United States Environmental Protection Agency

RCRA Hazardous Waste Identification of Methamphetamine Production Process By-products

Report To Congress
Under the USA PATRIOT Improvement and Reauthorization Act of 2005

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

SEP 2 6 2008

THE ADMINISTRATOR

The Honorable Richard B. Cheney
President of the Senate
Washington, DC 20510

Dear Mr. President:

I am pleased to submit the enclosed report entitled, "RCRA Hazardous Waste Identification of Methamphetamine Production Process By-products," in accordance with the requirements of section 742 of the USA PATRIOT Improvement and Reauthorization Act of 2005, 42 U.S.C. §6921(j).

If you have questions or comments regarding this report, please contact Susan Parker Bodine, Assistant Administrator, Office of Solid Waste and Emergency Response, at (202) 566-0200, or your staff may contact Amy Hayden in the Office of Congressional and Intergovernmental Relations at (202) 564-0555.

Sincerely,

Stephen L. Johnson

Enclosure

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

SEP 2 6 2008

THE ADMINISTRATOR

The Honorable Nancy Pelosi
Speaker of the House of Representatives
Washington, DC 20515

Dear Madam Speaker:

I am pleased to submit the enclosed report entitled, "RCRA Hazardous Waste Identification of Methamphetamine Production Process By-products," accordance with the requirements of section 742 of the USA PATRIOT Improvement and Reauthorization Act of 2005, 42 U.S.C. §6921(j).

If you have questions or comments regarding this report, please contact Susan Parker Bodine, Assistant Administrator, Office of Solid Waste and Emergency Response, at (202) 566-0200, or your staff may contact Amy Hayden in the Office of Congressional and Intergovernmental Relations at (202) 564-0555.

Sincerely,

Stephen L. Johnson

Enclosure

Contents:

I. Introduction

On March 9, 2006, the President signed into law the USA PATRIOT Improvement and Reauthorization Act of 2005, Pub. L. No. 109-177, 120 Stat. 192 (2006) (USA PATRIOT Act). This Act contains a provision, amending section 3001 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (RCRA) (42 U.S.C. § 6921), that instructs the Administrator of the Environmental Protection Agency (EPA) to, not later than every two years, submit a report to the Committee on Energy and Commerce of the House of Representatives and the Committee on Environment and Public Works of the Senate that identifies the by-products of the methamphetamine (meth) production process and whether the Administrator considers any of these by-products to be a hazardous waste under Subtitle C of RCRA. USA PATRIOT Act, Pub. L. No. 109-177, § 742, 120 Stat. 192, 272 (2006). This report is required to set forth information collected by the Administrator from law enforcement agencies, States, and other relevant stakeholders that identifies the by-products of the methamphetamine (meth) production process. Specifically, the report describes how RCRA regulates hazardous waste, as well as the wastes that are likely to be found at meth labs. Appendix B also provides a list of by-products from meth production that would likely meet the RCRA regulatory definition of hazardous waste.

This report fulfills the requirement of section 742 of the Act, which is codified at 42 U.S.C. § 6921(j).

II. What is Methamphetamine?

Meth is a powerful synthetic stimulant drug that comes in several forms and affects the central nervous system. When it enters the brain, meth triggers a release of norephinephrine,

dopamine, and serotonin. It can also act as a dopaminergic (reactive to dopamine, a brain chemical involved in mood regulation) and an adrenergic reuptake inhibitor (reactive to epinephrine, also a brain chemical responsible for mood regulation), and in high concentrations as a monoamine oxidase inhibitor (MAOI), which inhibits the activity of monoamine oxidase, preventing the breakdown of the serotonin, norepinephrine and dopamine. Meth is similar to amphetamine; however, an added methyl group causes this compound to be more lipid soluble and more easily transported across the blood-brain barrier. It is also more stable against enzymatic degradation. These characteristics contribute to its potency.

III. How is Methamphetamine Produced?

This section generally describes the basic processes used to produce meth in order to understand the numerous by-products, wastes, and combinations of by-products and wastes that may be generated and found at any particular laboratory. While meth is produced in small quantities for limited legal medical uses, meth is produced most frequently for use as an illicit recreational drug. That is, most meth is produced by illegal, makeshift, clandestine laboratories using a variety of raw materials and equipment. Below we describe the basic, most common processes for illicit meth production, and the most common wastes that may be generated. A more detailed list of wastes which have been identified at illicit meth labs, can be found in Appendix B.

A. Primary Processes to Produce Methamphetamine

While there are well over 100 “recipes” for making meth, they can be grouped into two primary processes used to manufacture or “cook” meth. The two primary processes are the

Anhydrous Ammonia Method and the Red Phosphorus Method. Each method involves three basic steps: (1) the extraction of the precursor drug; (2) the reduction of the ephedrine/pseudoephedrine to meth, usually by hydrogenation of the hydroxyl group on the ephedrine or pseudoephedrine molecule; and (3) the "salting out" stage, which extracts the meth in solid form from solution using hydrochloric acid (HCl).

While many laboratories perform all three basic steps, it is not uncommon for the various stages to be divided between labs. Therefore, meth lab by-products and wastes may include materials considered by-products or wastes by the operators, as well as any intermediate production products, unused reagent chemicals and produced meth. It also will include contaminated equipment being used for meth production.

The production method(s) used in any particular lab cannot be identified with certainty, and the physical evidence at a lab (e.g., chemical raw materials) may only indicate the most recent method used. A summary flow chart of the processes involved in meth production is provided in Appendix A.

B. Less Common Procedures for Methamphetamine Production

Meth may also be produced through a process of reductive amination of phenylacetone with methylamine, both of which are currently U.S. Drug Enforcement Administration (DEA) List I chemicals (as are pseudoephedrine and ephedrine). The reaction requires a catalyst (Adams') that acts as a reducing agent, such as mercury aluminum amalgam or platinum dioxide catalyst. Other less common methods of meth production use other means of hydrogenation such as hydrogen gas in the presence of a catalyst.

IV. RCRA and Other Concerns During Discovery of Illegal Drug Labs

Following the discovery of an illegal meth lab by law enforcement, officers collect samples of the chemicals used in that lab as evidence for prosecution. After all forensic samples are gathered, a Hazardous Materials (Hazmat) Team is summoned to clean up the remaining chemicals and other by-products or wastes. Estimates indicate that for each pound of meth produced, between five and six pounds of highly toxic waste is generated.[1] The by-products or wastes removed by the Hazmat Teams are generally treated as RCRA hazardous waste without further analysis, and are sent to a RCRA permitted site for treatment and disposal.

State and Federal officials also have found that during the operation of the meth lab, the residue from meth production may enter porous building materials such as wallboard, carpets and furnishings.[2] In addition to the potential contamination of the building and its contents, there may be further contamination from the improper disposal of these by-products or wastes by the producers of the meth, which is typically poured into the indoor plumbing drains that flow either into the city sewer or individual sewage treatment systems (e.g., septic systems), or modified to allow drainage directly onto the soil near the meth lab. The other disposal method typically seen at functioning meth labs is a burn or burial pit. The primary environmental concern from drainage of these materials into the soil or from disposal into a burn or burial pit is contamination of ground water by the chemicals, including volatile organic chemicals used in the production of meth, as well as vapor intrusion which involves soil vapor gas from ground water plumes

[1] Bureau of Justice Assistance (1998); Pennell et al. (1999) ; U.S. Office of National Drug Control Policy (1998); U.S. Drug Enforcement Administration (DEA)(2000) U.S. Office of National Drug Control Policy (2004)

[2] At this time, there is little information known on whether other chemical by-products or wastes may be present on these porous surfaces. However, if meth itself is found on these porous surfaces, then it is likely that at least some of the other chemicals used in the production process may also be present.

infiltrating, and accumulating in, nearby buildings (residences and nonresidential sites) at dangerous levels.[3]

In most States, the property owner is responsible for decontamination of the property. In some States, the health department or another agency may evaluate the property for risks from long-term exposure to residual chemicals, including the potential environmental impacts of chemical spills into the environment or improper waste disposal.

V. How Does RCRA Regulate Hazardous Waste?

The determination of whether a particular waste is a Subtitle C RCRA hazardous waste is a multi-step process that depends on a number of factors, including the chemical character and composition of the waste. The regulations for making the hazardous waste determination are found in 40 CFR part 261.[4]

The first step is to determine whether the waste in question is a solid waste as defined under RCRA. The RCRA regulations require this determination to be made at the point at which the waste is initially generated. The hazardous waste regulations define solid waste as any material, not specifically excluded from the definition of solid waste, that is discarded (i.e., abandoned, recycled in certain ways, or certain waste-like munitions) (40 CFR 261.2.) In the case of meth production, any chemical substance and equipment confiscated at the site is

[3] "Meth Production in Minnesota", http://www.pca.state.mn.us/publications/c-er5-03.pdf

[4] It should be noted that State laws may be more stringent than the Federal RCRA hazardous waste regulations. Most States have been authorized to implement their own State hazardous waste program in lieu of the Federal program. This report only addresses the Federal laws and regulations; thus, one must look at the specific State laws in order to have a full picture of any given situation.

considered "abandoned," and considered a solid waste under the RCRA hazardous waste regulations.[5]

The generator of the solid waste must determine if such waste meets the regulatory definition of hazardous waste (40 CFR 261.3). For illegal meth labs, because the generator has abandoned the waste, the Hazmat Team or others responsible for site clean up would make this hazardous waste determination. EPA's hazardous waste regulations define which solid wastes are hazardous wastes under Subtitle C of RCRA: generally, a solid waste is hazardous if (1) it is or contains a listed hazardous waste; or (2) it exhibits one or more of the hazardous waste characteristics. Either testing or acceptable knowledge of the waste may be used to make this determination (40 CFR 262.11(c)).

A. Listed Wastes

EPA has listed hundreds of industrial waste streams and commercial chemical products that, if discarded, qualify as hazardous waste. These wastes are grouped into four lists as follows:

- F list — The F list includes wastes from certain common industrial and manufacturing processes. Because the processes generating these wastes can occur in different industry sectors, the F listed wastes are known as wastes from nonspecific sources. The F list is codified at 40 CFR 261.31.
- K list — The K list includes wastes from specific industries. As a result, K listed wastes are known as wastes from specific sources. The K list is codified at 40 CFR 261.32.

[5] If these materials are held in evidence for court proceedings, they would not be regulated as RCRA hazardous waste until sent to a facility for treatment or disposal. (Letter from Sylvia K. Lowrance to Mr. Phillip C. McGuire, 08/11/1988, RCRA Online number 11636.)

- P and U lists — These two lists include chemical substances that are manufactured or formulated for commercial or manufacturing use and which consists of the commercially pure grade of the chemical, any technical grades of the chemical that are produced or marketed, and all formulations in which the chemical is the sole active ingredient.[6] Chemicals are included on the P list if they are identified as acute hazardous wastes based on criteria described in 40 CFR 261.11(a)(2). The U list is generally comprised of chemicals that are toxic based on criteria described in 40 CFR 261.11(a)(3), but also includes chemicals that display other characteristics such as ignitability or reactivity. Both the P and U lists are codified in 40 CFR §261.33.

Under the RCRA hazardous waste regulations, mixtures of listed wastes and other solid wastes or residues derived from the treatment, storage or disposal of a listed hazardous waste is also considered to be a listed hazardous waste. 40 CFR 261.3(a)(2)(iv) and (c)(2)(i).

In addition, some hazardous wastes are listed solely because they exhibit one or more of the characteristics of ignitability, corrosivity, and/or reactivity, and may not be regulated the same as other listed hazardous wastes are regulated under RCRA. (See next section for discussion of characteristic wastes.) Specifically, when a waste meets the listing description for one of the 29 wastes that are listed solely because they exhibit the characteristic of ignitability, corrosivity, and/or reactivity, the waste is not regulated as hazardous if it does not exhibit any of the characteristics at the point of generation (40 CFR 261.3(g)). For example, F003 (certain non-halogenated solvents, including acetone, which is used in meth production) is listed for the characteristic of ignitability. If a waste is generated and meets the listing description for F003

[6] The P and U listed hazardous wastes also include: (1)the listed commercial chemical product or manufacturing chemical intermediate that are off-specification; (2) any residue remaining in a container or in an inner liner removed from a container that has held the commercial chemical product or manufacturing chemical intermediate; and (3) any residue or contaminated soil, water or other debris resulting from the cleanup of a spill of any of the listed commercial chemical product or manufacturing chemical intermediates.

(based on the solvents it contains) but does not exhibit the characteristic of ignitability at the point of generation, it is not regulated as a hazardous waste.[7]

B. Characteristic Wastes

Characteristic wastes are those wastes that (1) may cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness, or (2) pose a substantial present or potential hazard to human health or the environment when improperly managed (40 CFR 261.10(a)). Given these criteria, EPA established four hazardous waste characteristics: (1) Ignitability, (2) Corrosivity, (3) Reactivity, and (4) Toxicity. Wastes exhibiting a hazardous characteristic are identified as "D" wastes. The characteristics identify both acute (near-term) and chronic (long-term) hazards and are an essential supplement to the hazardous waste listings. For example, some wastes may not meet any listing description because they do not originate from the specific industry or process identified, but the wastes may still pose a threat to human health and the environment. Therefore, a facility is also required to determine whether such waste exhibits a hazardous characteristic, even if it does not meet a listing description. Any RCRA solid waste produced from or otherwise generated by <u>any</u> industrial or commercial source, including clandestine meth labs, may exhibit hazardous characteristics. If a listed waste exhibits a hazardous characteristic, the waste may pose an additional hazard to human health and the environment and may necessitate additional regulatory precautions, such as waste treatment requirements under the land disposal restrictions (LDR) program (40 CFR 268). EPA requires that the characteristics of a hazardous waste should be

[7] This assumes that the State program has adopted the Hazardous Waste Identification Rule (HWIR) which added 261.3(g). If the State program has not adopted this Rule, then the waste could be regulated as a hazardous waste. Most states have adopted the Rule.

determined by using a standardized test method or by applying general knowledge of the waste's properties (40 CFR 262.11(c)).

The specific hazardous waste characteristics are described as follows:

- Ignitability: The ignitability characteristic identifies wastes that can readily catch fire and sustain combustion. Specifically, the following qualify as ignitable wastes: (1) liquid wastes, other than solutions containing 24% alcohol by volume with a flashpoint of less than 60 degrees C (140 degrees F) using specified tests; (2) non-liquid waste that can spontaneously catch fire or catch fire through friction or absorption of moisture under normal handling conditions and burns so vigorously and persistently that it creates a hazard; (3) certain compressed gases; and (4) substances, such as chlorate, permanganate, inorganic peroxide or nitrate that yield oxygen readily to stimulate the combustion of organic matter (i.e., oxidizers). Ignitable wastes carry the hazardous waste code D001. The regulations providing the definition of the characteristic of ignitability are codified at 40 CFR 261.21.
- Corrosivity: The corrosivity characteristic identifies wastes that are acidic or alkaline (basic) or can readily corrode or dissolve flesh, metal, or other materials. EPA uses two criteria to identify corrosive hazardous wastes. Specifically, aqueous wastes are considered corrosive if they have a pH greater than or equal to 12.5 or less than or equal to 2. Liquid wastes are considered corrosive if they corrode steel at a rate greater than 6.35 mm per year using a specific test method. Corrosive wastes carry the hazardous waste code D002. The regulations providing the definition of the characteristic of corrosivity are codified at 40 CFR 261.22.

- Reactivity: The reactivity characteristic identifies wastes that readily explode or undergo violent reactions or react to produce toxic gases. Specifically, wastes are considered reactive if they: (1) are normally unstable and readily undergo violent change without detonation; (2) react violently with water; (3) form potentially explosive mixtures with water; (4) generate toxic gases, vapors or fumes when mixed with water; (5) are a cyanide or sulfide bearing material which, when exposed to pH conditions between 2 and 12.5 can generate toxic gases, vapors, or fumes; (6) are capable of detonation or explosive reactions if subjected to a strong initiating source or if heated under confinement; (7) are readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure; and/or (8) are a forbidden explosive as defined in Department of Transportation (DOT) regulations. Unlike many of the other hazardous characteristics that require the use of a specific test method, the reactivity characteristic is based primarily on narrative descriptions. Thus, determining whether a waste at a meth lab is reactive is somewhat subjective. Reactive wastes carry the hazardous waste code D003. The regulations providing the definition of the reactivity characteristic are codified at 40 CFR 261.23.
- Toxicity: The toxicity characteristic (TC) identifies wastes that are likely to leach dangerous concentrations of toxic chemicals into ground water. In order to predict whether any particular waste is likely to leach chemicals into ground water at dangerous levels, EPA designed a laboratory procedure to estimate the leaching potential of wastes when disposed of in municipal solid waste landfills. This lab procedure is known as the Toxicity Characteristic Leaching Procedure (TCLP). There are 40 different chemicals for which specified regulatory levels have been

determined, identified as D004 - D043. The regulations providing the definition of the toxicity characteristic are codified at 40 CFR 261.24 and the TC regulatory levels appear in Table 1 of that same section.

VI. Which Specific Wastes from the Methamphetamine Production Process Would Be Considered Hazardous Wastes under RCRA?

As stated above, the determination of whether a particular waste meets the definition of "hazardous" under the RCRA Subtitle C hazardous waste regulations is determined by more than simply its chemical makeup. The waste identification process can be complicated, and it is generally not possible to make a blanket statement as to whether a waste would be defined as hazardous under RCRA without knowing specific details about its generation. This may be particularly true for wastes generated at meth labs because there are many variations in the production methods and materials used. However, it is possible to identify many meth lab wastes that are likely to meet the definition of hazardous waste under the RCRA hazardous waste regulations.

Because the methamphetamine production process is not one of the specific industries whose wastes are identified in the K list, meth lab wastes, if a listed hazardous waste, would be listed as hazardous either as an F list hazardous waste or a P or U list hazardous waste. For example, many solvents used in meth production processes may result in some of these wastes identified as F001 – F005 hazardous wastes. It is also possible that some of the reagent chemicals used in the meth production process might be listed on the P and U lists of commercial chemical products and manufacturing chemical intermediates.

It also is likely that many of the wastes that are generated during the meth production process exhibit one or more of the hazardous characteristics. For example, many meth labs are

identified as a result of an explosion, demonstrating quite clearly the "ignitability" or "reactivity" characteristic (Hazardous Waste Code D001 or D003). Because the hazardous characteristics address properties of the wastes, whether meth lab waste will exhibit a hazardous characteristics will likely vary. For example, a pure solvent may have a low flash point and be classified as ignitable-D001. If mixed with other wastes, the ignitability of the mixture may be different and the waste may no longer be considered ignitable-D001; however, it may still meet the narrative definition of "reactivity."

The tables in Appendix B, modified from a table contained in the Drug Enforcement Agency (DEA) "Guidelines for the Cleanup of Clandestine Drug Laboratories," identify hazardous waste codes that may apply to various wastes found in meth production laboratories.

VII. EPA Coordination with State and Federal Law Enforcement

Responding to the *Anti-Drug Abuse Act of 1988* (P.L. 100-690), EPA, DEA, and the U.S. Coast Guard came together to form a "Joint Federal Task Force" and collaboratively developed the *Guidelines for the Cleanup of Clandestine Drug Laboratories* (March 1990). EPA also contributed to DEA's 2005 update of the 1990 *Guidelines for the Cleanup of Clandestine Drug Laboratories*. This document continues to be widely used by local law enforcement when responding to meth labs.[8]

In addition, EPA has coordinated extensively with local, State and Federal law enforcement on strategies for dealing with clandestine meth labs. Specifically:

- In 2000, EPA developed a train-the-trainer course for first responders, State, and Federal personnel who might come in contact with former meth labs. The course,

[8] "Guidelines for the Cleanup of Clandestine Drug Laboratories 2005 Edition," Drug Enforcement Administration. http://www.usdoj.gov/dea/resources/redbook.html

Methamphetamine Awareness and Operations for First Responders, has been conducted nationwide over the last eight years.

- EPA, in coordination with the States, continues its meth lab hazard control and prevention work by developing a set of voluntary guidelines for meth lab remediation. This document will be a broad set of voluntary guidelines that provides a review of Federal and State meth remediation guidance documents and other relevant studies and potential best practices. EPA intends to complete this document by December 2008 to meet the requirements of both the *Synthetic Drug Control Strategy: A Focus on Methamphetamine and Prescription Drug Abuse* issued in June 2006 by the White House Office of National Drug Control[9], and the *Methamphetamine Remediation Research Act of 2007* that was signed into law on December 21, 2007 (Public Law No: 110-143).

[9] http://www.ondcp.gov/publications/synthetic_drg_control_strat/synth_strat.pdf

Appendix A: Flow Chart of Primary Methamphetamine Production Processes [10]

Extracting Precursor Drug

Use: cold tablets, solvent (nail polish remover, paint thinner) and coffee filters
Byproducts: Solvent vapors, ephedrine or pseudoephedrine, binder from tablets, and coffee filters
Solvent evaporates or may be reused.

Red Phosphorus Method

Use: Iodine, red phosphorus, hydroiodic acid (HI), hydrochloric (muriatic) acid, sulfuric acid, sodium hydroxide (lye), sodium chloride (salt isopropyl alcohol, ethyl alcohol (ethanol), methyl alcohol (methanol), hydrogen peroxide, naphtha (Coleman fuel), charcoal lighter fluid (mineral spirits, petroleum distillate), acetone, benzene, toluene, ethyl ether (starting fluid), Freon, hydrogen chloride gas, and chloroform. Other chemicals that may be used include acetic acid, methyl-ethyl-ketone (MEK) and hypophosphoric acid.
By-products: Iodine, red, white and yellow phosphorus, sodium hydroxide, phosphine gas, hydrogen chloride gas, coffee filters, solvent, and possible other by-products.

Anhydrous Ammonia Method

Use: Sodium, potassium, or lithium metal, anhydrous ammonia, water, ether or other solvent. [isopropyl alcohol, ethyl alcohol (ethanol), methyl alcohol (methanol), hydrogen chloride gas, hydrochloric (muriatic) acid, sulfuric acid, sodium chloride (salt), toluene, naphtha (Coleman fuel) , Freon, ethyl ether (starter fluid), chloroform, and methyl-ethyl-ketone (MEK)]
Exothermic reaction can cause gaseous by-products
Heat may be used to expedite solvent evaporation.
By-products: coffee filters, excess metal, hydrogen chloride gas

"Salting out"

Use: Rock salt or table salt, sulfuric or muriatic acid, filters.
Byproducts: Excess salt, sulfuric or muriatic acid, hydrochloric acid, hydrogen chloride gas, coffee filters, meth, solvent from above phases, possibly acetone.

[10] Modified from chart in MN "Meth Production in Minnesota: Cooking Methods."

Appendix B: Chemical Properties and Hazardous Waste Codes Associated with Chemicals Commonly Found at Clandestine Methamphetamine Laboratory Sites.

(Modified from tables contained in the DEA "Guidelines for the Cleanup of Clandestine Drug Laboratories.")

TABLE B-1: CYANIDES (all in this list potentially meet reactivity characteristic –D003)			
Substance	**Form**	**Exposure**	**EPA Hazardous Waste Code**
Sodium Cyanide	Solid	Skin, Eyes, Ingestion	P106
Potassium Cyanide	Solid	Skin, Eyes, Ingestion	P098
Benzyl Cyanide	Liquid	Skin, Eyes, Inhalation, Ingestion	D003, D018
Hydrogen Cyanide	Gas,[11] Liquid	Inhalation	P063

TABLE B-2: IRRITANTS AND CORROSIVES			
Substance	**Form**	**Exposure**	**EPA Hazardous Waste Code**
Acetic Acid	Liquid	Skin, Eyes, Inhalation	D001[12]
Acetic Anhydride	Liquid	Skin, Eyes, Inhalation	D001
Acetyl Chloride	Liquid	Skin, Eyes, Inhalation	U006
Ammonium Hydroxide	Liquid	Skin, Eyes, Inhalation	D002
Benzyl Chloride	Liquid	Skin, Eyes, Inhalation	P028, D018
Dimethylsulfate	Liquid	Skin, Eyes, Inhalation	U103, D003
Formaldehyde	Gas, Liquid	Skin, Eyes, Inhalation	U122
Formic Acid	Liquid	Skin, Eyes, Inhalation	U123, D001[13]
Hydrogen Chloride/Hydrochloric Acid	Gas, Liquid	Skin, Eyes, Inhalation	D002[14]
Hydrobromic Acid	Liquid	Skin, Eyes, Inhalation	D003

[11] Ignitable contained gases intended for discard are regulated under RCRA.
[12] Ignitable at high concentrations (e.g. 96%).
[13] At 55% concentration, but not at 62% concentration.
[14] Only liquids can be classified as D002. Solids and gases cannot be classified as D002, even if they are corrosive. Refer to 40 CFR 261.33 for a detailed definition.

TABLE B-2: IRRITANTS AND CORROSIVES			
Substance	**Form**	**Exposure**	**EPA Hazardous Waste Code**
Hydriodic Acid	Liquid	Skin, Eyes, Inhalation	D002, D002
Hydroxylamine	Liquid, Solid	Skin, Eyes, Inhalation	D003
Methylamine	Gas, Liquid, Solid	Skin, Eyes, Inhalation	D001
Methylene Chloride (dichloromethane, methylene dichloride)	Liquid	Skin, Eyes, Inhalation	U080
Methyl Methacrylate	Liquid	Skin, Eyes, Inhalation	U162
Nitroethane	Liquid	Skin, Eyes, Inhalation	D001
Oxalyl Chloride	Liquid	Skin, Eyes, Inhalation	D003
Perchloric Acid	Liquid	Skin, Eyes, Inhalation	D001
Phenylmagnesium Bromide	Liquid	Skin, Eyes, Inhalation	D001, D003
Phosphine	Gas	Eyes, Inhalation	P096
Phosphorous Oxychloride	Solid	Skin, Eyes, Inhalation	D003
Phosphorous Pentoxide	Solid	Skin, Eyes	D003
Sodium Amide (Sodamide)	Solid	Skin, Eyes, Inhalation	D003
Sodium Metal	Solid	Skin, Eyes	D003
Sodium Hydroxide	Liquid, Solid	Skin, Eyes	D002
Sulfur Trioxide	Liquid, Solid	Skin, Eyes, Inhalation	D001, D002 D003
Sulfuric Acid	Liquid	Skin, Eyes, Inhalation	D002
Tetrahydrofuran	Liquid	Skin, Eyes, Inhalation	U213
Thionyl Chloride	Liquid	Skin, Eyes, Inhalation	D003

TABLE B-3: SOLVENTS			
Substance	**Form**	**Exposure**	**EPA Hazardous Waste Code**
Acetone	Liquid	Skin, Eyes, Inhalation	U002, D001
Acetonitrile	Liquid	Skin, Eyes, Inhalation	U003, D001
Aniline	Liquid	Skin, Eyes, Inhalation	U012
Benzene	Liquid	Skin, Eyes, Inhalation	U019, D018, D001
Benzyl Chloride	Liquid	Skin, Eyes, Inhalation	P028, D018, D001
Carbon Tetrachloride	Liquid	Skin, Eyes, Inhalation	U211, D019
Chloroform	Liquid	Skin, Eyes, Inhalation	U044, D022
Cyclohexanone	Liquid	Skin, Eyes, Inhalation	U057, D001
Dioxane	Liquid	Skin, Eyes, Inhalation	U108, D001
Ethanol	Liquid	Skin, Eyes, Inhalation	D001
Ethyl Acetate	Liquid	Skin, Eyes, Inhalation	U112, D001
Ethyl Ether	Liquid	Skin, Eyes, Inhalation	U117, D001, D003
Freon 11 (trichloromonofluoromethane)	Liquid	Skin, Eyes, Inhalation	U121
Hexane	Liquid	Skin, Eyes, Inhalation	D001
Isopropanol	Liquid	Skin, Eyes, Inhalation	D001
Methanol	Liquid	Skin, Eyes, Inhalation	U154, D001
Methylene Chloride (dichloromethane, methylene dichloride)	Liquid	Skin, Eyes, Inhalation	U080
Petroleum Ether	Liquid	Skin, Eyes, Inhalation	D001
Pyridine	Liquid	Skin, Eyes, Inhalation	U196, D001
Toluene	Liquid	Skin, Eyes, Inhalation	U220, D001
o-Toluidine	Liquid	Skin, Eyes, Inhalation	U328, D001

TABLE B-4: METALS/SALTS			
Substance	**Form**	**Exposure**	**EPA Hazardous Waste Code**
Magnesium metal	Solid	Skin, Eyes	D003
Red Phosphorus	Solid	Skin, Eyes	D003
Mercuric Chloride	Solid	Skin, Eyes	D003, D009
Lead Acetate	Solid	Skin, Eyes	U144, D008
Lithium Aluminum Hydride	Solid	Skin, Eyes	D001, D003
Lithium Hydroxide	Solid	Skin, Eyes	D003
Potassium Hydroxide[15]	Solid	Skin, Eyes	D003
Raney Nickel	Solid	Skin, Eyes	D003
Sodium Hydroxide[16]	Solid	Skin, Eyes	D003
Sodium Metal	Solid in kerosene	Skin, Eyes	D003
Potassium Metal	Solid in kerosene	Skin, Eyes	D003

Table B-5: OTHER POTENTIALLY HAZARDOUS PRECURSORS, SOLVENTS, REAGENTS, DRUG PRODUCTS AND BY-PRODUCTS FOUND IN CLANDESTINE DRUG LABORATORIES, WHICH WOULD NOT BE CONSIDERED TO BE HAZARDOUS WASTE UNDER RCRA		
Substance	**Form**	**Exposure**
Ammonia (anhydrous)	Gas	Skin, Eyes, Inhalation
Aluminum Chloride	Solid	Skin, Eyes
Palladium	Solid	Skin, Eyes
Iodine	Solid	Skin, Eyes
Thorium Salts	Solid	Skin, Eyes
Fentanyl	Solid	Inhalation, Skin, Eyes
Hydrogen	Gas	Inhalation
Lysergic Acid Diethylamide (LSD)	Powder	Ingestion, Inhalation
MPTP, MPPP[17]	Solids	Inhalation, Skin
Methylfentanyl	Solid	Inhalation, Skin, Eyes
Phenylacetic Acid	Solid	Skin, Eyes
Phenyl-2-Propane (phenylacetone)	Liquid	Skin, Inhalation
Piperidine	Liquid	Skin, Inhalation

[15] Water or aqueous solutions would be D002.
[16] Water solutions would be D002.
[17] MPTP (1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine); MPPP (1-methyl-4-phenyl-4-propionoxypiperidine).