performed before the waste is offered for shipment.

Where analysis of waste is required a Waste Analysis Plan will be developed to describe sampling, analysis, and quality assurance/quality control (QA/QC) requirements for hazardous waste characterization. Waste samples will be collected and managed according to the appropriate sample preparation protocol described in the EPA's *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, as amended. Trained samplers at the facilities can be used to collect samples. Alternatively, TDOT Facility Managers, with approval from the TDOT Environmental Coordinator may request sampling services from outside sources (i.e., independent contractor, disposal firm).

Appropriate analytical procedures to determine whether a sample contains a given toxic constituent are specified in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, Chapter Two, "Choosing the Correct Procedure." Prior to final sampling and analytical method selection, the generator should consult the specific section or method described in SW-846 for additional guidance on which of the approved methods should be employed for a specific sample analysis situation. Generators may also request assistance from the Environmental Management Division, as necessary. Table 1 lists analytes or groups of constituents with the sample preparation method and the recommended analytical method.

Table 1. Typical Methods

Analyte or Group	Sample Preparation Method ^a	Analytical Method
<i>Organic constituents</i>		
Volatile organics	5030	Gas Chromatography/Mass Spectrometry (GC/MS) 8240 or 8260
Toxicity Characteristic Leaching Procedure (TCLP) volatile organics	1311	GS/MS 8240
Semivolatile organics	3250, 3540, 3550, or 3510	GS/MS 8270
TCLP semivolatile organics	1311	GS/MS 8270
Dioxin and furans	3510, 3520, 3540, or 3550	GS/MS 8240
Polychlorinated biphenyls (PCBs)	3250, 3550, 3540, or 3510	Gas Chromatography (GC) 8080 or 8081
Penolics, total		420.1 or 9060
<i>Metals^b</i>		
Mercury		245.1, 245.2, 245.5, 245.6, or Cold Vapor Atomic Absorption Spectrometry (CVAAS) 7470 or 7471
TCLP mercury	1311	CVAAS 7471
TCLP metals	1311	Inductively Coupled Plasma (ICP) 6010 or ICP Mass Spectroscopy (ICPMS) 6020
Heavy metals (Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, P, Pb, Sb, Se, Si, Ti, Tl, Th, U, V, and/or Zn)	200.3, 200.7, 200.8, 3005, 3010, 3020, or 3050	200 series, or ICP Atomic Emission Spectrometry 6010, or ICPMS 6020, or Graphite Furnace Atomic Absorption (GFAA) Spectrometry 7000 series.
<i>Other constituents or properties</i>		
Cyanides	9010, 9012, or 335.2	9010, 9012, or 335.2
Sulfides	9030, 376.1, or 376.2	930, 376.1, 376.2
Reactivity	9010 and/or 9030	9010 and/or 9030
Total chloride		300.0 or 325.3
Total fluoride		300.0 or 340.2
Total organic halides (TOX)		9020
Flash point	1010	1010
pH	9040, 9045, or 150.1	9040, 9045, or 150.1
Corrosivity	1110	1110

^a In most cases, the analytical laboratory will choose the appropriate preparation method. The preparation method does not need to be specified on the analytical request except in the case of TCLP Method 1311.

^b Metals included in ICP or ICPMS scans may vary by laboratory. Check with the analytical laboratory to ensure all applicable metals will be included. Also note, it is sometimes less costly to request a full scan rather than five or six specific metals; check with the analytical laboratory for costs.

5.0 PERSONNEL TRAINING

Each TDOT facility shall ensure that personnel who generate and handle hazardous wastes or universal wastes for the purpose of characterization shall have completed a training program that ensures compliance with the requirements of RCRA⁶, as documented in this TDOT Core Plan for Waste Characterization. Personnel who handle used oil or universal wastes or who sample hazardous wastes shall complete awareness training concerning the proper handling and sampling procedures, spill prevention, and emergency response. Training requirements are discussed in the TDOT Hazardous Waste Accumulation Core Plan.

5.1 CHARACTERIZATION TRAINING

Hazardous waste characterization training shall address the following elements: hazards associated with the wastes, waste identification and characterization criteria, standard operating procedures for waste sampling and handling, record keeping for waste sampling and analysis, spill and emergency response procedures and use of spill and response equipment.

Hazardous waste characterization training shall be provided to personnel who generate or handle hazardous waste for the purpose of sampling and characterization within six months of the assignment of those duties. Training shall be documented, and training records shall include the person's name, job position, description of the duties associated with the position, required training elements, and dates of completion of the required training.

5.2 TRAINING FREQUENCY

Personnel who assist in or perform the characterization of hazardous waste, whether through sampling or field analysis, shall complete awareness training annually. Awareness training shall be documented as described in Section 5.1. The Facility Manager shall maintain records of training for at least three years as described in the TDOT Hazardous Waste Accumulation Plan.

6.0 RECORD KEEPING AND REPORTING

Each TDOT Facility Manager shall complete the necessary documentation and retain the relevant records required under RCRA concerning the characterization of hazardous wastes, universal wastes, and used oil. The minimum documentation and record-keeping requirements for TDOT facilities are as follows:

- Training records for all personnel who handle hazardous wastes or universal wastes as stated in Section 5.0.
- Appropriate documentation to demonstrate that a material is excluded from the definition of hazardous or solid waste or is conditionally exempted from Subtitle C regulations.
- Appropriate documentation to demonstrate that the generator has determined that the waste is hazardous based solely on his knowledge of the waste or on testing of the waste
- All documentation the generator relied upon to characterize waste based on process knowledge including MSDSs, vendor information, or historical data.
- All analytical results, analytical request forms, sample chain of custody, generator RFD information, and waste characterization documentation.
- All documentation used to determine whether an environmental media contains a hazardous waste and must be managed as such.
- All appropriate documentation to support generator claims that characteristic wastes are no longer hazardous.
- All appropriate documentation used to characterize mixtures of hazardous and/or solid wastes.
- All documentation of characterization of residues, derived from the treatment, storage, or disposal of hazardous wastes.

A copy of all notices, certifications, demonstrations, waste analysis data, and other documentation stated above must be retained at the facility for at least three years from the date the waste was last sent to off-site treatment, storage, or disposal.

ENDNOTES

¹ 40 *CFR* 261.4 and TNRule 1200-1-11-.02(1)(d)—These regulations provide exclusions from the definitions of solid and hazardous waste.

² 40 *CFR* 261.2 and TNRule 1200-1-11-.02(1)(b)—Identifies and lists inherently waste-like materials.

³ 40 *CFR* 261 Subpart D and TNRule 1200-1-11-.02(4)—Explains how a listed waste may also exhibit a hazardous waste characteristic.

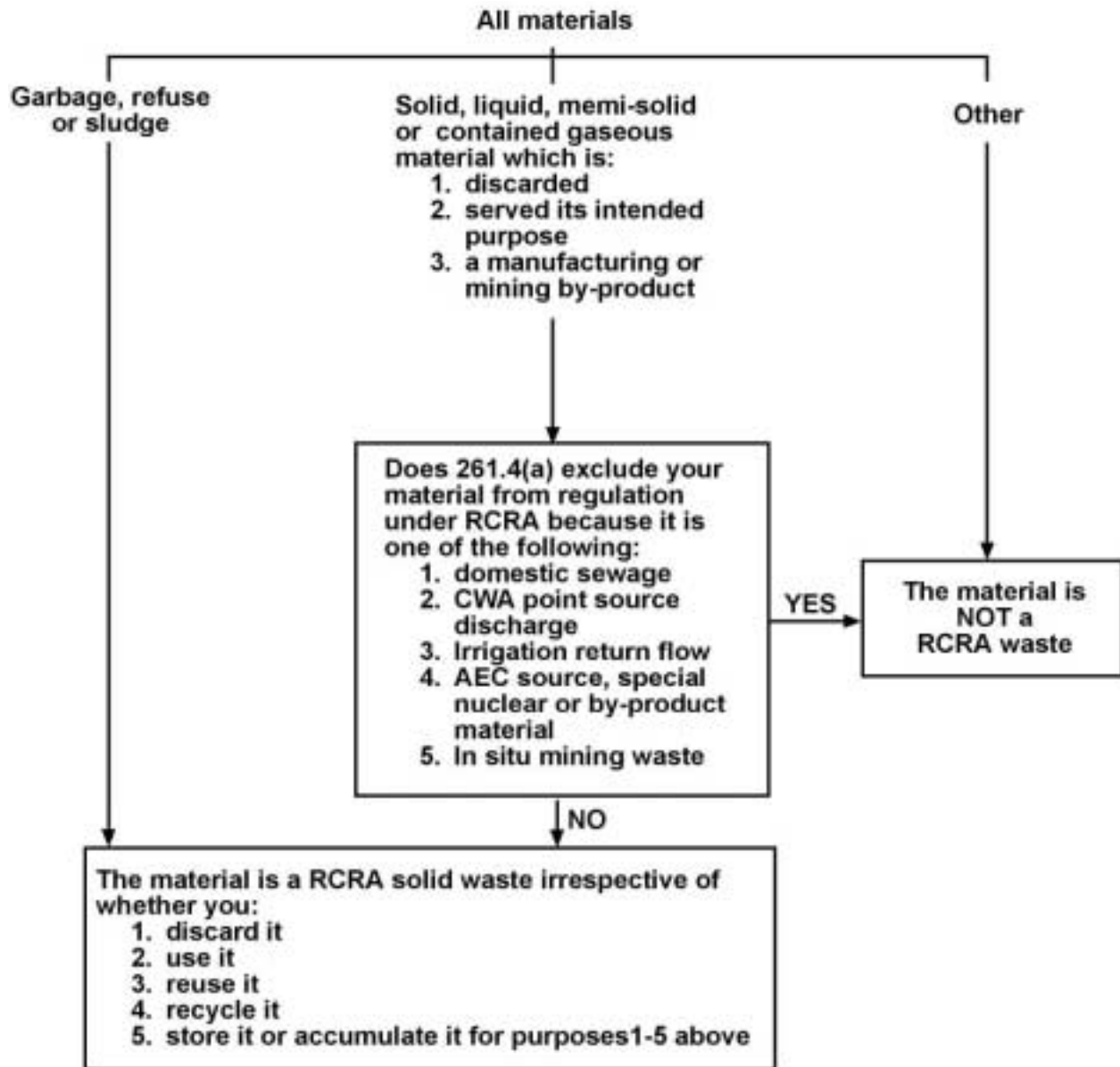
⁴ 40 *CFR* 279.10 and TNRule 1200-1-11-.11(2)—Characteristic provides characterization of used oil mixed with hazardous waste and products. Also provides determination for application of the rebuttable presumption.

⁵ 40 *CFR* 279.11 and TN Rule 1200-1-11-.11(2)(b)—Provides specifications and concentration limits for used oil burned for energy recovery.

⁶ 40 *CFR* 262.34 and TNRule 1200-1-11.03(4)(e)—Provides training program requirements.

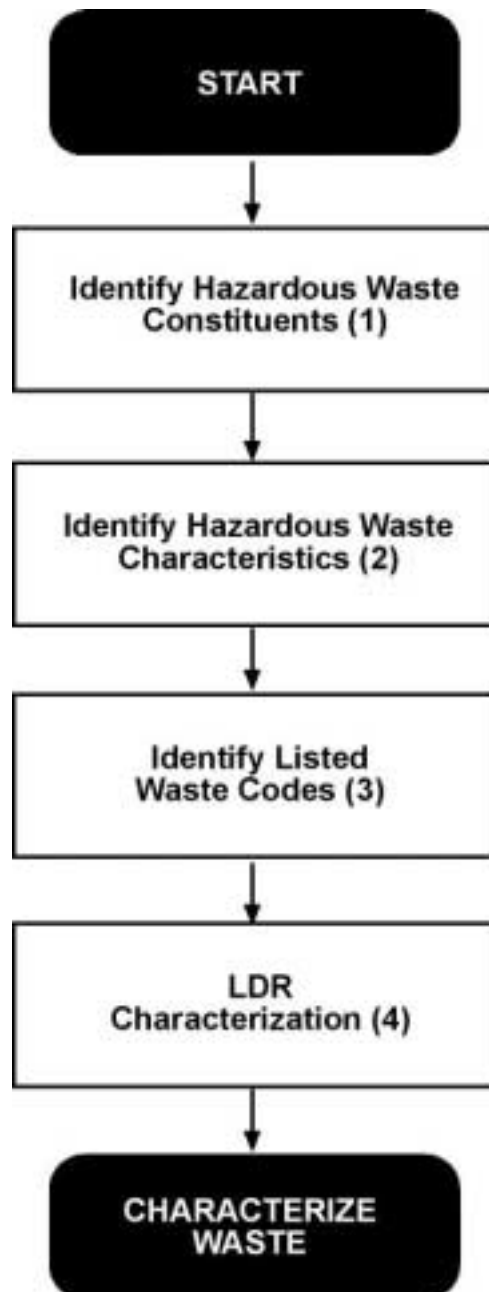
APPENDIX A. DEFINITION OF A SOLID WASTE

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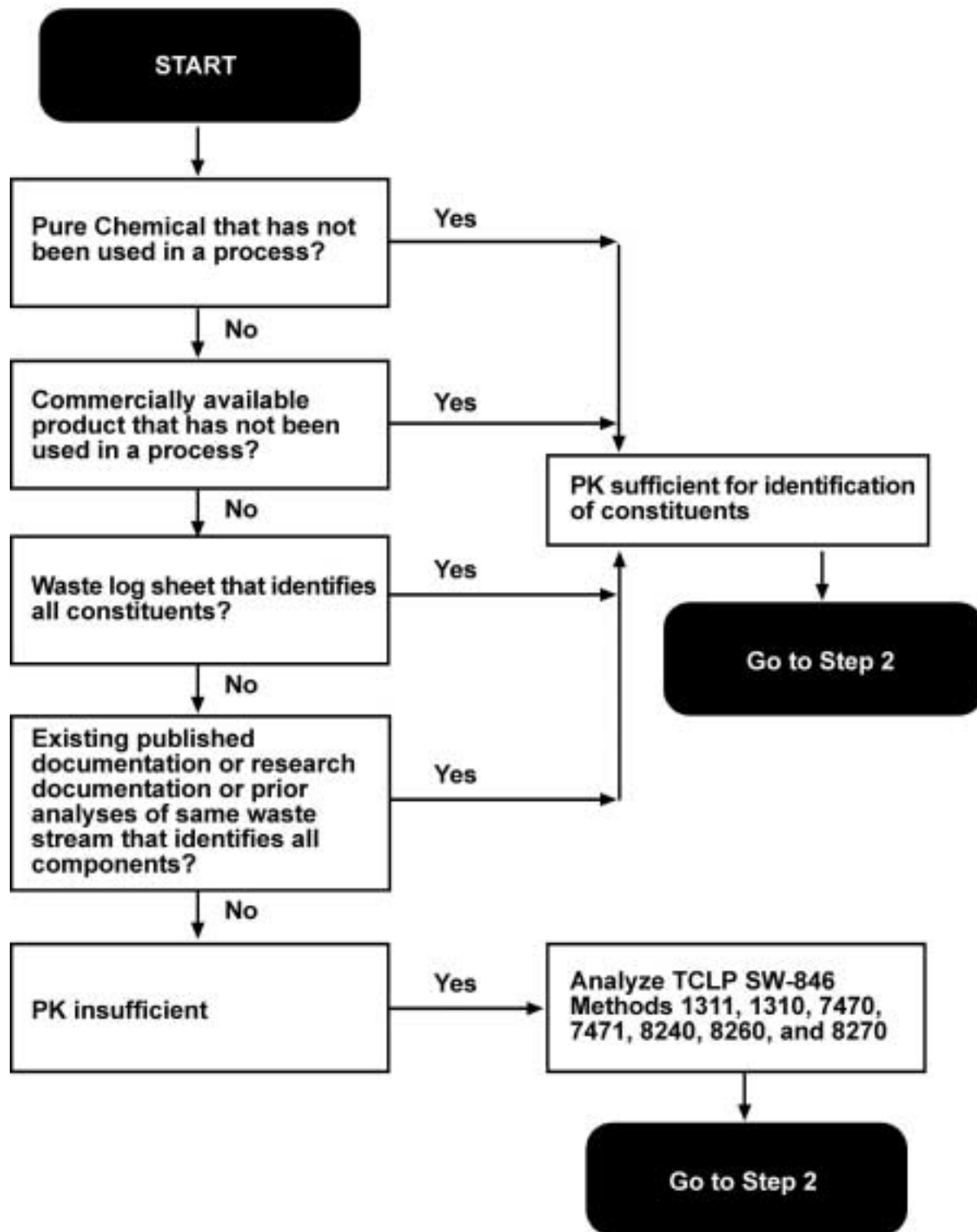


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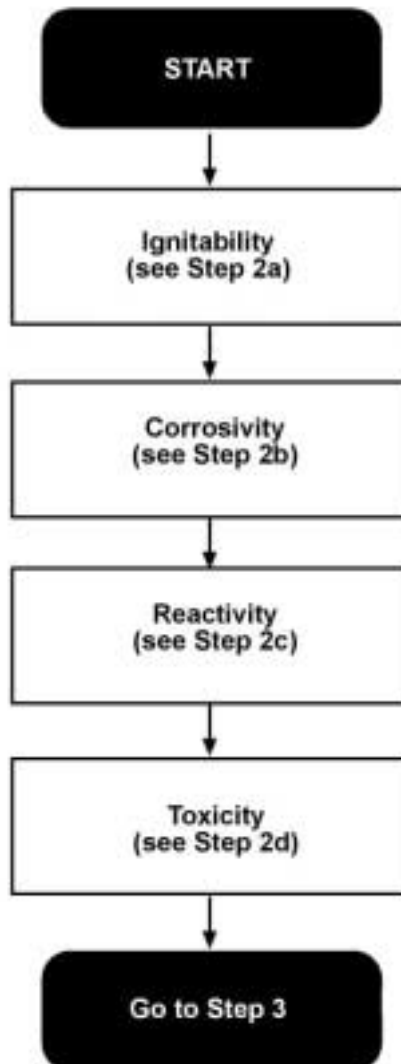
**APPENDIX B. HAZARDOUS WASTE IDENTIFICATION
FLOW CHARTS**



Step 1: Identify Hazardous Constituents

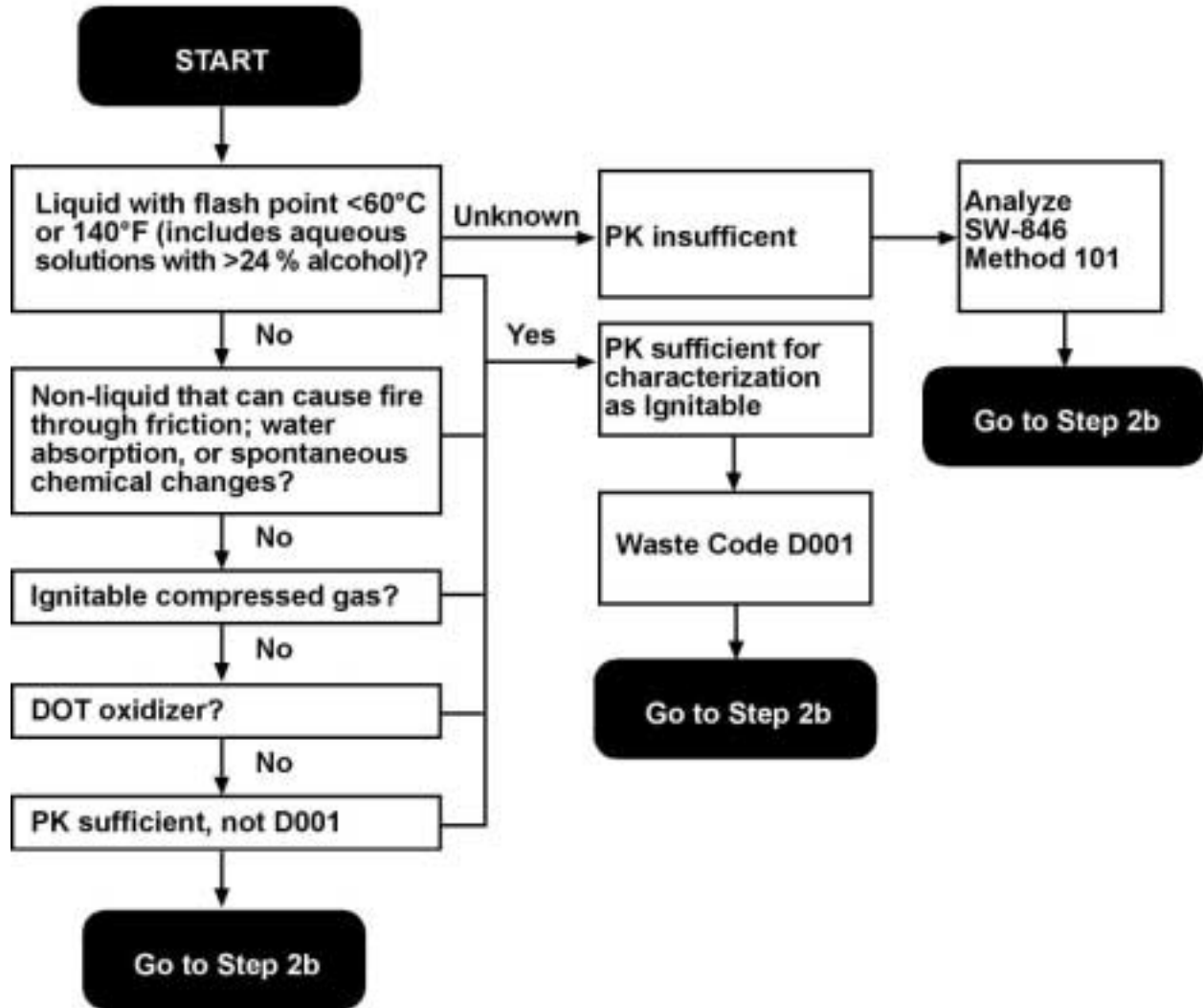


Step 2: Identify Hazardous Waste Characteristics



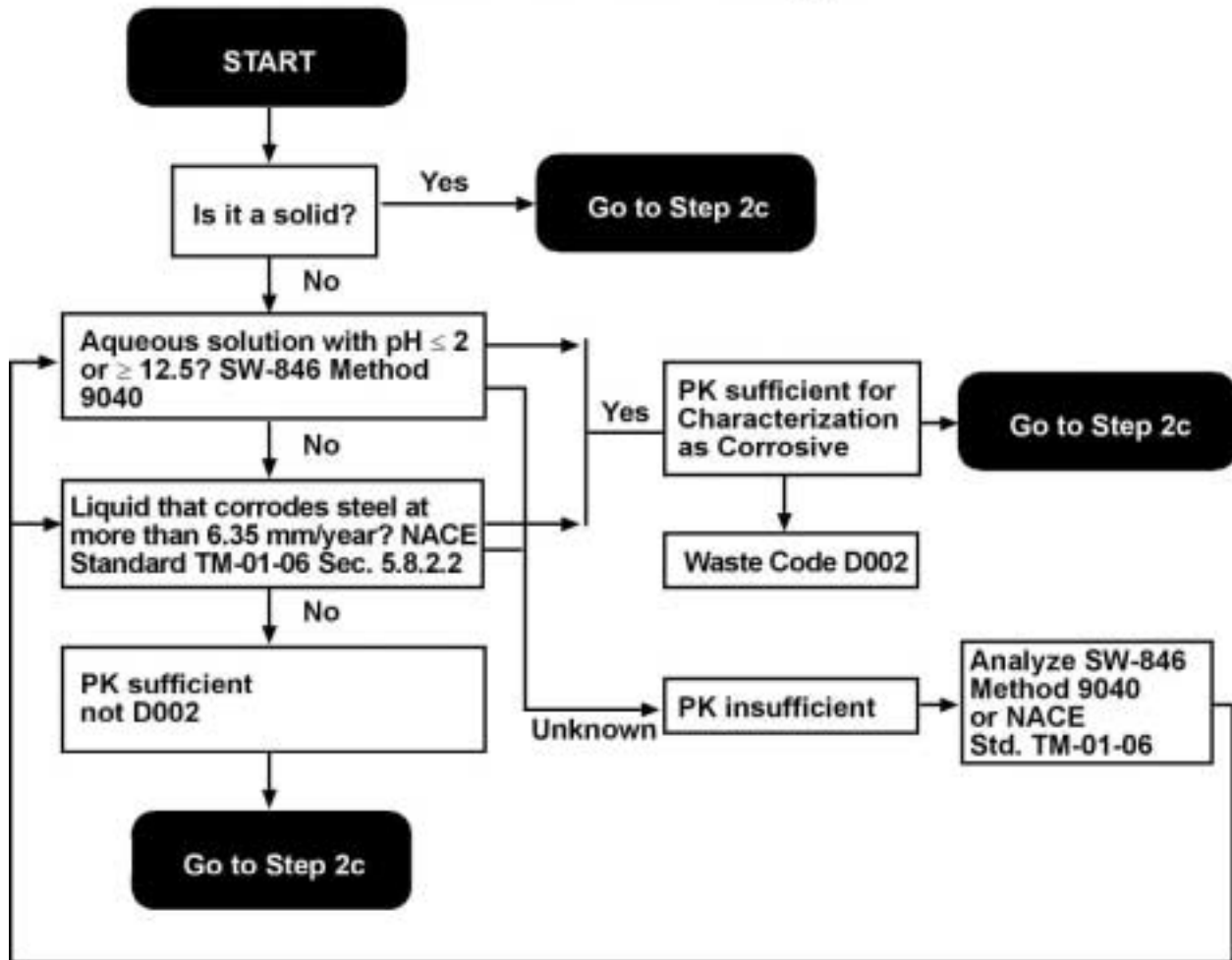
Step 2a: Ignitability

40 CFR 261.21 and TN Rule 1200-1-11-.02 (3)(b)



Step 2b: Corrosivity

40 CFR 261.22 and TNRule 1200-1-11-.02(3)(c)



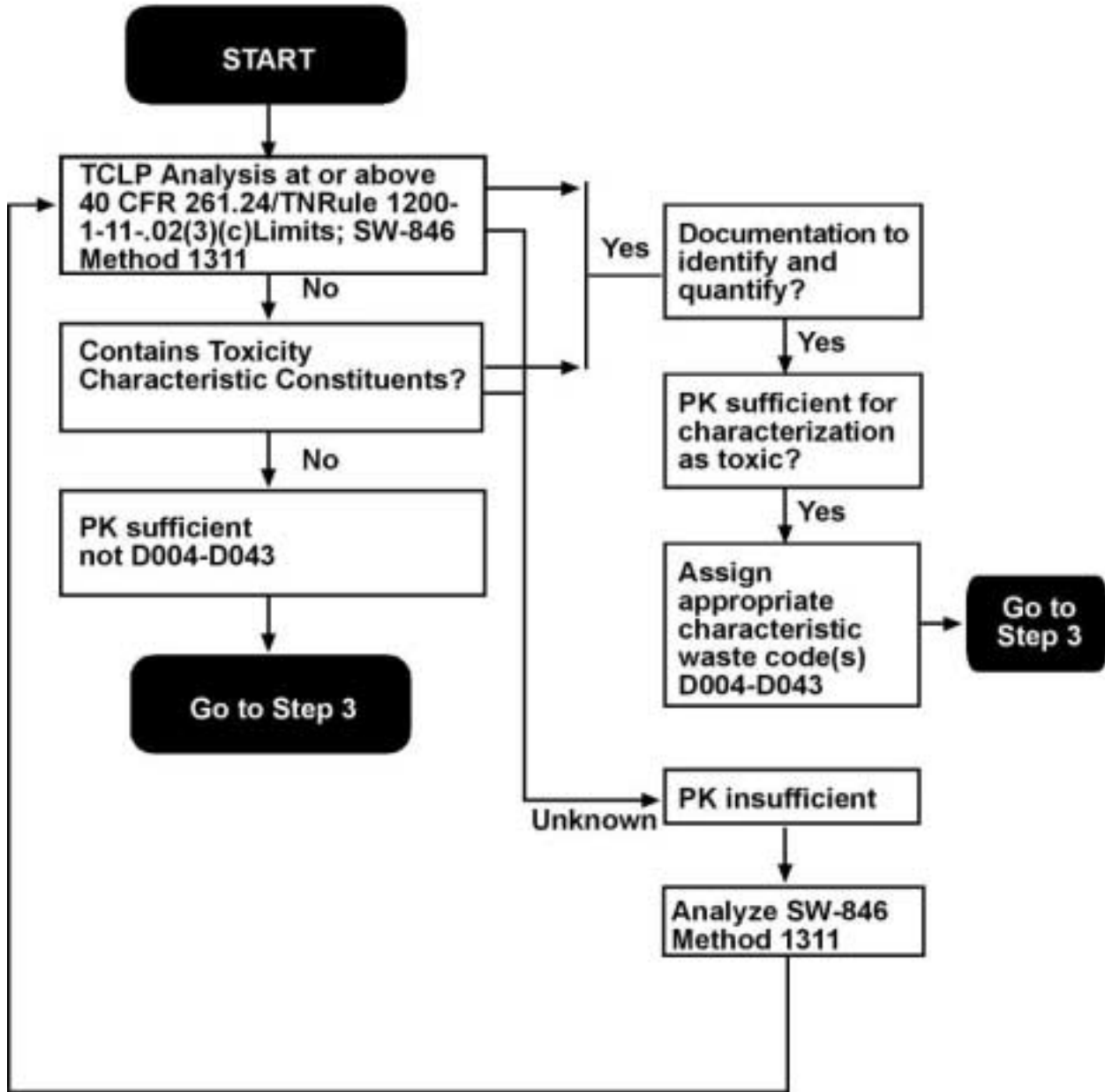
Step 3c: Reactivity

40 CFR 261.23 and TNRule 1200-1-11-.02(3)(d)

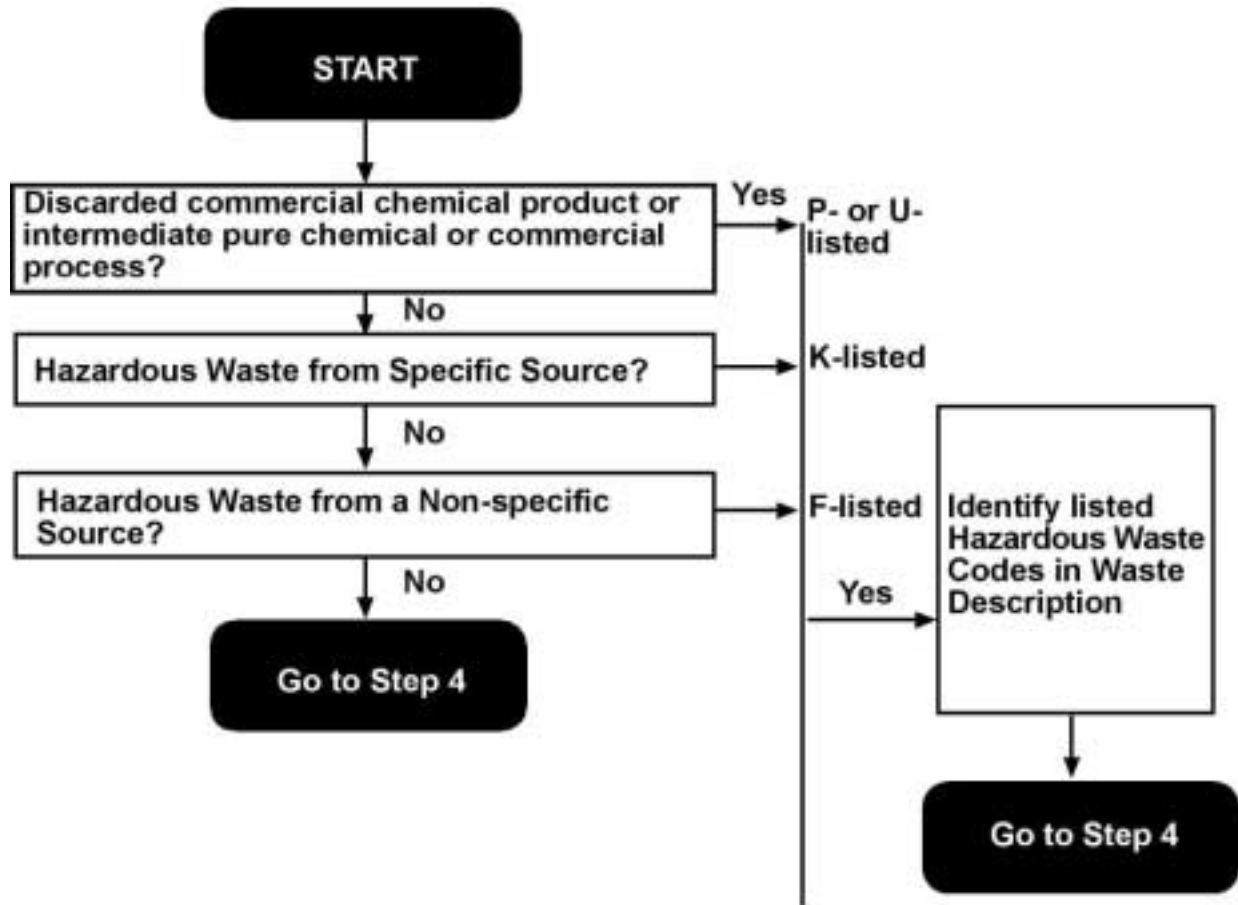


Step 3d: Toxicity

40 CFR 261.24 and TNRule 1200-1-11-.02(3)(c)



Step 3: Identify Listed Waste Codes



Step 4: LDR Characterization for Underlying Hazardous Constituents

