CHAPTER TWO

CHOOSING THE CORRECT PROCEDURE

SW-846 analytical methods are written as quantitative trace analytical methods to demonstrate that a waste does not contain analytes of concern that cause it to be managed as a hazardous waste. As such, these methods typically contain relatively stringent quality control (QC) criteria appropriate to trace analyses. However, if a particular application does not require data of this quality, less stringent QC criteria may be used. The purpose of this chapter is to aid the analyst in choosing the appropriate methods for sample analyses, based upon the sample matrix and the analytes to be determined. The ultimate responsibility for producing reliable analytical results lies with the entity subject to the regulation. Therefore, members of the regulated community are advised to refer to this chapter and to consult with knowledgeable laboratory personnel when choosing the most appropriate suite of analytical methods. In addition, analysts and data users are advised that, except where explicitly specified in a regulation, the use of SW-846 methods is not mandatory in response to Federal testing requirements.

Section 2.1 provides guidance regarding the analytical flexibility inherent to SW-846 methods and the precedence of various QC criteria. Section 2.2 reviews the information required to choose the correct combination of methods for an analytical procedure. Section 2.3 provides useful information on implementing the method selection guidance for organic analyses. Section 2.4 provides guidance on characteristic analyses and Section 2.5 provides guidance on the determination of analytes in ground water.

2.1 GUIDANCE REGARDING FLEXIBILITY INHERENT TO SW-846 METHODS AND THE PRECEDENCE OF SW-846 QUALITY CONTROL CRITERIA

The specific products and instrument settings cited in SW-846 methods represent those products and settings used during method development or subsequently evaluated by the Agency for use in the method. Glassware, reagents, supplies, equipment and settings other than those listed in this manual may be employed, provided that method performance appropriate for the intended RCRA application has been documented. Such performance includes consideration of precision, accuracy (or bias), recovery, representativeness, comparability, and sensitivity (detection, quantitation, or reporting limits) relative to the data quality objectives for the intended use of the analytical results. In response to this inherent flexibility, if an alternative analytical procedure is employed, then EPA expects the laboratory to demonstrate and document that the procedure is capable of providing appropriate performance for its intended application. This demonstration must not be performed after the fact, but as part of the laboratory's initial demonstration of proficiency with the method. The documentation should be in writing, maintained in the laboratory, and available for inspection upon request by authorized representatives of the appropriate regulatory authorities. The documentation should include the performance data as well as a detailed description of the procedural steps as performed (i.e., a written standard operating procedure).

Given this allowance for flexibility, EPA wishes to emphasize that this manual also contains procedures for "method-defined parameters," where the analytical result is wholly dependant on the process used to make the measurement. Examples include the use of the toxicity characteristic leaching procedure (TCLP) to prepare a leachate, and the flash point, pH, paint filter liquids, and corrosivity tests. In these instances, changes to the specific methods may change the end result

and incorrectly identify a waste as nonhazardous. Therefore, when the measurement of such method-defined parameters is required by regulation, those methods are not subject to the flexibility afforded in other methods.

Analysts and data users are advised that even for those analytes that are not method-defined, different procedures may produce some difference in results. Common examples include the differences in recoveries of phenolic compounds extracted from water by separatory funnel (Method 3510) and continuous liquid-liquid (Method 3520) extraction techniques, differences in recoveries of many compounds between Soxhlet (Method 3540) and ultrasonic (Method 3550) extraction techniques, and differences resulting from the choice of acid digestion of metals (Method 3050) or microwave digestion (Method 3051). Where practical, the Agency has included guidance in the individual methods regarding known potential problems, and analysts are advised to review this information carefully in choosing or modifying analytical procedures. Chapter One describes a variety of QC procedures that may be used to evaluate the quality of the analytical results. Additional QC procedures may be described in the individual methods. The results of these QC procedures should be used by the analyst to evaluate if the choice of the analytical procedures and/or any modifications are appropriate to generate data of the quality necessary to satisfy the data quality needs of the intended application.

The performance data included in the SW-846 methods are not intended to be used as absolute QC acceptance criteria for method performance. The data are intended to be guidance, by providing typical method performance in typical matrices, to assist the analyst in selection of the appropriate method for the intended application. In addition, it is the responsibility of the laboratory to establish actual operating parameters and in-house QC acceptance criteria, based on its own laboratory SOPs and in-house QC program, to demonstrate appropriate performance of the methods used in that laboratory for the RCRA analytical applications for which they are intended.

The regulated community is further advised that the methods here or from other sources need only be used for those specific analytes of concern that are subject to regulation or other monitoring requirements. The fact that a method provides a long list of analytes does not mean that each of those analytes is subject to any or all regulations, or that all of those analytes must be analyzed each time the method is employed, or that all of the analytes can be analyzed using a single sample preparation procedure. It is EPA's intention that the target analyte list for any procedure includes those analytes necessary to meet the data quality objectives of the project, i.e., those analytes subject to monitoring requirements and set out in a RCRA permit (or other applicable regulation), plus those analytes used in the methods for QC purposes, such as surrogates, internal standards, system performance check compounds, etc. Additional analytes, not included on the analyte list of a particular method(s) but needed for a specific project, may be analyzed by that particular method(s), if appropriate performance can be demonstrated for the analytes of concern in the matrices of concern at the levels of concern.

2.1.1 Trace Analysis vs. Macroanalysis

Through the choice of sample size and concentration procedures, the methods presented in SW-846 were designed to address the problem of "trace" analyses (<1000 ppm), and have been developed for an optimized working range. These methods are also applicable to "minor" (1000 ppm - 10,000 ppm) and "major" (>10,000 ppm) analyses, as well, through use of appropriate sample preparation techniques that result in analyte concentrations within that optimized range. Such sample preparation techniques include:

1) adjustment of size of sample prepared for analysis (for homogeneous samples),
2) adjustment of injection volumes,
3) dilution or concentration of sample,
4) elimination of concentration steps prescribed for "trace" analyses, and
5) direct injection (of samples to be analyzed for volatile constituents).

The performance data presented in each of these methods were generated from "trace" analyses, and may not be applicable to "minor" and "major" analyses. Generally, extraction efficiency improves as concentration increases.

CAUTION: Great care should be taken when performing trace analyses after the analysis of concentrated samples, given the possibility of contamination.

2.1.2 Choice of Apparatus and Preparation of Reagents

Since many types and sizes of glassware and supplies are commercially available, and since it is possible to prepare reagents and standards in many different ways, the apparatus, reagents, and volumes specified in these methods may be replaced by any similar types as long as this substitution does not affect the overall quality of the analyses.

2.1.3 Quality Control Criteria Precedence

Chapter One contains general quality control (QC) guidance for analyses using SW-846 methods. QC guidance specific to a given analytical technique (e.g., extraction, cleanup, sample introduction, or analysis) may be found in Methods 3500, 3600, 5000, 7000, and 8000. Method-specific QC criteria may be found in Sec. 8.0 of each individual method (or in Sec. 11.0 of air sampling methods). When inconsistencies exist between the information in these locations, method-specific QC criteria take precedence over both technique-specific criteria and those criteria given in Chapter One, and technique-specific QC criteria take precedence over the criteria in Chapter One.

2.2 REQUIRED INFORMATION

In order to choose the correct combination of methods to comprise the appropriate analytical procedure, some basic information is required.

2.2.1 Physical State(s) of Sample

The phase characteristics of the sample must be known. There are several general categories of phases into which the sample may be categorized, including:

Aqueous
Sludge
TCLP or EP Extract
Solid
Ground Water
Oil or other Organic Liquid
Stack Sampling (VOST) Condensate
Multiphase Sample

There may be a substantial degree of overlap between the phases listed above and it may be useful to further divide these phases in certain instances. A multiphase sample may be a

combination of aqueous, organic liquid, sludge, and/or solid phases, and generally must undergo a phase separation as the first step in the analytical procedure.

2.2.2 Analytes

Analytes may be divided into various classes based on the determinative methods which are used to identify and quantify them. The most basic differentiation is between organic (e.g., carbon-containing) analytes and inorganic (e.g., metals and anions) analytes.

Table 2-1 is an alphabetical list of analytes cited within the SW-846 organic determinative methods. These analytes have been evaluated by those methods. The methods may also be applicable to other analytes that are similar to those listed. Tables 2-2A and 2-2B list the organic analytes that may be prepared using Method 3650. Table 2-3 lists the organic analytes that are collected from stack gas effluents using the volatile organic sampling train (VOST) methodology. Tables 2-4 through 2-34 list the analytes by organic determinative method.

Table 2-35 indicates which methods are applicable to inorganic analytes.

2.2.3 Detection Limits

Some regulations may require a specific sensitivity or detection limit for an analysis, as in the determination of analytes for the Toxicity Characteristic (TC). Drinking water detection limits, for those specific organic and metallic analytes covered by the National Primary Drinking Water Regulations, are desired in the analysis of ground water.

2.2.4 Analytical Objective

Knowledge of the analytical objective will be useful in the choice of sample preparation procedures and in the selection of a determinative method. This is especially true when the sample has more than one phase. Knowledge of the analytical objective may not be possible or desirable at all management levels, but that information should be transmitted to the analytical laboratory management to ensure that the correct techniques are used during the analytical effort.

2.2.5 Detection and Monitoring

The strategy for detection of compounds in environmental or process samples may be contrasted with the strategy for collecting monitoring data. Detection samples define initial conditions. When there is little information available about the composition of the sample source, e.g., a well or process stream, mass spectral identification of organic analytes leads to fewer false positive results. Thus, the most practical form of detection for organic analytes is often mass spectral identification. However, where the sensitivity requirements exceed those that can be achieved using mass spectral method (e.g., GC/MS or HPLC/MS), it may be necessary to employ a more sensitive detection method (e.g., electron capture). In these instances, the risk of false positive results may be minimized by confirming the results through a second analysis with a dissimilar detector or chromatographic column. Thus, the choice of technique for organic analytes may be governed by the detection limit requirements and potential interferants.

Similarly, the choice of technique for metals is governed by the detection limit requirements and potential interferants.

In contrast, monitoring samples are analyzed to confirm existing and on-going conditions, tracking the presence or absence of known constituents in an environmental or process matrix. In well-defined matrices and under stable analytical conditions, less compound-specific detection modes may be used, as the risk of false positive results is less.

2.2.6 Sample Containers, Preservations, and Holding Times

Appropriate sample containers, sample preservation techniques, and sample holding times for aqueous matrices are listed in Table 2-36, near the end of this chapter. Similar information may be found in Table 3-1 of Chapter Three (inorganic analytes) and Table 4-1 of Chapter Four (organic analytes). Samples must be extracted and analyzed within the specified holding times for the results to be considered reflective of total concentrations. Analytical data generated outside of the specified holding times must be considered to be minimum values only. Such data may be used to demonstrate that a waste is hazardous where it shows the concentration of a constituent to be above the regulatory threshold but cannot be used to demonstrate that a waste is not hazardous.

2.3 IMPLEMENTING THE GUIDANCE

The choice of the appropriate sequence of methods depends on the information required and on the experience of the analyst. Figure 2-1 summarizes the organic analysis options available. Appropriate selection is confirmed by the quality control results. The use of the recommended procedures, whether they are approved or mandatory, does not release the analyst from demonstrating the correct execution of the method.

2.3.1 Extraction and Sample Preparation Procedures for Organic Analytes

Methods for preparing samples for organic analytes are shown in Table 2-37. Method 3500 and associated methods should be consulted for further details on preparing the sample for analysis.

2.3.1.1 Aqueous Samples

Methods 3510 and 3520 may be used for extraction of the semivolatile organic compounds from aqueous samples. The choice of a preparative method depends on the sample. Method 3510, a separatory funnel liquid-liquid extraction technique, is appropriate for samples which will not form a persistent emulsion interface between the sample and the extraction solvent. The formation of an emulsion that cannot be broken up by mechanical techniques will prevent proper extraction of the sample. Method 3520, a continuous liquid-liquid extraction technique, may be used for any aqueous sample and will minimize emulsion formation.

Method 3535 is solid-phase extraction technique that has been tested for organochlorine pesticides and phthalate esters and may be applicable to other semivolatile and extractable compounds as well. The aqueous sample is passed through a solid sorbent material which traps the analytes. They are then eluted from the solid-phase sorbent with a small volume of organic solvent. This technique may be used to minimize the volumes of organic solvents that are employed, but may not be appropriate for aqueous samples with high suspended solids contents.

2.3.1.1.1 Basic or Neutral Extraction of Semivolatile Analytes

The solvent extract obtained by performing Method 3510, 3520, or 3535 at a neutral or basic pH will contain the neutral organic compounds and the organic bases of interest. Refer to Table 1 in the extraction methods (3510 and/or 3520) for guidance on the requirements for pH adjustment prior to extraction and analysis.

2.3.1.1.2 Acidic Extraction of Phenols and Acid Analytes

The solvent extract obtained by performing Method 3510, 3520, or 3535 at a pH less than or equal to 2 will contain the phenols and acid extractable organics of interest.

2.3.1.2 Solid Samples

Soxhlet extraction (Methods 3540 and 3541), ultrasonic extraction (Method 3550), and accelerated solvent extraction (Method 3545) may be used with solid samples. Consolidated samples should be ground finely enough to pass through a 1 mm sieve. In limited applications, waste dilution (Methods 3580 and 3585) may be used if the entire sample is soluble in the specified solvent.

Methods 3540, 3541, 3545, and 3550 are neutral-pH extraction techniques and therefore, depending on the analysis requirements, acid-base partition cleanup (Method 3650) may be necessary. Method 3650 will only be needed if chromatographic interferences are severe enough to prevent detection of the analytes of interest. This separation will be most important if a GC method is chosen for analysis of the sample. If GC/MS is used, the ion selectivity of the technique may compensate for chromatographic interferences.

There are two extraction procedures for solid samples that employ supercritical fluid extraction (SFE). Method 3560 is a technique for the extraction of petroleum hydrocarbons from various solid matrices using carbon dioxide at elevated temperature and pressure. Method 3561 may be used to extract polynuclear aromatic hydrocarbons (PAHs) from solid matrices using supercritical carbon dioxide.

2.3.1.3 Oils and Organic Liquids

Method 3580, waste dilution, may be used to prepare oils and organic liquid samples for analysis of semivolatile and extractable organic analytes by GC or GC/MS. Method 3585 may be employed for the preparation of these matrices for volatiles analysis by GC or GC/MS. To avoid overloading the analytical detection system, care must be exercised to ensure that proper dilutions are made. Methods 3580 and 3585 give guidance on performing waste dilutions.

To remove interferences for semivolatiles and extractables, Method 3611 (Alumina cleanup) may be performed on an oil sample directly, without prior sample preparation.

Method 3650 is the only other preparative procedure for oils and other organic liquids. This procedure is a back extraction into an aqueous phase. It is generally introduced as a cleanup procedure for extracts rather than as a preparative procedure. Oils generally have

a high concentration of semivolatile compounds and, therefore, preparation by Method 3650 should be done on a relatively small aliquot of the sample. Generally, extraction of 1 mL of oil will be sufficient to obtain a saturated aqueous phase and avoid emulsions.

2.3.1.4 Sludge Samples

Determining the appropriate methods for analysis of sludges is complicated because of the lack of precise definitions of sludges with respect to the relative percent of liquid and solid components. There is no set ratio of liquid to solid which enables the analyst to determine which of the three extraction methods cited is the most appropriate. Sludges may be classified into three categories: liquid sludges, solid sludges, and emulsions, but with appreciable overlap.

If the sample is an organic sludge (solid material and organic liquid, as opposed to an aqueous sludge), the sample should be handled as a multiphase sample.

2.3.1.4.1 Liquid Sludges

Use of Method 3510 or Method 3520 may be applicable to sludges that behave like and have the consistency of aqueous liquids. Ultrasonic extraction (Method 3550) and Soxhlet (Method 3540) procedures will, most likely, be ineffective because of the overwhelming presence of the liquid aqueous phase.

2.3.1.4.2 Solid Sludges

Soxhlet extraction (Methods 3540 and 3541), accelerated solvent (Method 3545) extraction, and ultrasonic extraction (Method 3550) will be more effective when applied to sludge samples that resemble solids. Samples may be dried or centrifuged to form solid materials for subsequent determination of semivolatile compounds.

Using Method 3650, Acid-Base Partition Cleanup, on the extract may be necessary, depending on whether chromatographic interferences prevent determination of the analytes of interest.

2.3.1.4.3 Emulsions

Attempts should be made to break up and separate the phases of an emulsion. Several techniques are effective in breaking emulsions or separating the phases of emulsions, including:

1. Freezing/thawing: Certain emulsions will separate if exposed to temperatures below 0°C.

2. Salting out: Addition of a salt to make the aqueous phase of an emulsion too polar to support a less polar phase promotes separation.

3. Centrifugation: Centrifugal force may separate emulsion components by density.

4. Addition of water or ethanol: Emulsion polymers may be destabilized when a preponderance of the aqueous phase is added.

5. Forced filtering through glass wool: Many emulsions can be broken by forcing the emulsion through a pad of Pyrex glass wool in a drying column using a slight amount of air pressure (using a rubber bulb usually provides sufficient pressure).

If techniques for breaking emulsions fail, use Method 3520. If the emulsion can be broken, the different phases (aqueous, solid, or organic liquid) may then be analyzed separately.

2.3.1.5 Multiphase Samples

Choice of the procedure for separating multiphase samples is highly dependent on the objective of the analysis. With a sample in which some of the phases tend to separate rapidly, the percent weight or volume of each phase should be calculated and each phase should be individually analyzed for the required analytes.

An alternate approach is to obtain a homogeneous sample and attempt a single analysis on the combination of phases. This approach will give no information on the abundance of the analytes in the individual phases other than what can be implied by solubility.

A third alternative is to select phases of interest and to analyze only those selected phases. This tactic must be consistent with the sampling/analysis objectives or it will yield insufficient information for the time and resources expended. The phases selected should be compared with Figure 2-1 and Table 2-37 for further guidance.

2.3.2 Cleanup Procedures

Each category in Table 2-38, Cleanup of Organic Analyte Extracts, corresponds to one of the possible determinative methods available in the manual. Cleanups employed are determined by the analytes of interest within the extract. However, the necessity of performing cleanup may also depend upon the matrix from which the extract was developed. Cleanup of a sample may be done exactly as instructed in the cleanup method for some of the analytes. There are some instances when cleanup using one of the methods may only proceed after the procedure is modified to optimize recovery and separation. Several cleanup techniques may be possible for each analyte category. The information provided is not meant to imply that any or all of these methods must be used for the analysis to be acceptable. Extracts with components which interfere with spectral or chromatographic determinations are expected to be subjected to cleanup procedures.

The analyst's discretion must determine the necessity for cleanup procedures, as there are no clear cut criteria for indicating their use. Method 3600 and associated methods should be consulted for further details on extract cleanup.

2.3.3 Determinative Procedures

The determinative methods for organic analytes have been divided into three categories, as shown in Table 2-39: gas chromatography/mass spectrometry (GC/MS); specific detection methods, i.e., gas chromatography (GC) with specific non-MS detectors; and high performance liquid chromatography (HPLC). This division is intended to help an analyst choose which determinative method will apply. Under each analyte column, SW-846 method numbers have been indicated, if appropriate, for the determination of the analyte. A blank has been left if no chromatographic determinative method is available.

Generally, the MS procedures are more specific but less sensitive than the appropriate gas chromatographic/specific detection method.

Method 8000 gives a general description of the techniques of gas chromatography and high performance liquid chromatography. Method 8000 should be consulted prior to application of any of the gas chromatographic methods.

Method 8081 (organochlorine pesticides), Method 8082 (polychlorinated biphenyls), Method 8141 (organophosphorus pesticides), and Method 8151 (chlorinated herbicides), are preferred over GC/MS because of the combination of selectivity and sensitivity of the flame photometric, nitrogen-phosphorus, and electron capture detectors.

Method 8260 is a GC/MS method for volatile analytes, which employs a capillary column. A variety of sample introduction techniques may be used with Method 8260, including Methods 5021, 5030, 5031, 5035, and 3585. A GC with a selective detector is also useful for the determination of volatile organic compounds in a monitoring scenario, as described in Sec. 2.2.5.

Method 8270 is a GC/MS method for semivolatile analytes, which employs a capillary column.

Table 2-39 lists several GC and HPLC methods that apply to only a small number of analytes. Methods 8031 and 8033 are GC methods for acrolein, acrylonitrile, and acetonitrile. Methods 8315 and 8316 are HPLC methods for these three analytes. Method 8316 also addresses acrylamide, which may be analyzed by Method 8032.

HPLC methods have been developed for other types of analytes, most notably carbamates (Method 8318); azo dyes, phenoxy acid herbicides, carbamates, and organophosphorus pesticides (Method 8321); PAHs (Method 8310); explosives (Methods 8330, 8331, and 8332); and some volatile organics (Methods 8315 and 8316).

Method 8430 utilizes a Fourier Transform Infrared Spectrometer (FT-IR) coupled to a gas chromatograph to determine bis(2-chloroethyl) ether and its hydrolysis products. The sample is introduced by direct aqueous injection. Method 8440 may be employed for the determination of total recoverable petroleum hydrocarbons (TRPH) in solid samples by infrared (IR) spectrophotometry. The samples may be extracted with supercritical carbon dioxide, using Method 3560.

2.4 CHARACTERISTICS

Figure 2-2 outlines a sequence for determining if a waste exhibits one or more of the characteristics of a hazardous waste.

2.4.1 EP and TCLP extracts

The leachate obtained from using either the EP (Figure 2-3A) or the TCLP (Figure 2-3B) is an aqueous sample, and therefore, requires further solvent extraction prior to the analysis of semivolatile compounds.

The TCLP leachate is solvent extracted with methylene chloride at a pH > 11 and at a pH <2 by either Method 3510 or 3520. Method 3510 should be used unless the formation of emulsions between the sample and the solvent prevent proper extraction. If this problem is encountered, Method 3520 should be employed.

The solvent extract obtained by performing either Method 3510 or 3520 at a basic or neutral pH will contain the base/neutral compounds of interest. Refer to the specific determinative method for guidance on the pH requirements for extraction prior to analysis. Method 5031 (Azeotropic Distillation) may be used as an effective preparative method for pyridine.

Due to the high concentration of acetate in the TCLP extract, it is recommended that purge-and-trap be used to introduce the volatile sample into the gas chromatograph.

2.5 GROUND WATER

Appropriate analysis schemes for the determination of analytes in ground water are presented in Figures 2-4A, 2-4B, and 2-4C. Quantitation limits for the inorganic analytes should correspond to the drinking water limits which are available.

2.5.1 Special Techniques for Inorganic Analytes

All atomic absorption analyses should employ appropriate background correction systems whenever spectral interferences could be present. Several background correction techniques are employed in modern atomic absorption spectrometers. Matrix modification can complement background correction in some cases. Since no approach to interference correction is completely effective in all cases, the analyst should attempt to verify the adequacy of correction. If the interferant is known (e.g., high concentrations of iron in the determination of selenium), accurate analyses of synthetic solutions of the interferant (with and without analyte) could establish the efficacy of the background correction. If the nature of the interferant is not established, good agreement of analytical results using two substantially different wavelengths could substantiate the adequacy of the background correction.

To reduce matrix interferences, all graphite furnace atomic absorption (GFAA) analyses should be performed using techniques which maximize an isothermal environment within the furnace cell. Data indicate that two such techniques, L'vov platform and the Delayed Atomization Cuvette (DAC), are equivalent in this respect, and produce high quality results.

All furnace atomic absorption analysis should be carried out using the best matrix modifier for the analysis. Some examples of modifiers are listed below. (See also the appropriate methods.)

Element(s)	Modifier(s)
As and Se	Nickel nitrate, palladium
Pb	Phosphoric acid, ammonium phosphate, palladium
Cd	Ammonium phosphate, palladium
Sb	Ammonium nitrate, palladium
Tl	Platinum, palladium

The ICP calibration standards must match the acid composition and strength of the acids contained in the samples. Acid strengths in the ICP calibration standards should be stated in the raw data. When using a method which permits the use of internal standardization, and the internal standardization option is being used, matrix matching is not required.

2.6 REFERENCES

1. Barcelona, M.J. "TOC Determinations in Ground Water"; Ground Water 1984, 22(1), 18-24.

2. Riggin, R.; et al. Development and Evaluation of Methods for Total Organic Halide and Purgeable Organic Halide in Wastewater; U.S. Environmental Protection Agency. Office of Research and Development. Environmental Monitoring and Support Laboratory. ORD Publication Offices of Center for Environmental Research Information: Cincinnati, OH, 1984; EPA-600/4-84-008.

3. McKee, G.; et al. Determination of Inorganic Anions in Water by Ion Chromatography; (Technical addition to Methods for Chemical Analysis of Water and Wastewater, EPA 600/4-79-020), U.S. Environmental Protection Agency. Environmental Monitoring and Support Laboratory. ORD Publication Offices of Center for Environmental Research Information: Cincinnati, OH, 1984; EPA-600/4-84-017.

TABLE 2-1
DETERMINATIVE METHODS FOR ORGANIC ANALYTES

Analyte	Applicable Method(s)
Acenaphthene	8100, 8270, 8275, 8310, 8410
Acenaphthylene	8100, 8270, 8275, 8310, 8410
Acetaldehyde	8315
Acetone	8015, 8260, 8315
Acetonitrile	8015, 8033, 8260
Acetophenone	8270
2-Acetylaminofluorene	8270
1-Acetyl-2-thiourea	8270
Acifluorfen	8151
Acrolein (Propenal)	8015, 8260, 8315, 8316
Acrylamide	8032, 8316
Acrylonitrile	8015, 8031, 8260, 8316
Alachlor	8081
Aldicarb (Temik)	8318, 8321
Aldicarb sulfone	8318, 8321
Aldicarb sulfoxide	8321
Aldrin	8081, 8270
Allyl alcohol	8015, 8260
Allyl chloride	8021, 8260
2-Aminoanthraquinone	8270
Aminoazobenzene	8270
4-Aminobiphenyl	8270
Aminocarb	8321
2-Amino-4,6-dinitrotoluene (2-Am-DNT)	8330
4-Amino-2,6-dinitrotoluene (4-Am-DNT)	8330
3-Amino-9-ethylcarbazole	8270
Anilazine	8270
Aniline	8131, 8270
o-Anisidine	8270
Anthracene	8100, 8270, 8275, 8310, 8410
Aramite	8270
Aroclor-1016 (PCB-1016)	8082, 8270
Aroclor-1221 (PCB-1221)	8082, 8270
Aroclor-1232 (PCB-1232)	8082, 8270
Aroclor-1242 (PCB-1242)	8082, 8270
Aroclor-1248 (PCB-1248)	8082, 8270
Aroclor-1254 (PCB-1254)	8082, 8270
Aroclor-1260 (PCB-1260)	8082, 8270
Aspon	8141
Asulam	8321
Atrazine	8141
Azinphos-ethyl	8141
Azinphos-methyl	8141, 8270
Barban	8270, 8321
Baygon (Propoxur)	8318, 8321
Bendiocarb	8321

Analyte	Applicable Method(s)
Benefin	8091
Benomyl	8321
Bentazon	8151
Benzal chloride	8121
Benzaldehyde	8315
Benz(a)anthracene	8100, 8270, 8275, 8310, 8410
Benzene	8021, 8260
Benzenethiol (Thiophenol)	8270
Benzidine	8270, 8325
Benzo(b)fluoranthene	8100, 8270, 8275, 8310
Benzo(j)fluoranthene	8100
Benzo(k)fluoranthene	8100, 8270, 8275, 8310
Benzoic acid	8270, 8410
Benzo(g,h,i)perylene	8100, 8270, 8275, 8310
Benzo(a)pyrene	8100, 8270, 8275, 8310, 8410
p-Benzoquinone	8270
Benzotrichloride	8121
Benzoylprop ethyl	8325
Benzyl alcohol	8270
Benzyl benzoate	8061
Benzyl chloride	8021, 8121, 8260
α-BHC (α-Hexachlorocyclohexane)	8081, 8121, 8270
β-BHC (β-Hexachlorocyclohexane)	8081, 8121, 8270
δ-BHC (δ-Hexachlorocyclohexane)	8081, 8121, 8270
γ-BHC (Lindane, γ-Hexachlorocyclohexane)	8081, 8121, 8270
Bis(2-chloroethoxy)methane	8111, 8270, 8410
Bis(2-chloroethyl) ether	8111, 8270, 8410, 8430
Bis(2-chloroethyl)sulfide	8260
Bis(2-chloroisopropyl) ether	8021, 8111, 8270, 8410
Bis(2-n-butoxyethyl) phthalate	8061
Bis(2-ethoxyethyl) phthalate	8061
Bis(2-ethylhexyl) phthalate	8061, 8270, 8410
Bis(2-methoxyethyl) phthalate	8061
Bis(4-methyl-2-pentyl)-phthalate	8061
Bolstar (Sulprofos)	8141
Bromacil	8321
Bromoacetone	8021, 8260
4-Bromoaniline	8131
Bromobenzene	8021, 8260
Bromochloromethane	8021, 8260
2-Bromo-6-chloro-4-nitroaniline	8131
Bromodichloromethane	8021, 8260
2-Bromo-4,6-dinitroaniline	8131
4-Bromofluorobenzene	8260
Bromoform	8021, 8260
Bromomethane	8021, 8260

TABLE 2-1. (Continued)

Analyte	Applicable Method(s)
4-Bromophenyl phenyl ether	8111, 8270, 8275, 8410
Bromoxynil	8270
Butanal	8315
1-Butanol (n-Butyl alcohol)	8015
n-Butanol	8260
2-Butanone (Methyl ethyl ketone, MEK)	8015, 8260
Butralin	8091
n-Butyl alcohol (1-Butanol)	8015
t-Butyl alcohol	8015
n-Butylbenzene	8021, 8260
sec-Butylbenzene	8021, 8260
tert-Butylbenzene	8021, 8260
Butyl benzyl phthalate	8061, 8270, 8410
2-sec-Butyl-4,6-dinitrophenol (DNBP, Dinoseb)	8041, 8151, 8270, 8321
Caffeine	8321
Captafol	8081, 8270
Captan	8270
Carbaryl (Sevin)	8270, 8318, 8321, 8325
Carbendazim	8321
Carbofuran (Furaden)	8270, 8318, 8321
Carbon disulfide	8260
Carbon tetrachloride	8021, 8260
Carbophenothion	8141, 8270
Chloral hydrate	8260
Chloramben	8151
Chlordane (NOS)	8270
α-Chlordane	8081
γ-Chlordane	8081
Chlorfenvinphos	8141, 8270
Chloroacetonitrile	8260
2-Chloroacrylonitrile	8015
2-Chloroaniline	8131
3-Chloroaniline	8131
4-Chloroaniline	8131, 8270, 8410
Chlorobenzene	8021, 8260
Chlorobenzilate	8081, 8270
2-Chlorobiphenyl	8082, 8275
2-Chloro-1,3-butadiene (Chloroprene)	8021, 8260
1-Chlorobutane	8260
Chlorodibromomethane (Dibromochloromethane)	8021, 8260
2-Chloro-4,6-dinitroaniline	8131
1-Chloro-2,4-dinitrobenzene	8091
1-Chloro-3,4-dinitrobenzene	8091
Chloroethane	8021, 8260
2-Chloroethanol	8021, 8260, 8430
2-(2-Chloroethoxy)ethanol	8430

Analyte	Applicable Method(s)
2-Chloroethyl vinyl ether	8021, 8260
Chloroform	8021, 8260
1-Chlorohexane	8260
Chloromethane	8021, 8260
5-Chloro-2-methylaniline	8270
Chloromethyl methyl ether	8021
2-Chloro-5-methylphenol	8041
4-Chloro-2-methylphenol	8041
4-Chloro-3-methylphenol	8041, 8270, 8410
3-(Chloromethyl)pyridine hydrochloride	8270
1-Chloronaphthalene	8270, 8275
2-Chloronaphthalene	8121, 8270, 8410
Chloroneb	8081
2-Chloro-4-nitroaniline	8131
4-Chloro-2-nitroaniline	8131
1-Chloro-2-nitrobenzene	8091
1-Chloro-4-nitrobenzene	8091
2-Chloro-6-nitrotoluene	8091
4-Chloro-2-nitrotoluene	8091
4-Chloro-3-nitrotoluene	8091
2-Chlorophenol	8041, 8270, 8410
3-Chlorophenol	8041
4-Chlorophenol	8041, 8410
4-Chloro-1,2-phenylenediamine	8270
4-Chloro-1,3-phenylenediamine	8270
4-Chlorophenyl phenyl ether	8111, 8270, 8410
2-Chlorophenyl 4-nitrophenyl ether	8111
3-Chlorophenyl 4-nitrophenyl ether	8111
4-Chlorophenyl 4-nitrophenyl ether	8111
o-Chlorophenyl thiourea	8325
Chloroprene (2-Chloro-1,3-butadiene)	8021, 8260
3-Chloropropionitrile	8260
Chloropropham	8321
Chloropropylate	8081
Chlorothalonil	8081
2-Chlorotoluene	8021, 8260
4-Chlorotoluene	8021, 8260
Chloroxuron	8321
Chlorpyrifos	8141
Chlorpyrifos methyl	8141
Chrysene	8100, 8270, 8275, 8310, 8410
Coumaphos	8141, 8270
Coumarin Dyes	8321
p-Cresidine	8270
o-Cresol (2-Methylphenol)	8041, 8270, 8410
m-Cresol (3-Methylphenol)	8041, 8270

TABLE 2-1. (Continued)

Analyte	Applicable Method(s)
p-Cresol (4-Methylphenol)	8041, 8270, 8275, 8410
Crotonaldehyde	8015, 8260, 8315
Crotoxyphos	8141, 8270
Cyclohexanone	8315
2-Cyclohexyl-4,6-dinitrophenol	8041, 8270
2,4-D	8151, 8321
Dalapon	8151, 8321
2,4-DB	8151, 8321
DBCP (1,2-Dibromo-3-chloropropane)	8011, 8021, 8081, 8260, 8270
2,4-D, butoxyethanol ester	8321
DCM (Dichloromethane, Methylene chloride)	8021, 8260
DCPA	8081
DCPA diacid	8151
4,4'-DDD	8081, 8270
4,4'-DDE	8081, 8270
4,4'-DDT	8081, 8270
DDVP (Dichlorvos, Dichlorovos)	8141, 8270, 8321
2,2',3,3'4,4'5,5',6,6'-Decachlorobiphenyl	8275
Decanal	8315
Demeton-O, and Demeton-S	8141, 8270
2,4-D, ethylhexyl ester	8321
Diallate	8081, 8270
Diamyl phthalate	8061
2,4-Diaminotoluene	8270
Diazinon	8141
Dibenz(a,h)acridine	8100
Dibenz(a,j)acridine	8100, 8270
Dibenz(a,h)anthracene	8100, 8270, 8275, 8310
7H-Dibenzo(c,g)carbazole	8100
Dibenzofuran	8270, 8275, 8410
Dibenzo(a,e)pyrene	8100, 8270
Dibenzo(a,h)pyrene	8100
Dibenzo(a,i)pyrene	8100
Dibenzothiophene	8275
Dibromochloromethane (Chlorodibromomethane)	8021, 8260
1,2-Dibromo-3-chloropropane (DBCP)	8011, 8260, 8270
1,2-Dibromoethane (EDB, Ethylene dibromide)	8011, 8021, 8260
Dibromofluoromethane	8260
Dibromomethane	8021, 8260
2,6-Dibromo-4-nitroaniline	8131
2,4-Dibromophenyl 4-nitrophenyl ether	8111
Di-n-butyl phthalate	8061, 8270, 8410
Dicamba	8151, 8321
Dichlone	8081, 8270
3,4-Dichloroaniline	8131
1,2-Dichlorobenzene	8021, 8121, 8260, 8270, 8410

TABLE 2-1. (Continued)

Analyte	Applicable Method(s)
1,3-Dichlorobenzene	8021, 8121, 8260, 8270, 8410
1,4-Dichlorobenzene	8021, 8121, 8260, 8270, 8410
3,3'-Dichlorobenzidine	8270,8325
3,5-Dichlorobenzoic acid	8151
2,3-Dichlorobiphenyl	8082, 8275
3,3'-Dichlorobiphenyl	8275
cis-1,4-Dichloro-2-butene	8260
trans-1,4-Dichloro-2-butene	8260
Dichlorodifluoromethane	8021, 8260
1,1-Dichloroethane	8021, 8260
1,2-Dichloroethane	8021, 8260
1,1-Dichloroethene (Vinylidene chloride)	8021, 8260
cis-1,2-Dichloroethene	8021, 8260
trans-1,2-Dichloroethene	8021, 8260
Dichlorofenthion	8141
Dichloromethane (DCM, Methylene chloride)	8021, 8260
2,6-Dichloro-4-nitroaniline	8131
2,3-Dichloronitrobenzene	8091
2,4-Dichloronitrobenzene	8091
3,5-Dichloronitrobenzene	8091
3,4-Dichloronitrobenzene	8091
2,5-Dichloronitrobenzene	8091
2,3-Dichlorophenol	8041
2,4-Dichlorophenol	8041, 8270, 8410
2,5-Dichlorophenol	8041
2,6-Dichlorophenol	8041, 8270
3,4-Dichlorophenol	8041
3,5-Dichlorophenol	8041
2,4-Dichlorophenol 3-methyl-4-nitrophenyl ether	8111
2,6-Dichlorophenyl 4-nitrophenyl ether	8111
3,5-Dichlorophenyl 4-nitrophenyl ether	8111
2,5-Dichlorophenyl 4-nitrophenyl ether	8111
2,4-Dichlorophenyl 4-nitrophenyl ether	8111
2,3-Dichlorophenyl 4-nitrophenyl ether	8111
3,4-Dichlorophenyl 4-nitrophenyl ether	8111
Dichloroprop (Dichlorprop)	8151, 8321
1,2-Dichloropropane	8021, 8260
1,3-Dichloropropane	8021, 8260
2,2-Dichloropropane	8021, 8260
1,3-Dichloro-2-propanol	8021, 8260
1,1-Dichloropropene	8021, 8260
cis-1,3-Dichloropropene	8021, 8260
trans-1,3-Dichloropropene	8021, 8260
Dichlorovos (DDVP, Dichlorvos)	8141, 8270, 8321
Dichlorprop (Dichloroprop)	8151, 8321
Dichlorvos (DDVP, Dichlorovos)	8141, 8270, 8321

Analyte	Applicable Method(s)
Dicrotophos	8141, 8270
Dicofol	8081
Dicyclohexyl phthalate	8061
Dieldrin	8081, 8270
1,2,3,4-Diepoxybutane	8260
Diesel range organics (DRO)	8015, 8440
Diethylene glycol	8430
Diethyl ether	8015, 8260
Diethyl phthalate	8061, 8270, 8410
Diethylstilbestrol	8270
Diethyl sulfate	8270
1,4-Difluorobenzene	8260
Dihexyl phthalate	8061
Dihydrosaffrole	8270
Diisobutyl phthalate	8061
Dimethoate	8141, 8270, 8321
3,3'-Dimethoxybenzidine	8270, 8325
Dimethylaminoazobenzene	8270
2,5-Dimethylbenzaldehyde	8315
7,12-Dimethylbenz(a)anthracene	8270
3,3'-Dimethylbenzidine	8270, 8325
α,α-Dimethylphenethylamine	8270
2,3-Dimethylphenol	8041
2,4-Dimethylphenol	8041, 8270
2,5-Dimethylphenol	8041
2,6-Dimethylphenol	8041
3,4-Dimethylphenol	8041
Dimethyl phthalate	8061, 8270, 8410
Dinitramine	8091
2,4-Dinitroaniline	8131
1,2-Dinitrobenzene	8091, 8270
1,3-Dinitrobenzene (1,3-DNB)	8091, 8270, 8330
1,4-Dinitrobenzene	8091, 8270
4,6-Dinitro-2-methylphenol	8270, 8410
2,4-Dinitrophenol	8041, 8270, 8410
2,5-Dinitrophenol	8041
2,4-Dinitrotoluene (2,4-DNT)	8091, 8270, 8330, 8410
2,6-Dinitrotoluene (2,6-DNT)	8091, 8270, 8330, 8410
Dinocap	8270
Dinonyl phthalate	8061
Dinoseb (2-sec-Butyl-4,6-dinitrophenol, DNBP)	8041, 8151, 8270, 8321
Di-n-octyl phthalate	8061, 8270, 8410
Dioxacarb	8318
1,4-Dioxane	8015, 8260
Dioxathion	8141, 8270
Di-n-propyl phthalate	8410

Analyte	Applicable Method(s)
Diphenylamine	8270
5,5-Diphenylhydantoin	8270
1,2-Diphenylhydrazine	8270
Disperse Blue 3	8321
Disperse Blue 14	8321
Disperse Brown 1	8321
Disperse Orange 3	8321
Disperse Orange 30	8321
Disperse Red 1	8321
Disperse Red 5	8321
Disperse Red 13	8321
Disperse Red 60	8321
Disperse Yellow 5	8321
Disulfoton	8141, 8270, 8321
Diuron	8321, 8325
1,3-DNB (1,3-Dinitrobenzene)	8091, 8270, 8330
DNBP (2-sec-Butyl-4,6-dinitrophenol, Dinoseb)	8151, 8270, 8321
2,4-DNT (2,4-Dinitrotoluene)	8091, 8270, 8275, 8330, 8410
2,6-DNT (2,6-Dinitrotoluene)	8091, 8270, 8330, 8410
EDB (1,2-Dibromoethane, Ethylene dibromide)	8011, 8021, 8260
Endosulfan I	8081, 8270
Endosulfan II	8081, 8270
Endosulfan sulfate	8081, 8270
Endrin	8081, 8270
Endrin aldehyde	8081, 8270
Endrin ketone	8081, 8270
Epichlorohydrin	8021, 8260
EPN	8141, 8270
Ethanol	8015, 8260
Ethion	8141, 8270
Ethoprop	8141
Ethyl acetate	8015, 8260
Ethylbenzene	8021, 8260
Ethyl carbamate	8270
Ethyl cyanide (Propionitrile)	8015, 8260
Ethylene dibromide (EDB, 1,2-Dibromoethane)	8011, 8021, 8260
Ethylene glycol	8015, 8430
Ethylene oxide	8015, 8260
Ethyl methacrylate	8260
Ethyl methanesulfonate	8270
Etridiazole	8081
Famphur	8141, 8270, 8321
Fenitrothion	8141
Fensulfothion	8141, 8270, 8321
Fenthion	8141, 8270
Fenuron	8321

TABLE 2-1. (Continued)

Analyte	Applicable Method(s)
Fluchloralin	8270
Fluometuron	8321
Fluoranthene	8100, 8270, 8275, 8310, 8410
Fluorene	8100, 8270, 8275, 8310, 8410
Fluorescent Brightener 61	8321
Fluorescent Brightener 236	8321
Fluorobenzene	8260
2-Fluorobiphenyl	8270
2-Fluorophenol	8270
Fonophos	8141
Formaldehyde	8315
Furaden (Carbofuran)	8270, 8318, 8321
Gasoline range organics (GRO)	8015
Halowax-1000	8081
Halowax-1001	8081
Halowax-1013	8081
Halowax-1014	8081
Halowax-1051	8081
Halowax-1099	8081
Heptachlor	8081, 8270
2,2',3,3',4,4',5-Heptachlorobiphenyl	8082, 8275
2,2',3,4,4',5,5'-Heptachlorobiphenyl	8082, 8275
2,2',3,4,4',5',6-Heptachlorobiphenyl	8082
2,2',3,4',5,5',6-Heptachlorobiphenyl	8082, 8275
Heptachlor epoxide	8081, 8270
Heptanal	8315
Hexachlorobenzene	8081, 8121, 8270, 8275, 8410
2,2',3,3,4,4'-Hexachlorobiphenyl	8275
2,2',3,4,4',5'-Hexachlorobiphenyl	8082, 8275
2,2',3,4,5,5'-Hexachlorobiphenyl	8082
2,2',3,5,5',6-Hexachlorobiphenyl	8082
2,2',4,4',5,5'-Hexachlorobiphenyl	8082
Hexachlorobutadiene	8021, 8121, 8260, 8270, 8410
α-Hexachlorocyclohexane (α-BHC)	8081, 8121, 8270
β-Hexachlorocyclohexane (β-BHC)	8081, 8121, 8270
δ-Hexachlorocyclohexane (δ-BHC)	8081, 8121, 8270
γ-Hexachlorocyclohexane (γ-BHC, Lindane)	8081, 8121, 8270
Hexachlorocyclopentadiene	8081, 8121, 8270, 8410
Hexachloroethane	8121, 8260, 8270, 8410
Hexachlorophene	8270
Hexachloropropene	8270
Hexafluoro-2-methyl-2-propanol	8015
Hexafluoro-2-propanol	8015
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	8330
Hexamethylphosphoramide (HMPA)	8141, 8270
Hexanal	8315

TABLE 2-1. (Continued)

Analyte	Applicable Method(s)
2-Hexanone	8260
Hexyl 2-ethylhexyl phthalate	8061
HMPA (Hexamethylphosphoramide)	8141, 8270
HMX (Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine)	8330
1,2,3,4,6,7,8-HpCDD	8280, 8290
HpCDD, total	8280
1,2,3,4,6,7,8-HpCDF	8280, 8290
1,2,3,4,7,8,9-HpCDF	8280, 8290
HpCDF, total	8280
1,2,3,4,7,8-HxCDD	8280, 8290
1,2,3,6,7,8-HxCDD	8280, 8290
1,2,3,7,8,9-HxCDD	8280, 8290
HxCDD, total	8280
1,2,3,4,7,8-HxCDF	8280, 8290
1,2,3,6,7,8-HxCDF	8280, 8290
1,2,3,7,8,9-HxCDF	8280, 8290
2,3,4,6,7,8-HxCDF	8280, 8290
HxCDF	8280
Hydroquinone	8270
3-Hydroxycarbofuran	8318, 8321
5-Hydroxydicamba	8151
2-Hydroxypropionitrile	8260
Indeno(1,2,3-cd)pyrene	8100, 8270, 8275, 8310
Iodomethane (Methyl iodide)	8260
Isobutyl alcohol (2-Methyl-1-propanol)	8015, 8260
Isodrin	8081, 8270
Isophorone	8270, 8410
Isopropalin	8091
Isopropyl alcohol (2-Propanol)	8015, 8260
Isopropylbenzene	8021, 8260
p-Isopropyltoluene	8021, 8260
Isosafrole	8270
Isovaleraldehyde	8315
Kepone	8081, 8270
Lannate (Methomyl)	8318, 8321
Leptophos	8141, 8270
Lindane (γ-Hexachlorocyclohexane, γ-BHC)	8081, 8121, 8270
Linuron (Lorox)	8321, 8325
Lorox (Linuron)	8321, 8325
Malathion	8141, 8270
Maleic anhydride	8270
Malononitrile	8260
MCPA	8151, 8321
MCPP	8151, 8321
Merphos	8141, 8321
Mestranol	8270

Analyte	Applicable Method(s)
Mesurol (Methiocarb)	8318, 8321
Methacrylonitrile	8260
Methanol	8015, 8260
Methapyrilene	8270
Methiocarb (Mesurol)	8318, 8321
Methomyl (Lannate)	8318, 8321
Methoxychlor	8081, 8270
Methyl acrylate	8260
2-Methyl-1-propanol (Isobutyl alcohol)	8015, 8260
Methyl-t-butyl ether	8260
3-Methylcholanthrene	8100, 8270
2-Methyl-4,6-dinitrophenol	8041
4,4'-Methylenebis(2-chloroaniline)	8270
4,4'-Methylenebis(N,N-dimethylaniline)	8270
Methyl ethyl ketone (MEK, 2-Butanone)	8015, 8260
Methylene chloride (Dichloromethane, DCM)	8021, 8260
Methyl iodide (Iodomethane)	8260
Methyl isobutyl ketone (MIBK, 4-Methyl-2-pentanone)	8015, 8260
Methyl methacrylate	8260
Methyl methanesulfonate	8270
2-Methylnaphthalene	8270, 8410
Methyl parathion	8270, 8321
4-Methyl-2-pentanone (MIBK, Methyl isobutyl ketone)	8015, 8260
2-Methylphenol (o-Cresol)	8041, 8270, 8410
3-Methylphenol (m-Cresol)	8041, 8270
4-Methylphenol (p-Cresol)	8041, 8270, 8410
2-Methylpyridine (2-Picoline)	8015, 8260, 8270
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	8330
Mevinphos	8141, 8270
Mexacarbate	8270, 8321
MIBK (Methyl isobutyl ketone, 4-Methyl-2-pentanone)	8015, 8260
Mirex	8081, 8270
Monocrotophos	8141, 8270, 8321
Monuron	8321, 8325
Naled	8141, 8270, 8321
Naphthalene	8021, 8100, 8260, 8270, 8275, 8310, 8410
NB (Nitrobenzene)	8091, 8260, 8270, 8330, 8410
1,2-Naphthoquinone	8091
1,4-Naphthoquinone	8270, 8091
1-Naphthylamine	8270
2-Naphthylamine	8270
Neburon	8321
Nicotine	8270
5-Nitroacenaphthene	8270
2-Nitroaniline	8131, 8270, 8410
3-Nitroaniline	8131, 8270, 8410

TABLE 2-1. (Continued)

Analyte	Applicable Method(s)
4-Nitroaniline	8131, 8270, 8410
5-Nitro-o-anisidine	8270
Nitrobenzene (NB)	8091, 8260, 8270, 8330, 8410
4-Nitrobiphenyl	8270
Nitrofen	8081, 8270
Nitroglycerin	8332
2-Nitrophenol	8041, 8270, 8410
3-Nitrophenol	8041
4-Nitrophenol	8041, 8151, 8270, 8410
4-Nitrophenyl phenyl ether	8111
2-Nitropropane	8260
Nitroquinoline-1-oxide	8270
N-Nitrosodi-n-butylamine	8015, 8260, 8270
N-Nitrosodiethylamine	8270
N-Nitrosodimethylamine	8070, 8270, 8410
N-Nitrosodi-n-butylamine (N-Nitrosodibutylamine)	8015, 8260, 8270
N-Nitrosodiphenylamine	8070, 8270, 8410
N-Nitrosodi-n-propylamine	8070, 8270, 8410
N-Nitrosomethylethylamine	8270
N-Nitrosomorpholine	8270
N-Nitrosopiperidine	8270
N-Nitrosopyrrolidine	8270
2-Nitrotoluene (o-Nitrotoluene, 2-NT)	8091, 8330
3-Nitrotoluene (m-Nitrotoluene, 3-NT)	8091, 8330
4-Nitrotoluene (p-Nitrotoluene, 4-NT)	8091, 8330
o-Nitrotoluene (2-Nitrotoluene, 2-NT)	8091, 8330
m-Nitrotoluene (3-Nitrotoluene, 3-NT)	8091, 8330
p-Nitrotoluene (4-Nitrotoluene, 4-NT)	8091, 8330
5-Nitro-o-toluidine	8270
trans-Nonachlor	8081
2,2'3,3'4,4'5,5'6-Nonachlorobiphenyl	8082, 8275
Nonanal	8315
2-NT (2-Nitrotoluene, o-Nitrotoluene)	8091, 8330
3-NT (3-Nitrotoluene, m-Nitrotoluene)	8091, 8330
4-NT (4-Nitrotoluene, p-Nitrotoluene)	8091, 8330
OCDD	8280, 8290
OCDF	8280, 8290
2,2',3,3',4,4'5,5'-Octachlorobiphenyl	8275
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	8330
Octamethyl pyrophosphoramide	8270
Octanal	8315
Oxamyl	8321
4,4'-Oxydianiline	8270
Paraldehyde	8015, 8260
Parathion	8270
Parathion, ethyl	8141

TABLE 2-1. (Continued)

Analyte	Applicable Method(s)
Parathion, methyl	8141
PCB-1016 (Aroclor-1016)	8082, 8270
PCB-1221 (Aroclor-1221)	8082, 8270
PCB-1232 (Aroclor-1232)	8082, 8270
PCB-1242 (Aroclor-1242)	8082, 8270
PCB-1248 (Aroclor-1248)	8082, 8270
PCB-1254 (Aroclor-1254)	8082, 8270
PCB-1260 (Aroclor-1260)	8082, 8270
PCNB	8081
1,2,3,7,8-PeCDD	8280, 8290
PeCDD, total	8280
1,2,3,7,8-PeCDF	8280, 8290
2,3,4,7,8-PeCDF	8280, 8290
PeCDF, total	8280
Pendimethaline (Penoxalin)	8091
Penoxalin (Pendimethaline)	8091
Pentachlorobenzene	8121, 8270
2,2',3,4,5'-Pentachlorobiphenyl	8082
2,2',4,5,5'-Pentachlorobiphenyl	8082, 8275
2,3,3',4',6-Pentachlorobiphenyl	8082
2,3',4,4',5-Pentachlorobiphenyl	8275
Pentachloroethane	8260
Pentachloronitrobenzene	8091, 8270
Pentachlorophenol	8041, 8151, 8270, 8410
Pentafluorobenzene	8260
Pentanal (Valeraldehyde)	8315
2-Pentanone	8015, 8260
Permethrin	8081
Perthane	8081
Phenacetin	8270
Phenanthrene	8100, 8270, 8275, 8310, 8410
Phenobarbital	8270
Phenol	8041, 8270, 8410
1,4-Phenylenediamine	8270
Phorate	8141, 8270, 8321
Phosalone	8270
Phosmet	8141, 8270
Phosphamidon	8141, 8270
Phthalic anhydride	8270
Picloram	8151
2-Picoline (2-Methylpyridine)	8015, 8260, 8270
Piperonyl sulfoxide	8270
Profluralin	8091
Promecarb	8318
Pronamide	8270
Propachlor	8081, 8321

TABLE 2-1. (Continued)

Analyte	Applicable Method(s)
Propanal (Propionaldehyde)	8315, 8321
1-Propanol	8015, 8260
2-Propanol (Isopropyl alcohol)	8015, 8260
Propargyl alcohol	8260
Propenal (Acrolein)	8260, 8315
Propham	8321
ß-Propiolactone	8260
Propionaldehyde (Propanal)	8315
Propionitrile (Ethyl cyanide)	8015, 8260
Propoxur (Baygon)	8318, 8321
n-Propylamine	8260
n-Propylbenzene	8021, 8260
Propylthiouracil	8270
Prothiophos (Tokuthion)	8141
Pyrene	8100, 8270, 8275, 8310, 8410
Pyridine	8015, 8260, 8270
RDX (Hexahydro-1,3,5-trinitro-1,3,5-triazine)	8330
Resorcinol	8270
Ronnel	8141
Rotenone	8325
Safrole	8270
Sevin (Carbaryl)	8270, 8318, 8321, 8325
Siduron	8321, 8325
Simazine	8141
Silvex (2,4,5-TP)	8151, 8321
Solvent Red 3	8321
Solvent Red 23	8321
Stirophos (Tetrachlorvinphos)	8141, 8270
Strobane	8081
Strychnine	8270, 8321
Styrene	8021, 8260
Sulfallate	8270
Sulfotepp	8141
Sulprofos (Bolstar)	8141
2,4,5-T	8151, 8321
2,4,5-T, butoxyethanol ester	8321
2,4,5-T, butyl ester	8321
2,3,7,8-TCDD	8280, 8290
TCDD, total	8280
2,3,7,8-TCDF	8280, 8290
TCDF, total	8280
Tebuthiuron	8321
Temik (Aldicarb)	8318, 8321
TEPP	8141
Terbufos	8141, 8270
1,2,3,4-Tetrachlorobenzene	8121

Analyte	Applicable Method(s)
1,2,3,5-Tetrachlorobenzene	8121
1,2,4,5-Tetrachlorobenzene	8121, 8270
2,2',3,5'-Tetrachlorobiphenyl	8082, 8275
2,2',4,5'-Tetrachlorobiphenyl	8275
2,2',5,5'-Tetrachlorobiphenyl	8082, 8275
2,3',4,4'-Tetrachlorobiphenyl	8082, 8275
1,1,1,2-Tetrachloroethane	8021, 8260
1,1,2,2-Tetrachloroethane	8021, 8260
Tetrachloroethene	8021, 8260
2,3,4,5-Tetrachlorophenol	8041
2,3,4,6-Tetrachlorophenol	8041, 8270
2,3,5,6-Tetrachlorophenol	8041
2,3,4,5-Tetrachloronitrobenzene	8091
2,3,5,6-Tetrachloronitrobenzene	8091
Tetrachlorvinphos (Stirophos)	8141, 8270
Tetraethyl dithiopyrophosphate	8270
Tetraethyl pyrophosphate	8270
Tetrazene	8331
Tetryl (Methyl-2,4,6-trinitrophenylnitramine)	8330
Thiofanox	8321
Thionazin (Zinophos)	8141, 8270
Thiophenol (Benzenethiol)	8270
1,3,5-TNB (1,3,5-Trinitrobenzene)	8270, 8330
2,4,6-TNT (2,4,6-Trinitrobenzene)	8330
TOCP (Tri-o-cresylphosphate)	8141
Tokuthion (Prothiophos)	8141
m-Tolualdehyde	8315
o-Tolualdehyde	8315
p-Tolualdehyde	8315
Toluene	8021, 8260
Toluene diisocyanate	8270
o-Toluidine	8015, 8260, 8270
Toxaphene	8081, 8270
2,4,5-TP (Silvex)	8151, 8321
2,4,6-Tribromophenol	8270
2,4,6-Trichloroaniline	8131
2,4,5-Trichloroaniline	8131
1,2,3-Trichlorobenzene	8021, 8121, 8260
1,2,4-Trichlorobenzene	8021, 8121, 8260, 8270, 8275, 8410
2,2',5-Trichlorobiphenyl	8082, 8275
2,3',5-Trichlorobiphenyl	8275
2,4',5-Trichlorobiphenyl	8082, 8275
1,3,5-Trichlorobenzene	8121
1,1,1-Trichloroethane	8021, 8260
1,1,2-Trichloroethane	8021, 8260
Trichloroethene	8021, 8260

TABLE 2-1. (Continued)

Analyte	Applicable Method(s)
Trichlorofluoromethane	8021, 8260
Trichlorfon	8141, 8321
Trichloronate	8141
1,2,3-Trichloro-4-nitrobenzene	8091
1,2,4-Trichloro-5-nitrobenzene	8091
2,4,6-Trichloronitrobenzene	8091
2,3,4-Trichlorophenol	8041
2,3,5-Trichlorophenol	8041
2,3,6-Trichlorophenol	8041
2,4,5-Trichlorophenol	8041, 8270, 8410
2,4,6-Trichlorophenol	8041, 8270, 8410
2,4,6-Trichlorophenyl 4-nitrophenyl ether	8111
2,3,6-Trichlorophenyl 4-nitrophenyl ether	8111
2,3,5-Trichlorophenyl 4-nitrophenyl ether	8111
2,4,5-Trichlorophenyl 4-nitrophenyl ether	8111
3,4,5-Trichlorophenyl 4-nitrophenyl ether	8111
2,3,4-Trichlorophenyl 4-nitrophenyl ether	8111
1,2,3-Trichloropropane	8021, 8260
O,O,O-Triethyl phosphorothioate	8270
Trifluralin	8091, 8081, 8270
2,4,5-Trimethylaniline	8270
1,2,4-Trimethylbenzene	8021, 8260
1,3,5-Trimethylbenzene	8021, 8260
Trimethyl phosphate	8270
1,3,5-Trinitrobenzene (1,3,5-TNB)	8270, 8330
2,4,6-Trinitrobenzene (2,4,6-TNT)	8330
Tris-BP (Tris-(2,3-dibromopropyl) phosphate)	8270, 8321
Tri-o-cresylphosphate (TOCP)	8141
Tri-p-tolyl phosphate	8270
Tris-(2,3-dibromopropyl) phosphate (Tris-BP)	8270, 8321
Valeraldehyde (Pentanal)	8315
Vinyl acetate	8260
Vinyl chloride	8021, 8260
Vinylidene chloride (1,1-Dichloroethene)	8021, 8260
o-Xylene	8021, 8260
m-Xylene	8021, 8260
p-Xylene	8021, 8260
Zinophos (Thionazin)	8141, 8270

TABLE 2-2A
METHOD 3650 (ACID-BASE PARTITION CLEANUP) - BASE/NEUTRAL FRACTION

Benz(a)anthracene	Hexachlorobenzene
Benzo(a)pyrene	Hexachlorobutadiene
Benzo(b)fluoranthene	Hexachloroethane
Chlordane	Hexachlorocyclopentadiene
Chlorinated dibenzodioxins	Naphthalene
Chrysene	Nitrobenzene
Creosote	Phorate
Dichlorobenzene(s)	2-Picoline
Dinitrobenzene	Pyridine
2,4-Dinitrotoluene	Tetrachlorobenzene(s)
Heptachlor	Toxaphene

TABLE 2-2B
METHOD 3650 (ACID-BASE PARTITION CLEANUP) - ACID FRACTION

2-Chlorophenol	4-Nitrophenol
Cresol(s)	Pentachlorophenol
Creosote	Phenol
Dichlorophenoxyacetic acid	Tetrachlorophenol(s)
2,4-Dimethylphenol	Trichlorophenol(s)
4,6-Dinitro-o-cresol	2,4,5-TP (Silvex)

TABLE 2-3
METHOD 5041 - SORBENT CARTRIDGES FROM VOLATILE ORGANIC SAMPLING TRAIN (VOST)

Acetone	1,2-Dichloropropane
Acrylonitrile	cis-1,3-Dichloropropene
Benzene	trans-1,3-Dichloropropene
Bromodichloromethane	Ethylbenzene[a]
Bromoform[a]	Iodomethane
Bromomethane[b]	Methylene chloride
Carbon disulfide	Styrene[a]
Carbon tetrachloride	1,1,2,2-Tetrachloroethane[a]
Chlorobenzene	Tetrachloroethene
Chlorodibromomethane	Toluene
Chloroethane[b]	1,1,1-Trichloroethane
Chloroform	1,1,2-Trichloroethane
Chloromethane[b]	Trichloroethene
Dibromomethane	Trichlorofluoromethane
1,1-Dichloroethane	1,2,3-Trichloropropane[a]
1,2-Dichloroethane	Vinyl chloride[b]
1,1-Dichloroethene	Xylenes[a]
trans-1,2-Dichloroethene	

[a] Boiling point of this compound is above 120°C. Method 0030 is not appropriate for quantitative sampling of this analyte.

[b] Boiling point of this compound is below 30°C. Special precautions must be taken when sampling for this analyte by Method 0030. Refer to Sec. 1 of Method 5041 for discussion.

TABLE 2-4
METHOD 8011 (MICROEXTRACTION AND GAS CHROMATOGRAPHY)

1,2-Dibromo-3-chloropropane (DBCP)
1,2-Dibromoethane (EDB)

TABLE 2-5
METHOD 8015 (GC/FID) - NONHALOGENATED VOLATILES

Acetone	Isobutyl alcohol
Acetonitrile	Isopropyl alcohol
Acrolein	Methanol
Acrylonitrile	Methyl ethyl ketone (MEK)
Allyl alcohol	Methyl isobutyl ketone (MIBK)
1-Butanol (n-Butyl alcohol)	N-Nitroso-di-n-butylamine
t-Butyl alcohol	Paraldehyde
2-Chloroacrylonitrile	2-Pentanone
Crotonaldehyde	2-Picoline
Diethyl ether	1-Propanol
1,4-Dioxane	Propionitrile
Ethanol	Pyridine
Ethyl acetate	o-Toluidine
Ethylene glycol	Gasoline range organics (GRO)
Ethylene oxide	Diesel range organics (DRO)
Hexafluoro-2-propanol	
Hexafluoro-2-methyl-2-propanol	

TABLE 2-6
METHOD 8021 (GC, PHOTOIONIZATION AND ELECTROLYTIC CONDUCTIVITY DETECTORS) - AROMATIC AND HALOGENATED VOLATILES

Allyl chloride	cis-1,2-Dichloroethene
Benzene	trans-1,2-Dichloroethene
Benzyl chloride	1,2-Dichloropropane
Bis(2-chloroisopropyl) ether	1,3-Dichloropropane
	2,2-Dichloropropane
Bromoacetone	1,3-Dichloro-2-propanol
Bromobenzene	1,1-Dichloropropene
Bromochloromethane	cis-1,3-Dichloropropene
Bromodichloromethane	trans-1,3-Dichloropropene
Bromoform	Epichlorhydrin
Bromomethane	Ethylbenzene
n-Butylbenzene	Hexachlorobutadiene
sec-Butylbenzene	Isopropylbenzene
tert-Butylbenzene	p-Isopropyltoluene
Carbon tetrachloride	Methylene chloride
Chlorobenzene	Naphthalene
Chlorodibromomethane	n-Propylbenzene
Chloroethane	Styrene
2-Chloroethanol	1,1,1,2-Tetrachloroethane
2-Chloroethyl vinyl ether	1,1,2,2-Tetrachloroethane
Chloroform	Tetrachloroethene
Chloromethyl methyl ether	Toluene
Chloroprene	1,2,3-Trichlorobenzene
Chloromethane	1,2,4-Trichlorobenzene
2-Chlorotoluene	1,1,1-Trichloroethane
4-Chlorotoluene	1,1,2-Trichloroethane
1,2-Dibromo-3-chloropropane	Trichloroethene
1,2-Dibromoethane	Trichlorofluoromethane
Dibromomethane	1,2,3-Trichloropropane
1,2-Dichlorobenzene	1,2,4-Trimethylbenzene
1,3-Dichlorobenzene	1,3,5-Trimethylbenzene
1,4-Dichlorobenzene	Vinyl chloride
Dichlorodifluoromethane	o-Xylene
1,1-Dichloroethane	m-Xylene
1,2-Dichloroethane	p-Xylene
1,1-Dichloroethene	

TABLE 2-7
METHODS 8031 AND 8032 (GC) AND 8033 (GC WITH NITROGEN-PHOSPHORUS DETECTION)

Method 8031: Acrylonitrile
Method 8032: Acrylamide
Method 8033: Acetonitrile

TABLE 2-8
METHOD 8041 (GC) - PHENOLS

2-Chloro-5-methylphenol	2,4-Dinitrophenol
4-Chloro-2-methylphenol	2,5-Dinitrophenol
4-Chloro-3-methylphenol	Dinoseb
2-Chlorophenol	2-Methyl-4,6-dinitrophenol
3-Chlorophenol	2-Methylphenol (o-Cresol)
4-Chlorophenol	3-Methylphenol (m-Cresol)
2-Cyclohexyl-4,6-dinitro-phenol	4-Methylphenol (p-Cresol)
	2-Nitrophenol
2,3-Dichlorophenol	3-Nitrophenol
2,4-Dichlorophenol	4-Nitrophenol
2,5-Dichlorophenol	Pentachlorophenol
2,6-Dichlorophenol	Phenol
3,4-Dichlorophenol	2,3,4,5-Tetrachlorophenol
3,5-Dichlorophenol	2,3,4,6-Tetrachlorophenol
2,3-Dimethylphenol	2,3,5,6-Tetrachlorophenol
2,4-Dimethylphenol	2,3,4-Trichlorophenol
2,5-Dimethylphenol	2,3,5-Trichlorophenol
2,6-Dimethylphenol	2,3,6-Trichlorophenol
3,4-Dimethylphenol	2,4,5-Trichlorophenol
	2,4,6-Trichlorophenol

TABLE 2-9
METHOD 8061 (GC/ECD) - PHTHALATE ESTERS

Benzyl benzoate	Dicyclohexyl phthalate
Bis(2-n-butoxyethyl) phthalate	Dihexyl phthalate
Bis(2-ethoxyethyl) phthalate	Diisobutyl phthalate
Bis(2-ethylhexyl) phthalate	Di-n-butyl phthalate
Bis(2-methoxyethyl) phthalate	Diethyl phthalate
Bis(4-methyl-2-pentyl)-phthalate	Dinonyl phthalate
	Dimethyl phthalate
Butyl benzyl phthalate	Di-n-octyl phthalate
Diamyl phthalate	Hexyl 2-ethylhexyl phthalate

TABLE 2-10
METHOD 8070 (GC) - NITROSAMINES

N-Nitrosodimethylamine
N-Nitrosodiphenylamine
N-Nitrosodi-n-propylamine

TABLE 2-11
METHOD 8081 (GC) - ORGANOCHLORINE PESTICIDES AND PCBs

Alachlor	Dichlone	Hexachlorobenzene
Aldrin	Dicofol	Hexachlorocyclo-pentadiene
α-BHC	Dieldrin	Isodrin
β-BHC	Endosulfan I	Kepone
δ-BHC	Endosulfan II	Methoxychlor
γ-BHC (Lindane)	Endosulfan sulfate	Mirex
Captafol	Endrin	Nitrofen
Chlorobenzilate	Endrin aldehyde	trans-Nonachlor
α-Chlordane	Endrin ketone	PCNB
γ-Chlordane	Etridiazole	Permethrin
Chlordane (NOS)	Halowax-1000	Perthane
Chloroneb	Halowax-1001	Propachlor
Chloropropylate	Halowax-1013	Strobane
Chlorothalonil	Halowax-1014	Toxaphene
DBCP	Halowax-1051	Trifluralin
DCPA	Halowax-1099	
4,4'-DDD	Heptachlor	
4,4'-DDE	Heptachlor epoxide	
4,4'-DDT		
Diallate		

TABLE 2-12
METHOD 8082 (GC) - POLYCHLORINATED BIPHENYLS

Aroclor 1016	2,2',3,4,5'-Pentachlorobiphenyl
Aroclor 1221	2,2',4,5,5'-Pentachlorobiphenyl
Aroclor 1232	2,3,3',4',6-Pentachlorobiphenyl
Aroclor 1242	2,2',3,4,4',5'-Hexachlorobiphenyl
Aroclor 1248	2,2',3,4,5,5'-Hexachlorobiphenyl
Aroclor 1254	2,2',3,5,5',6-Hexachlorobiphenyl
Aroclor 1260	2,2',4,4',5,5'-Hexachlorobiphenyl
2-Chlorobiphenyl	2,2',3,3',4,4',5-Heptachlorobiphenyl
2,3-Dichlorobiphenyl	2,2',3,4,4',5,5'-Heptachlorobiphenyl
2,2',5-Trichlorobiphenyl	2,2',3,4,4',5',6-Heptachloro-biphenyl
2,4',5-Trichlorobiphenyl	
2,2',3,5'-Tetrachlorobiphenyl	2,2',3,4',5,5',6-Heptachlorobiphenyl
2,2',5,5'-Tetrachlorobiphenyl	2,2',3,3',4,4',5,5',6-Nonachloro-biphenyl
2,3',4,4'-Tetrachlorobiphenyl	

TABLE 2-13
METHOD 8091 (GC) - NITROAROMATICS AND CYCLIC KETONES

Benefin	2,4-Dinitrotoluene
Butralin	2,6-Dinitrotoluene
1-Chloro-2,4-dinitrobenzene	Isopropalin
1-Chloro-3,4-dinitrobenzene	1,2-Naphthoquinone
1-Chloro-2-nitrobenzene	1,4-Naphthoquinone
1-Chloro-4-nitrobenzene	Nitrobenzene
2-Chloro-6-nitrotoluene	2-Nitrotoluene
4-Chloro-2-nitrotoluene	3-Nitrotoluene
4-Chloro-3-nitrotoluene	4-Nitrotoluene
2,3-Dichloronitrobenzene	Penoxalin [Pendimethalin]
2,4-Dichloronitrobenzene	Pentachloronitrobenzene
3,5-Dichloronitrobenzene	Profluralin
3,4-Dichloronitrobenzene	2,3,4,5-Tetrachloronitrobenzene
2,5-Dichloronitrobenzene	2,3,5,6-Tetrachloronitrobenzene
Dinitramine	1,2,3-Trichloro-4-nitrobenzene
1,2-Dinitrobenzene	1,2,4-Trichloro-5-nitrobenzene
1,3-Dinitrobenzene	2,4,6-Trichloronitrobenzene
1,4-Dinitrobenzene	Trifluralin

TABLE 2-14
METHOD 8100 - POLYNUCLEAR AROMATIC HYDROCARBONS

Acenaphthene	Dibenz(a,h)anthracene
Acenaphthylene	7H-Dibenzo(c,g)carbazole
Anthracene	Dibenzo(a,e)pyrene
Benz(a)anthracene	Dibenzo(a,h)pyrene
Benzo(b)fluoranthene	Dibenzo(a,i)pyrene
Benzo(j)fluoranthene	Fluoranthene
Benzo(k)fluoranthene	Fluorene
Benzo(g,h,i)perylene	Indeno(1,2,3-cd)pyrene
Benzo(a)pyrene	3-Methylcholanthrene
Chrysene	Naphthalene
Dibenz(a,h)acridine	Phenanthrene
Dibenz(a,j)acridine	Pyrene

TABLE 2-15
METHOD 8111 (GC) - HALOETHERS

Bis(2-chloroethoxy)methane	2,3-Dichlorophenyl 4-nitrophenyl ether
Bis(2-chloroethyl) ether	3,4-Dichlorophenyl 4-nitrophenyl ether
Bis(2-chloroisopropyl) ether	4-Nitrophenyl phenyl ether
4-Bromophenyl phenyl ether	2,4,6-Trichlorophenyl 4-nitrophenyl ether
4-Chlorophenyl phenyl ether	2,3,6-Trichlorophenyl 4-nitrophenyl ether
2-Chlorophenyl 4-nitrophenyl ether	2,3,5-Trichlorophenyl 4-nitrophenyl ether
3-Chlorophenyl 4-nitrophenyl ether	2,4,5-Trichlorophenyl 4-nitrophenyl ether
4-Chlorophenyl 4-nitrophenyl ether	3,4,5-Trichlorophenyl 4-nitrophenyl ether
2,4-Dibromophenyl 4-nitrophenyl ether	2,3,4-Trichlorophenyl 4-nitrophenyl ether
2,4-Dichlorophenyl 3-methyl-4-nitrophenyl ether	
2,6-Dichlorophenyl 4-nitrophenyl ether	
3,5-Dichlorophenyl 4-nitrophenyl ether	
2,5-Dichlorophenyl 4-nitrophenyl ether	
2,4-Dichlorophenyl 4-nitrophenyl ether	

TABLE 2-16
METHOD 8121 (GC) - CHLORINATED HYDROCARBONS

Benzal chloride	δ-Hexachlorocyclohexane [δ-BHC]
Benzotrichloride	γ-Hexachlorocyclohexane [γ-BHC]
Benzyl chloride	Hexachlorocyclopentadiene
2-Chloronaphthalene	Hexachloroethane
1,2-Dichlorobenzene	Pentachlorobenzene
1,3-Dichlorobenzene	1,2,3,4-Tetrachlorobenzene
1,4-Dichlorobenzene	1,2,3,5-Tetrachlorobenzene
Hexachlorobenzene	1,2,4,5-Tetrachlorobenzene
Hexachlorobutadiene	1,2,3-Trichlorobenzene
α-Hexachlorocyclohexane [α-BHC]	1,2,4-Trichlorobenzene
β-Hexachlorocyclohexane [β-BHC]	1,3,5-Trichlorobenzene

TABLE 2-17
METHOD 8131 (GC) - ANILINE AND SELECTED DERIVATIVES

Aniline	2,6-Dibromo-4-nitroaniline
4-Bromoaniline	3,4-Dichloroaniline
2-Bromo-6-chloro-4-nitroanilne	2,6-Dichloro-4-nitroaniline
2-Bromo-4,6-dintroaniline	2,4-Dinitroaniline
2-Chloroaniline	2-Nitroaniline
3-Chloroaniline	3-Nitroaniline
4-Chloroaniline	4-Nitroaniline
2-Chloro-4,6-dinitroaniline	2,4,6-Trichloroaniline
2-Chloro-4-nitroaniline	2,4,5-Trichloroaniline
4-Chloro-2-nitroaniline	

TABLE 2-18
METHOD 8141 (GC) - ORGANOPHOSPHORUS COMPOUNDS

Aspon	Fenthion
Atrazine	Fonophos
Azinphos-ethyl	Hexamethylphosphoramide (HMPA)
Azinphos-methyl	Leptophos
Bolstar (Sulprofos)	Malathion
Carbophenothion	Merphos
Chlorofenvinphos	Mevinphos
Chlorpyrifos	Monocrotophos
Chlorpyrifos methyl	Naled
Coumaphos	Parathion, ethyl
Crotoxyphos	Parathion, methyl
Demeton-O, and -S	Phorate
Diazinon	Phosmet
Dichlorofenthion	Phosphamidon
Dichlorvos (DDVP)	Ronnel
Dicrotophos	Simazine
Dimethoate	Stirophos (Tetrachlorvinphos)
Dioxathion	Sulfotepp
Disulfoton	TEPP
EPN	Terbufos
Ethion	Thionazin (Zinophos)
Ethoprop	Tokuthion (Prothiophos)
Famphur	Trichlorfon
Fenitrothion	Trichloronate
Fensulfothion	Tri-o-cresylphosphate (TOCP)

TABLE 2-19
METHOD 8151 (GC USING METHYLATION OR PENTAFLUOROBENZYLATION DERIVATIZATON) - CHLORINATED HERBICIDES

Acifluorfen	Dicamba	MCPP
Bentazon	3,5-Dichlorobenzoic acid	4-Nitrophenol
Chloramben	Dichloroprop	Pentachlorophenol
2,4-D	Dinoseb	Picloram
Dalapon	5-Hydroxydicamba	2,4,5-TP (Silvex)
2,4-DB	MCPA	2,4,5-T
DCPA diacid		

TABLE 2-20
METHOD 8260 (GC/MS)- VOLATILE ORGANIC COMPOUNDS

Acetone
Acetonitrile
Acrolein (Propenal)
Acrylonitrile
Allyl alcohol
Allyl chloride
Benzene
Benzyl chloride
Bis(2-chloroethyl)-sulfide
Bromoacetone
Bromobenzene
Bromochloromethane
Bromodichloromethane
4-Bromofluorobenzene
Bromoform
Bromomethane
n-Butanol
2-Butanone (MEK)
t-Butyl alcohol
n-Butylbenzene
sec-Butylbenzene
tert-Butylbenzene
Carbon disulfide
Carbon tetrachloride
Chloral hydrate
Chloroacetonitrile
Chlorobenzene
1-Chlorobutane
Chlorodibromomethane
Chloroethane
2-Chloroethanol
2-Chloroethyl vinyl ether
Chloroform
1-Chlorohexane
Chloromethane
Chloroprene
3-Chloropropionitrile
2-Chlorotoluene
4-Chlorotoluene
Crotonaldehyde
1,2-Dibromo-3-chloropropane
1,2-Dibromoethane
Dibromofluoromethane
Dibromomethane
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
cis-1,4-Dichloro-2-butene
trans-1,4-Dichloro-2-butene
Dichlorodifluoromethane
1,1-Dichloroethane
1,2-Dichloroethane
1,1-Dichloroethene
cis-1,2-Dichloroethene
trans-1,2-Dichloro-ethene
1,2-Dichloropropane
1,3-Dichloropropane
2,2-Dichloropropane
1,3-Dichloro-2-propanol
1,1-Dichloropropene
cis-1,3-Dichloropropene
trans-1,3-Dichloro-propene
1,2,3,4-Diepoxybutane
Diethyl ether
1,4-Difluorobenzene
1,4-Dioxane
Epichlorohydrin
Ethanol
Ethyl acetate
Ethylbenzene
Ethylene oxide
Ethyl methacrylate
Fluorobenzene
Hexachlorobutadiene
Hexachloroethane
2-Hexanone
2-Hydroxypropionitrile
Iodomethane
Isobutyl alcohol
Isopropylbenzene
p-Isopropyltoluene
Malononitrile
Methacrylonitrile
Methanol
Methyl-t-butyl ether
Methylene chloride
Methyl acrylate
Methyl methacrylate
4-Methyl-2-pentanone (MIBK)
Naphthalene
Nitrobenzene
2-Nitropropane
N-Nitroso-di-n-butylamine
Paraldehyde
Pentachloroethane
Pentafluorobenzene
2-Pentanone
2-Picoline
1-Propanol
2-Propanol
Propargyl alcohol
ß-Propiolactone
Propionitrile (Ethyl cyanide)
n-Propylamine
n-Propylbenzene
Pyridine
Styrene
1,1,1,2-Tetrachloro-ethane
1,1,2,2-Tetrachloro-ethane
Tetrachloroethene
Toluene
o-Toluidine
1,2,3-Trichlorobenzene
1,2,4-Trichlorobenzene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethene
Trichlorofluoromethane
1,2,3-Trichloropropane
1,2,4-Trimethylbenzene
1,3,5-Trimethylbenzene
Vinyl acetate
Vinyl chloride
o-Xylene
m-Xylene
p-Xylene

TABLE 2-21
METHOD 8270 (GC/MS) - SEMIVOLATILE ORGANIC COMPOUNDS

Acenaphthene
Acenaphthylene
Acetophenone
2-Acetylaminofluorene
1-Acetyl-2-thiourea
Aldrin
2-Aminoanthraquinone
Aminoazobenzene
4-Aminobiphenyl
3-Amino-9-ethyl-carbazole
Anilazine
Aniline
o-Anisidine
Anthracene
Aramite
Aroclor-1016
Aroclor-1221
Aroclor-1232
Aroclor-1242
Aroclor-1248
Aroclor-1254
Aroclor-1260
Azinphos-methyl
Barban
Benz(a)anthracene
Benzidine
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzoic acid
Benzo(g,h,i)perylene
Benzo(a)pyrene
p-Benzoquinone
Benzyl alcohol
α-BHC
β-BHC
δ-BHC
γ-BHC (Lindane)
Bis(2-chloroethoxy)-methane
Bis(2-chloroethyl) ether
Bis(2-chloroisopropyl) ether
Bis(2-ethylhexyl) phthalate
4-Bromophenyl phenyl ether
Bromoxynil
Butyl benzyl phthalate
Captafol
Captan
Carbaryl
Carbofuran
Carbophenothion
Chlordane (NOS)
Chlorfenvinphos
4-Chloroaniline
Chlorobenzilate
5-Chloro-2-methyl-aniline
4-Chloro-3-methylphenol
3-(Chloromethyl)-pyridine hydro-chloride
1-Chloronaphthalene
2-Chloronaphthalene
2-Chlorophenol
4-Chloro-1,2-phenylene-diamine
4-Chloro-1,3-phenylene-diamine
4-Chlorophenyl phenyl ether
Chrysene
Coumaphos
p-Cresidine
Crotoxyphos
2-Cyclohexyl-4,6-dinitrophenol
4,4'-DDD
4,4'-DDE
4,4'-DDT
Demeton-O
Demeton-S
Diallate (cis or trans)
2,4-Diaminotoluene
Dibenz(a,j)acridine
Dibenz(a,h)anthracene
Dibenzofuran
Dibenzo(a,e)pyrene
1,2-Dibromo-3-chloropropane
Di-n-butyl phthalate
Dichlone
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
3,3'-Dichlorobenzidine
2,4-Dichlorophenol
2,6-Dichlorophenol
Dichlorovos
Dicrotophos
Dieldrin
Diethyl phthalate
Diethylstilbestrol
Diethyl sulfate
Dihydrosaffrole
Dimethoate
3,3'-Dimethoxybenzidine
Dimethylaminoazobenzene
7,12-Dimethylbenz(a)-anthracene
3,3'-Dimethylbenzidine
α,α-Dimethylphenethyl-amine
2,4-Dimethylphenol
Dimethyl phthalate
1,2-Dinitrobenzene
1,3-Dinitrobenzene
1,4-Dinitrobenzene
4,6-Dinitro-2-methyl-phenol
2,4-Dinitrophenol
2,4-Dinitrotoluene
2,6-Dinitrotoluene
Dinocap
Dinoseb
Dioxathion
Diphenylamine
5,5-Diphenylhydantoin
1,2-Diphenylhydrazine
Di-n-octyl phthalate
Disulfoton
Endosulfan I
Endosulfan II
Endosulfan sulfate
Endrin
Endrin aldehyde
Endrin ketone
EPN
Ethion
Ethyl carbamate
Ethyl methanesulfonate

Famphur
Fensulfothion
Fenthion
Fluchloralin
Fluoranthene
Fluorene
2-Fluorobiphenyl
2-Fluorophenol
Heptachlor
Heptachlor epoxide
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclo-
pentadiene
Hexachloroethane
Hexachlorophene
Hexachloropropene
Hexamethylphosphoramide
Hydroquinone
Indeno(1,2,3-cd)pyrene
Isodrin
Isophorone
Isosafrole
Kepone
Leptophos
Malathion
Maleic anhydride
Mestranol
Methapyrilene
Methoxychlor
3-Methylcholanthrene
4,4'-Methylenebis-
(2-chloroaniline)
4,4'-Methylenebis-
(N,N-dimethylaniline)
Methyl methanesulfonate
2-Methylnaphthalene
Methyl parathion
2-Methylphenol
3-Methylphenol
4-Methylphenol
Mevinphos
Mexacarbate
Mirex
Monocrotophos
Naled
Naphthalene
1,4-Naphthoquinone
1-Naphthylamine
2-Naphthylamine
Nicotine
5-Nitroacenaphthene
2-Nitroaniline
3-Nitroaniline
4-Nitroaniline
5-Nitro-o-anisidine
Nitrobenzene
4-Nitrobiphenyl
Nitrofen
2-Nitrophenol
4-Nitrophenol
Nitroquinoline-1-oxide
N-Nitrosodi-n-
butylamine
N-Nitrosodiethylamine
N-Nitrosodimethylamine
N-Nitrosodiphenylamine
N-Nitrosodi-n-propyl-
amine
N-Nitrosomethylethyl-
amine
N-Nitrosomorpholine
N-Nitrosopiperidine
N-Nitrosopyrrolidine
5-Nitro-o-toluidine
Octamethyl pyrophos-
phoramide
4,4'-Oxydianiline
Parathion
Pentachlorobenzene
Pentachloronitrobenzene
Pentachlorophenol
Phenacetin
Phenanthrene
Phenobarbital
Phenol
1,4-Phenylenediamine
Phorate
Phosalone
Phosmet
Phosphamidion
Phthalic anhydride
2-Picoline
Piperonyl sulfoxide
Pronamide
Propylthiouracil
Pyrene
Pyridine
Resorcinol
Safrole
Strychnine
Sulfallate
Terbufos
1,2,4,5-Tetrachloro
benzene
2,3,4,6-Tetrachloro-
phenol
Tetrachlorvinphos
Tetraethyl dithio-
pyrophosphate
Tetraethyl
pyrophosphate
Thionazine
Thiophenol
(Benzenethiol)
Toluene diisocyanate
o-Toluidine
Toxaphene
2,4,6-Tribromophenol
1,2,4-Trichlorobenzene
2,4,5-Trichlorophenol
2,4,6-Trichlorophenol
O,O,O-Triethyl
phosphorothioate
Trifluralin
2,4,5-Trimethylaniline
Trimethyl phosphate
1,3,5-Trinitrobenzene
Tris(2,3-dibromopropyl)
phosphate
Tri-p-tolyl phosphate

TABLE 2-22
METHOD 8275 (TE/GC/MS) - SEMIVOLATILE ORGANIC COMPOUNDS

Acenaphthene	Pyrene	2,3',4,4',5-Penta-chlorobiphenyl
Acenaphthylene	1,2,4-Trichlorobenzene	2,2',3,4,4',5'-Hexachlorobiphenyl
Anthracene	2-Chlorobiphenyl	2,2',3,3',4,4'-Hexachlorobiphenyl
Benz(a)anthracene	3,3'-Dichlorobiphenyl	2,2',3,4',5,5',6-Heptachlorobiphenyl
Benzo(a)pyrene	2,2',5-Trichloro-biphenyl	2,2',3,4,4',5,5'-Heptachlorobiphenyl
Benzo(b)fluoranthene	2,3',5-Trichloro-biphenyl	2,2',3,3',4,4',5-Heptachlorobiphenyl
Benzo(g,h,i)perylene	2,4',5-Trichloro-biphenyl	2,2',3,3',4,4',5,5'-Octachlorobiphenyl
Benzo(k)fluoranthene	2,2',5,5'-Tetrachloro-biphenyl	2,2',3,3'4,4',5,5',6-Nonachlorobiphenyl
4-Bromophenyl phenyl ether	2,2'4,5'-Tetrachloro-biphenyl	2,2',3,3'4,4',5,5',6,6'-Decachlorobiphenyl
1-Chloronaphthalene	2,2'3,5'-Tetrachloro-biphenyl	
Chrysene	2,3',4,4'-Tetrachloro-biphenyl	
Dibenzofuran	2,2',4,5,5'-Penta-chlorobiphenyl	
Dibenz(a,h)anthracene		
Dibenzothiophene		
Fluoranthene		
Fluorene		
Hexachlorobenzene		
Indeno(1,2,3-cd)pyrene		
Naphthalene		
Phenanthrene		

TABLE 2-23
METHODS 8280 (HRGC/LRMS) AND 8290 (HRGC/HRMS) -
POLYCHLORINATED DIBENZO-*p*-DIOXINS (PCDDs)
AND POLYCHLORINATED DIBENZOFURANS (PCDFs)

2,3,7,8-TCDD	HpCDD, total*	1,2,3,7,8,9-HxCDF
TCDD, total*	OCDD	2,3,4,6,7,8-HxCDF
1,2,3,7,8-PeCDD	2,3,7,8-TCDF	HxCDF, total*
PeCDD, total*	TCDF, total*	1,2,3,4,6,7,8-HpCDF
1,2,3,4,7,8-HxCDD	1,2,3,7,8-PeCDF	1,2,3,4,7,8,9-HpCDF
1,2,3,6,7,8-HxCDD	2,3,4,7,8-PeCDF	HpCDF, total*
1,2,3,7,8,9-HxCDD	PeCDF, total*	OCDF
HxCDD, total*	1,2,3,4,7,8-HxCDF	
1,2,3,4,6,7,8-HpCDD	1,2,3,6,7,8-HxCDF	

* Analyte of only Method 8280.

TABLE 2-24
METHOD 8310 (HPLC) - POLYNUCLEAR AROMATIC HYDROCARBONS

Acenaphthene	Chrysene
Acenaphthylene	Dibenzo(a,h)anthracene
Anthracene	Fluoranthene
Benzo(a)anthracene	Fluorene
Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene
Benzo(b)fluoranthene	Naphthalene
Benzo(g,h,i)perylene	Phenanthrene
Benzo(k)fluoranthene	Pyrene

TABLE 2-25
METHOD 8315 - CARBONYL COMPOUNDS

Acetaldehyde	Hexanal (Hexaldehyde)
Acetone	Isovaleraldehyde
Acrolein	Nonanal
Benzaldehyde	Octanal
Butanal (Butyraldehyde)	Pentanal (Valeraldehyde)
Crotonaldehyde	Propanal
Cyclohexanone	(Propionaldehyde)
Decanal	m-Tolualdehyde
2,5-Dimethylbenzaldehyde	o-Tolualdehyde
Formaldehyde	p-Tolualdehyde
Heptanal	

TABLE 2-26
METHOD 8316 (HPLC)

Acrylamide
Acrylonitrile
Acrolein

TABLE 2-27
METHOD 8318 (HPLC) - N-METHYLCARBAMATES

Aldicarb (Temik)
Aldicarb sulfone
Carbaryl (Sevin)
Carbofuran (Furadan)
Dioxacarb
3-Hydroxycarbofuran
Methiocarb (Mesurol)
Methomyl (Lannate)
Promecarb
Propoxur (Baygon)

TABLE 2-28. METHOD 8321 (HPLC/TS/MS) - NONVOLATILE ORGANIC COMPOUNDS

Azo Dyes
Disperse Red 1
Disperse Red 5
Disperse Red 13
Disperse Yellow 5
Disperse Orange 3
Disperse Orange 30
Disperse Brown 1
Solvent Red 3
Solvent Red 23

Chlorinated Phenoxyacid Compounds
2,4-D
2,4-D, butoxyethanol ester
2,4-D, ethylhexyl ester
2,4-DB
Dalapon
Dicamba
Dichlorprop
Dinoseb
MCPA
MCPP
Silvex (2,4,5-TP)
2,4,5-T
2,4,5-T, butyl ester
2,4,5-T, butoxyethanol ester

Alkaloids
Strychnine
Caffeine

Organophosphorus Compounds
Asulam
Fensulfothion
Dichlorvos
Dimethoate
Disulfoton
Merphos
Methomyl
Methyl parathion
Monocrotophos
Famphur
Naled
Phorate
Trichlorfon
Thiofanox
Tris(2,3-dibromopropyl) phosphate (Tris-BP)

Anthraquinone Dyes

Disperse Blue 3
Disperse Blue 14
Disperse Red 60
Coumarin Dyes

Fluorescent Brighteners

Fluorescent Brightener 61
Fluorescent Brightener 236

Carbamates

Aldicarb
Aldicarb sulfone
Aldicarb sulfoxide
Aminocarb
Barban
Benomyl
Bromacil
Bendiocarb
Carbaryl
Carbendazim
Carbofuran
3-Hydroxycarbofuran
Chloroxuron
Chloropropham
Diuron
Fenuron
Fluometuron
Linuron
Methiocarb
Methomyl
Mexacarbate
Monuron
Neburon
Oxamyl
Propachlor
Propham
Propoxur
Siduron
Tebuthiuron

TABLE 2-29
METHOD 8325 (HPLC/PB/MS) - NONVOLATILE ORGANIC COMPOUNDS

Benzidine	3,3'-Dimethylbenzidine
Benzoylprop ethyl	Diuron
Carbaryl	Linuron (Lorox)
o-Chlorophenyl thiourea	Monuron
3,3'-Dichlorobenzidine	Rotenone
3,3'-Dimethoxybenzidine	Siduron

TABLE 2-30
METHOD 8330 (HPLC) - NITROAROMATICS AND NITRAMINES

4-Amino-2,6-dinitrotoluene (4-Am-DNT)	Nitrobenzene (NB)
2-Amino-4,6-dinitrotoluene (2-Am-DNT)	2-Nitrotoluene (2-NT)
1,3-Dinitrobenzene (1,3-DNB)	3-Nitrotoluene (3-NT)
2,4-Dinitrotoluene (2,4-DNT)	4-Nitrotoluene (4-NT)
2,6-Dinitrotoluene (2,6-DNT)	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	1,3,5-Trinitrobenzene (1,3,5-TNB)
Methyl-2,4,6-trinitrophenyl-nitramine (Tetryl)	2,4,6-Trinitrotoluene (2,4,6-TNT)

TABLE 2-31
METHOD 8331 (REVERSE PHASE HPLC)

Tetrazene

TABLE 2-32
METHOD 8332 (HPLC)

Nitroglycerine

TABLE 2-33
METHOD 8410 - SEMIVOLATILE ORGANIC COMPOUNDS

Acenaphthene	2,6-Dinitrotoluene
Acenaphthylene	Di-n-octyl phthalate
Anthracene	Di-n-propyl phthalate
Benzo(a)anthracene	Fluoranthene
Benzo(a)pyrene	Fluorene
Benzoic acid	Hexachlorobenzene
Bis(2-chloroethoxy)methane	1,3-Hexachlorobutadiene
Bis(2-chloroethyl) ether	Hexachlorocyclopentadiene
Bis(2-chloroisopropyl) ether	Hexachloroethane
Bis(2-ethylhexyl) phthalate	Isophorone
4-Bromophenyl phenyl ether	2-Methylnaphthalene
Butyl benzyl phthalate	2-Methylphenol
4-Chloroaniline	4-Methylphenol
4-Chloro-3-methylphenol	Naphthalene
2-Chloronaphthalene	2-Nitroaniline
2-Chlorophenol	3-Nitroaniline
4-Chlorophenol	4-Nitroaniline
4-Chlorophenyl phenyl ether	Nitrobenzene
Chrysene	2-Nitrophenol
Dibenzofuran	4-Nitrophenol
Di-n-butyl phthalate	N-Nitrosodimethylamine
1,2-Dichlorobenzene	N-Nitrosodiphenylamine
1,3-Dichlorobenzene	N-Nitroso-di-n-propylamine
1,4-Dichlorobenzene	Pentachlorophenol
2,4-Dichlorophenol	Phenanthrene
Diethyl phthalate	Phenol
Dimethyl phthalate	Pyrene
4,6-Dinitro-2-methylphenol	1,2,4-Trichlorobenzene
2,4-Dinitrophenol	2,4,5-Trichlorophenol
2,4-Dinitrotoluene	2,4,6-Trichlorophenol

TABLE 2-34
METHOD 8430 (GC/FT-IR) - BIS(2-CHLOROETHYL) ETHER
AND ITS HYDROLYSIS PRODUCTS

Bis(2-chloroethyl) ether
2-Chloroethanol
2-(2-Chloroethoxy)ethanol
Diethylene glycol
Ethylene glycol

TABLE 2-35
ANALYSIS METHODS FOR INORGANIC ANALYTES

Compound	Applicable Method(s)
Aluminum	6010, 6020, 7020
Antimony	6010, 6020, 7040, 7041, 7062
Arsenic	6010, 6020, 7060, 7061, 7062, 7063
Barium	6010, 6020, 7080, 7081
Beryllium	6010, 6020, 7090, 7091
Bromide	9056, 9211
Cadmium	6010, 6020, 7130, 7131
Calcium	6010, 7140
Chloride	9056, 9057, 9212, 9250, 9251, 9253
Chromium	6010, 6020, 7190, 7191
Chromium, hexavalent	7195, 7196, 7197, 7198, 7199
Cobalt	6010, 6020, 7200, 7201
Copper	6010, 6020, 7210, 7211
Cyanide	9010, 9012, 9013, 9213
Fluoride	9056, 9214
Iron	6010, 7380, 7381
Lead	6010, 6020, 7420, 7421
Lithium	6010, 7430
Magnesium	6010, 7450
Manganese	6010, 6020, 7460, 7461
Mercury	7470, 7471, 7472
Molybdenum	6010, 7480, 7481
Nickel	6010, 6020, 7520, 7521
Nitrate	9056, 9210
Nitrite	9056
Osmium	7550
Phosphate	9056
Phosphorus	6010
Phosphorus, white	7580
Potassium	6010, 7610
Selenium	6010, 7740, 7741, 7742
Silver	6010, 6020, 7760, 7761
Sodium	6010, 7770
Strontium	6010, 7780
Sulfate	9035, 9036, 9038, 9056
Sulfide	9030, 9031, 9215
Thallium	6010, 6020, 7840, 7841
Tin	7870
Vanadium	6010, 7910, 7911
Zinc	6010, 6020, 7950, 7951

TABLE 2-36
CONTAINERS, PRESERVATION TECHNIQUES, AND HOLDING TIMES
FOR AQUEOUS MATRICES[A]

Name	Container[1]	Preservation	Maximum holding time
Inorganic Tests:			
Chloride	P, G	None required	28 days
Cyanide, total and amenable to chlorination	P, G	Cool to 4°C; if oxidizing agents present add 5 mL 0.1N $NaAsO_2$ per L or 0.06 g of ascorbic acid per L; adjust pH>12 with 50% NaOH. See Method 9010 for other interferences.	14 days
Hydrogen ion (pH)	P, G	None required	24 hours
Nitrate	P, G	Cool to 4°C	48 hours
Sulfate	P, G	Cool to 4°C	28 days
Sulfide	P, G	Cool to 4°C, add zinc acetate	7 days
Metals:			
Chromium VI	P, G	Cool to 4°C	24 hours
Mercury	P, G	HNO_3 to pH<2	28 days
Metals, except chromium VI and mercury	P, G	HNO_3 to pH<2	6 months
Organic Tests:			
Acrolein and acrylonitrile	G, PTFE-lined septum	Cool to 4°C, 0.008% $Na_2S_2O_3$[3], Adjust pH to 4-5	14 days
Benzidines	G, PTFE-lined cap	Cool to 4°C, 0.008% Na_2S_2O3[3]	7 days until extraction, 40 days after extraction
Chlorinated hydrocarbons	G, PTFE-lined cap	Cool to 4°C, 0.008% $Na_2S_2O_3$[3]	7 days until extraction, 40 days after extraction
Dioxins and Furans	G, PTFE-lined cap	Cool to 4°C, 0.008% $Na_2S_2O_3$[3]	30 days until extraction, 45 days after extraction
Haloethers	G, PTFE-lined cap	Cool to 4°C, 0.008% $Na_2S_2O_3$[3]	7 days until extraction, 40 days after extraction
Nitroaromatics and cyclic ketones	G, PTFE-lined cap	Cool to 4°C, 0.008% $Na_2S_2O_3$[3], store in dark	7 days until extraction, 40 days after extraction
Nitrosamines	G, PTFE-lined cap	Cool to 4°C, 0.008% $Na_2S_2O_3$[3], store in dark	7 days until extraction, 40 days after extraction

(continued on next page)

TABLE 2-36 (cont.)

Name	Container[1]	Preservation	Maximum holding time
Oil and grease	G	Cool to 4°C, add 5 mL diluted HCl	28 days
Organic carbon, total (TOC)	P, G	Cool to 4°C, store in dark[2]	28 days
Organochlorine pesticides	G, PTFE-lined cap	Cool to 4°C	7 days until extraction, 40 days after extraction
Organophosphorus pesticides	G, PTFE-lined cap	Cool to 4°C[4]	7 days until extraction, 40 days after extraction
PCBs	G, PTFE-lined cap	Cool to 4°C	7 days until extraction, 40 days after extraction
Phenols	G, PTFE-lined cap	Cool to 4°C, 0.008% Na_2S_2O3[3]	7 days until extraction, 40 days after extraction
Phthalate esters	G, PTFE-lined cap	Cool to 4°C	7 days until extraction, 40 days after extraction
Polynuclear aromatic hydrocarbons	G, PTFE-lined cap	Cool to 4°C, 0.008% $Na_2S_2O_3$[3], store in dark	7 days until extraction, 40 days after extraction
Purgeable aromatic hydrocarbons	G, PTFE-lined septum	Cool to 4°C, 0.008% $Na_2S_2O_3$[2,3]	14 days
Purgeable Halocarbons	G, PTFE-lined septum	Cool to 4°C, 0.008% $Na_2S_2O_3$[3]	14 days
Total organic halides (TOX)	G, PTFE-lined cap	Cool to 4°C, Adjust to pH<2 with H_2SO_4	28 days
Radiological Tests:			
Alpha, beta and radium	P, G	HNO_3 to pH<2	6 months

[A] Table originally excerpted, in part, from Table II, 49 **FR** 28, October 26, 1984, and revised as appropriate for SW-846. See Chapter Three, Chapter Four, or Section 6.0 of the individual methods for more information.

[1] Polyethylene (P) or Glass (G)

[2] Adjust to pH<2 with H_2SO_4, HCl or solid $NaHSO_4$. Free chlorine must be removed prior to adjustment.

[3] Free chlorine must be removed by the appropriate addition of $Na_2S_2O_3$.

[4] Adjust samples to pH 5-8 using NaOH or H_2SO_4.

TABLE 2-37.
PREPARATION METHODS FOR ORGANIC ANALYTES

(Note: Footnote text is located on the last page of the table.)

	Matrix			
Analyte Type	Aqueous[1]	Solids	Sludges and Emulsions[1,2]	Organic Liquids, Tars, Oils
Acid Extractable	3510 3520 (pH ≤ 2)	3540 3541 3545 3550	3520 (pH ≤ 2)	3650 3580[3]
Acrolein, Acrylonitrile, and Acetonitrile	5031	5031	5031	3585
Acrylamide	8032[4]			
Aniline and Selected Derivatives	3510 3520 (pH >11) 5031[11]	3540 3541 3545 3550	3520 (pH >11)	3580[3]
Aromatic Volatiles	5021 5030 5032	5021 5032 5035	5030 5032	3585
Base/Neutral Extractable	3510 3520 (pH >11)	3540 3541 3545 3550	3520 (pH >11)	3650 3580[3]
Carbamates	8318[5] 8321	8318[5] 8321	8318[5]	8318[5]
Chlorinated Herbicides	8151[6] (pH ≤ 2) 8321	8151[6] 8321	8151[6] (pH ≤ 2)	3580[3]
Chlorinated Hydrocarbons	3510 3520 (pH as received)	3540 3541 3550	3520 (pH as recieved)	3580[3]
Dyes	3510 3520	3540 3541 3545 3550		
Explosives	8330[7] 8331[8]	8330[7] 8331[8]		
Formaldehyde	8315[9]	8315[9]		

TABLE 2-37
PREPARATION METHODS FOR ORGANIC ANALYTES
(continued)

	Matrix			
Analyte Type	Aqueous[1]	Solids	Sludges and Emulsions[1,2]	Organic Liquids, Tars, Oils
Haloethers	3510 3520	3540 3541 3545 3550		
Halogenated Volatiles	5021 5030 5032	5021 5032 5035	5030	3585
Nitroaromatic and Cyclic Ketones	3510 3520 (pH 5-9)	3540 3541 3545 3550	3520 (pH 5-9)	3580[3]
Nitrosamines	3510 3520	3540 3541 3545 3550		
Non-halogenated Volatiles	5021 5031 5032	5021 5031 5032	5021 5031 5032	5032 3585
Organochlorine Pesticides	3510 3520 3535 (pH 5-9)	3540 3541 3545 3550	3520 (pH 5-9)	3580[3]
Organophosphorus Pesticides	3510 3520 (pH 5-8)	3540 3541 3545	3520 (pH 5-8)	3580[3]
Phenols	3510 3520 (pH $\leq$ 2)	3540 3541 3545 3550	3520 (pH $\leq$ 2)	3650 3580[3]
Phthalate Esters	3510 3520 3535 (pH 5-7)	3540 3541 3545 3550	3520 (pH 5- 7)	3580[3]
Polychlorinated Biphenyls	3510 3520 3535 (pH 5-9)	3540 3541 3545	3520 (pH 5-9)	3580[3]
PCDDs and PCDFs	8280[10] 8290[10]	8280[10] 8290[10]	8280[10] 8290[10]	8280[10] 8290[10]

TABLE 2-37
PREPARATION METHODS FOR ORGANIC ANALYTES
(continued)

	Matrix			
Analyte Type	Aqueous[1]	Solids	Sludges and Emulsions[1,2]	Organic Liquids, Tars, Oils
Polynuclear Aromatic Hydrocarbons	3510 3520 (pH as received)	3540 3541 3545 3550 3561	3520 (pH as received)	3580[3]
Volatile Organics	5021 5030 5031 5032	5021 5031 5032 5035	5021 5030 5031 5032	3585

Footnotes for Table 2-37

1 The pH at which extraction should be performed is shown in parentheses.
2 If attempts to break an emulsion are unsuccessful, these methods may be used.
3 Method 3580 is only appropriate if the sample is soluble in the specified solvent.
4 Method 8032 contains the extraction, cleanup, and determinative procedures for this analyte.
5 Method 8318 contains the extraction, cleanup, and determinative procedures for these analytes.
6 Method 8151 contains the extraction, cleanup, and determinative procedures for these analytes.
7 Method 8330 contains the extraction, cleanup, and determinative procedures for these analytes.
8 Method 8331 is for Tetrazene only, and contains the extraction, cleanup, and determinative procedures for this analyte.
9 Method 8315 contains the extraction, cleanup, and determinative procedures for this analyte.
10 Methods 8280 and 8290 contain the extraction, cleanup, and determinative procedures for these analytes.
11 Method 5031 may be used when only aniline is to be determined.

TABLE 2-38. CLEANUP METHODS FOR ORGANIC ANALYTE EXTRACTS

Analyte Type	Method
Acid Extractable	3650, 3640
Base/Neutral Extractable	3650, 3640
Carbamates	8318[1]
Chlorinated Herbicides	8151[2]
Chlorinated Hydrocarbons	3620 3640
Haloethers	3620 3640
Nitroaromatics & Cyclic Ketones	3620 3640
Nitrosamines	3610, 3620, 3640
Organochlorine Pesticides	3620 3630 3640 3660
Organophosphorus Pesticides	3620
Phenols	3630 3640 3650 8041[3]
Phthalate Esters	3610 3611 3620 3640
Polychlorinated Biphenyls	3620 3630 3640 3660 3665
Polychlorinated Dibenzo-*p*-Dioxins and Polychlorinated Dibenzofurans	8280[4] 8290[4]
Polynuclear Aromatic Hydrocarbons	3610 3611 3630 3640 3650

1 Method 8318 contains the extraction, cleanup, and determinative procedures for these analytes.
2 Method 8151 contains the extraction, cleanup, and determinative procedures for these analytes.
3 Method 8041 includes a dervatization technique followed by GC/ECD analysis, if interferences are encountered using GC/FID.
4 Methods 8280 and 8290 contain the extraction, cleanup, and determinative procedures for these analytes.

TABLE 2-39. DETERMINATIVE METHODS ORGANIC ANALYTES

Analyte Type	GC/MS Method	Specific GC Method	HPLC Method
Acid Extractable	8270		
Acrolein, Acrylonitrile, Acetonitrile	8260	8031 8033[1]	8315[2] 8316
Acrylamide	8260	8032	8316
Aniline and Selected Derivatives	8270	8131	
Aromatic Volatiles	8260	8021	
Base/Neutral Extractable	8270		8325[4]
Carbamates			8318, 8321
Chlorinated Herbicides	8270[3]	8151	8321
Chlorinated Hydrocarbons	8270	8121	
Dyes			8321
Explosives			8330, 8331, 8332
Formaldehyde			8315
Haloethers	8270	8111	
Halogenated Volatiles	8260	8011, 8021	
Nitroaromatics and Cyclic Ketones	8270	8091	8330[5]
Nitrosoamines	8270	8070	
Non-halogenated Volatiles	8260	8015	8315
Organochlorine Pesticides	8270[3]	8081	
Organophosphorus Pesticides	8270[3]	8141	8321
Phenols	8270	8041	
Petroleum Hydrocarbons		8015	
Phthalate Esters	8270	8061	
Polychlorinated Biphenyls	8270[3]	8082	
PCDDs and PCDFs	8280 8290		
Polynuclear Aromatic Hydrocarbons	8270	8100	8310
Volatile Organics	8260	8011, 8015, 8021, 8031, 8032, 8033	8315 8316

1 Of these analytes, Method 8033 is for acetonitrile only.
2 Of these analytes, Method 8315 is for acrolein only.
3 This method is an alternative confirmation method, not the method of choice.
4 Benzidines and related compounds.
5 Nitroaromatics (see "Explosives").

FIGURE 2-1
ORGANIC ANALYSIS OPTIONS FOR SOLID AND LIQUID MATRICES

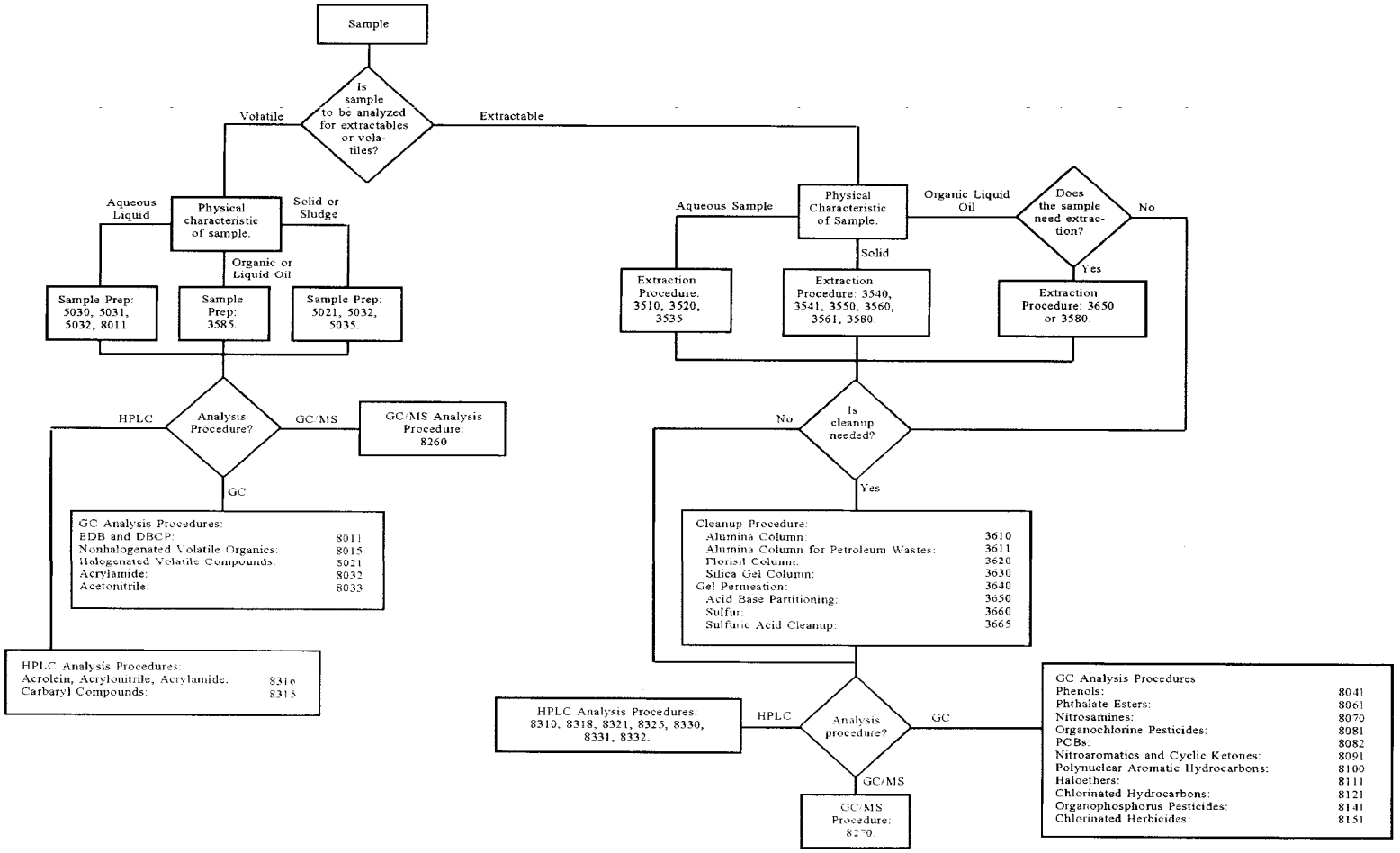


FIGURE 2-2
SCHEMATIC OF SEQUENCE TO DETERMINE
IF A WASTE IS HAZARDOUS BY CHARACTERISTIC

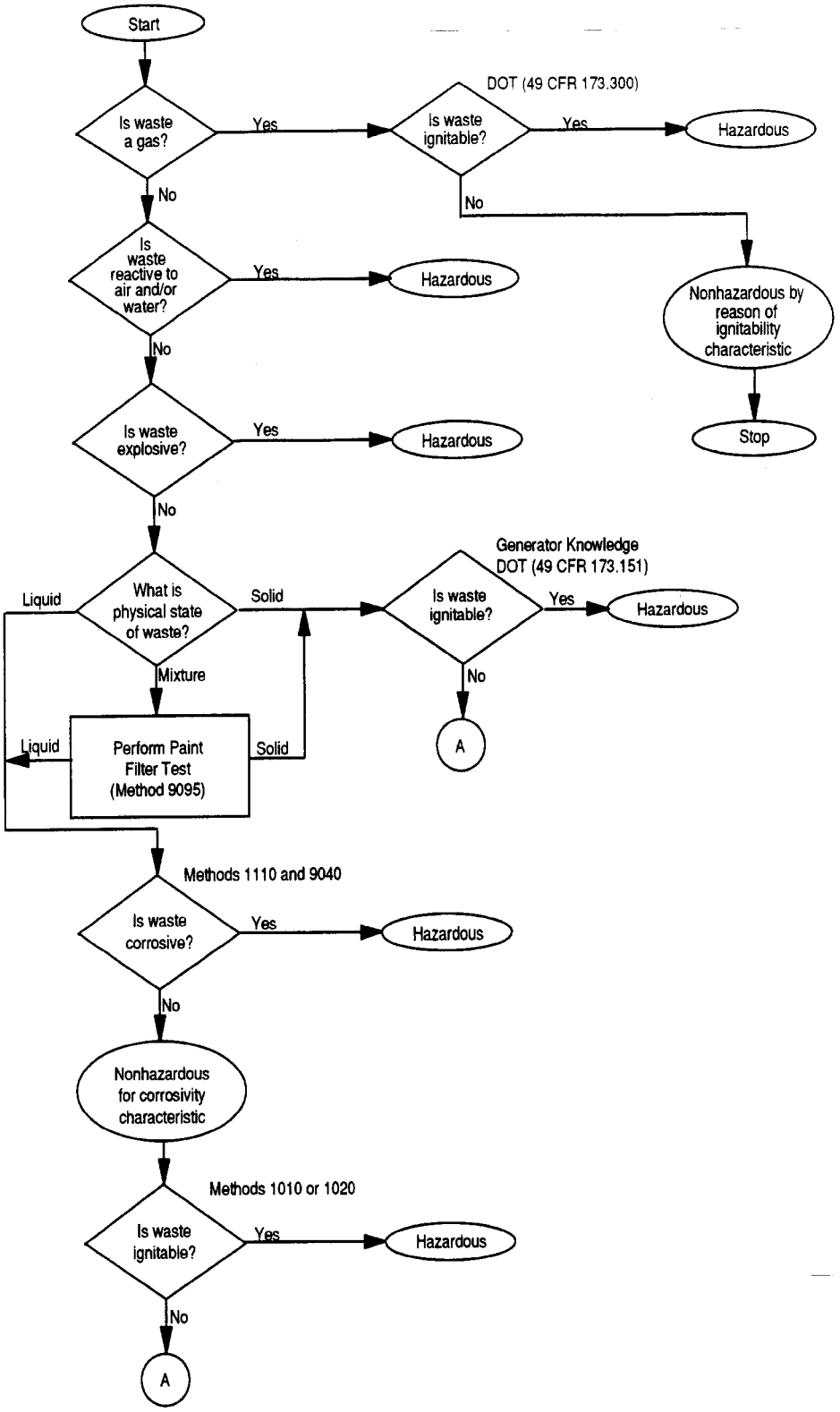


FIGURE 2-2
(Continued)

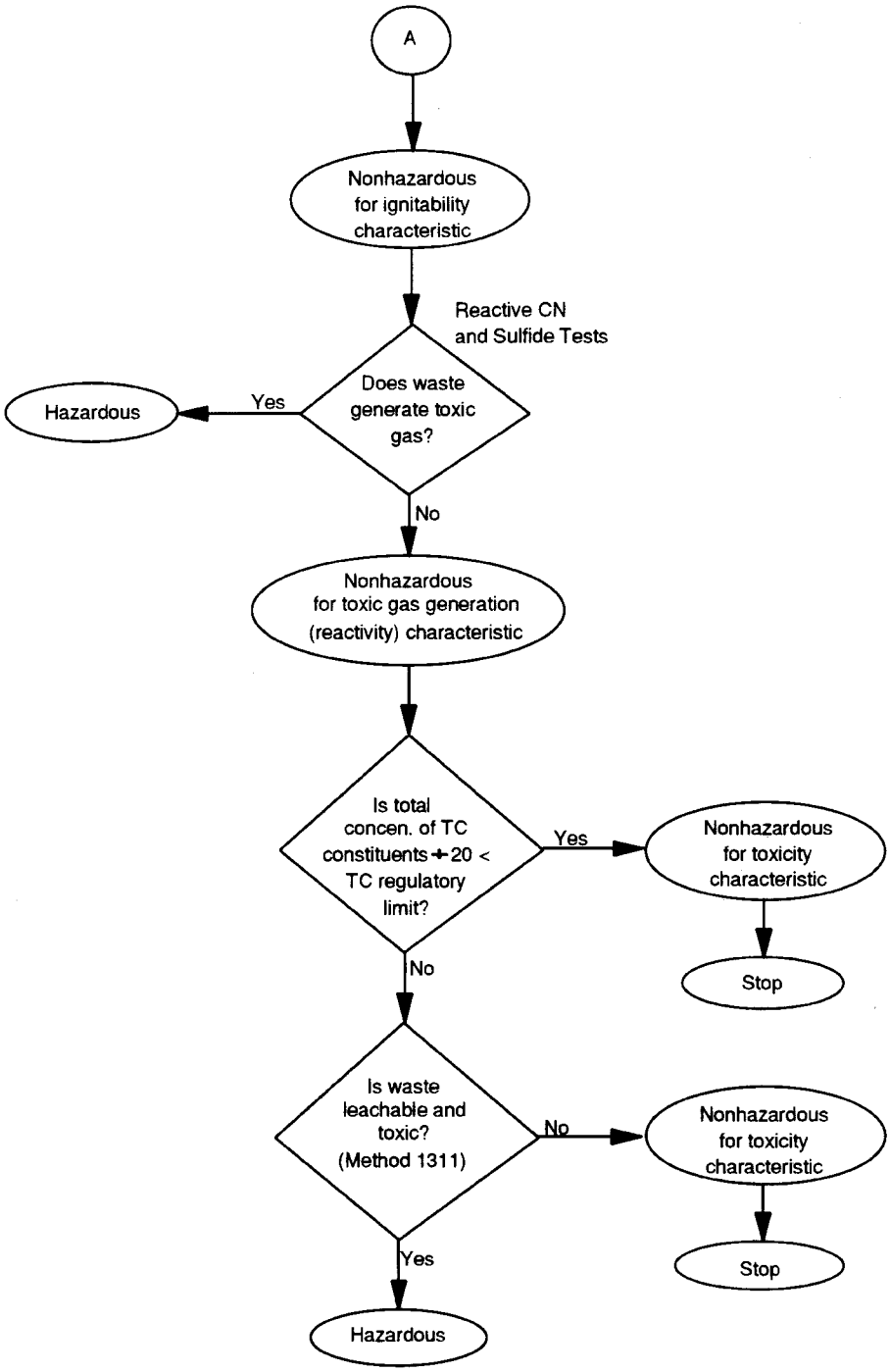
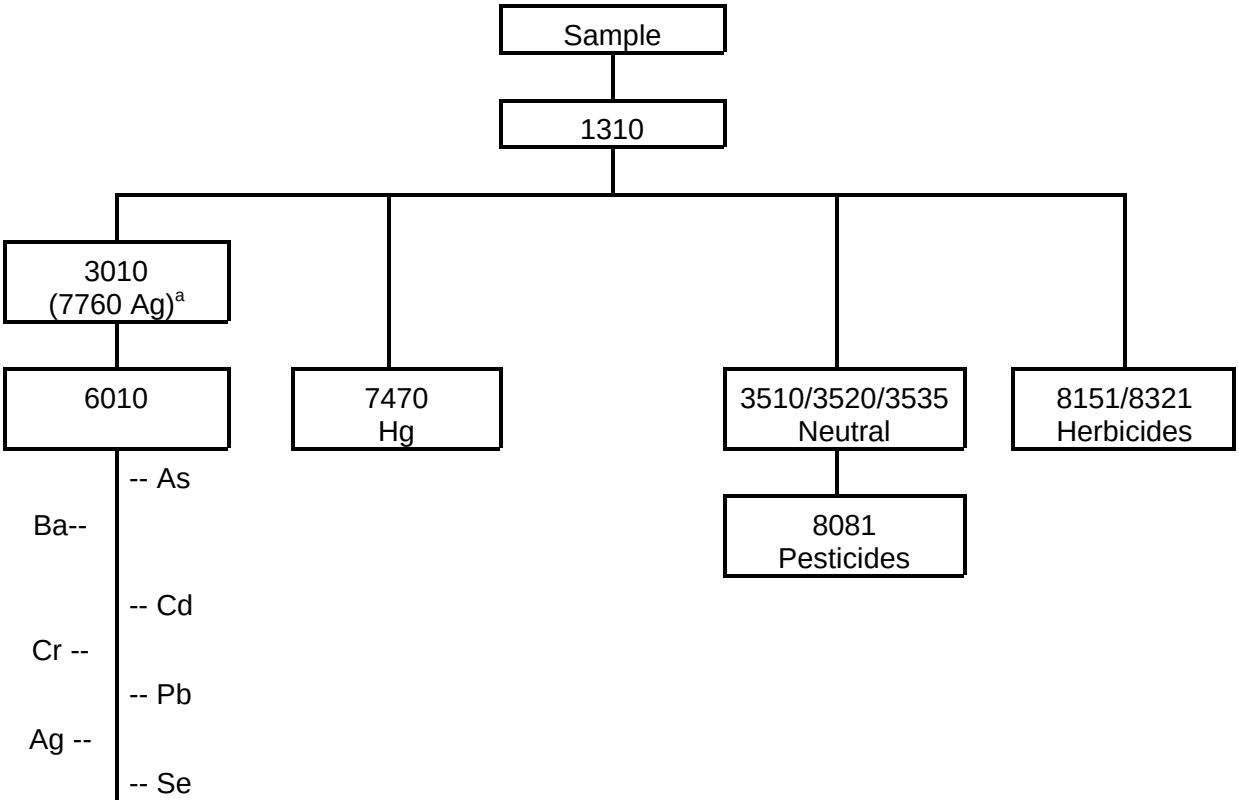
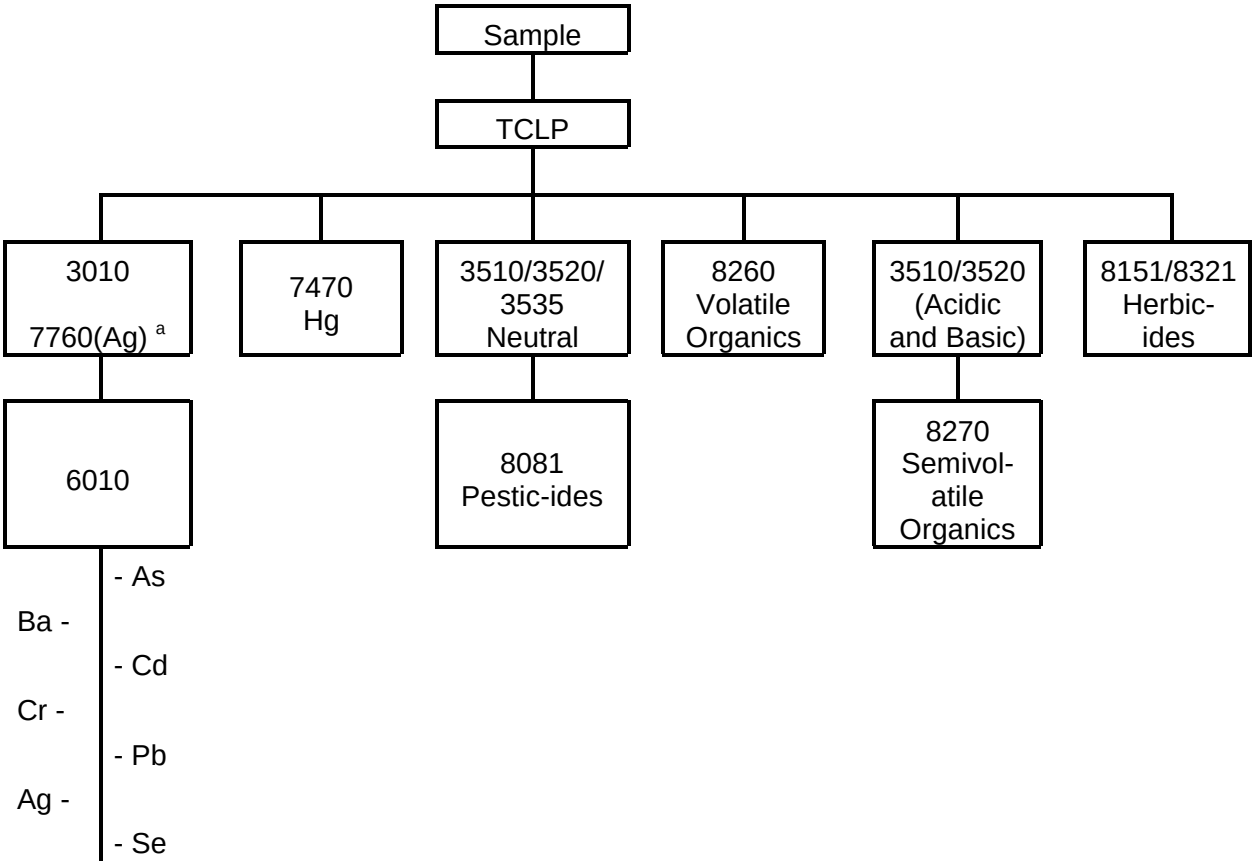


FIGURE 2-3A
EP



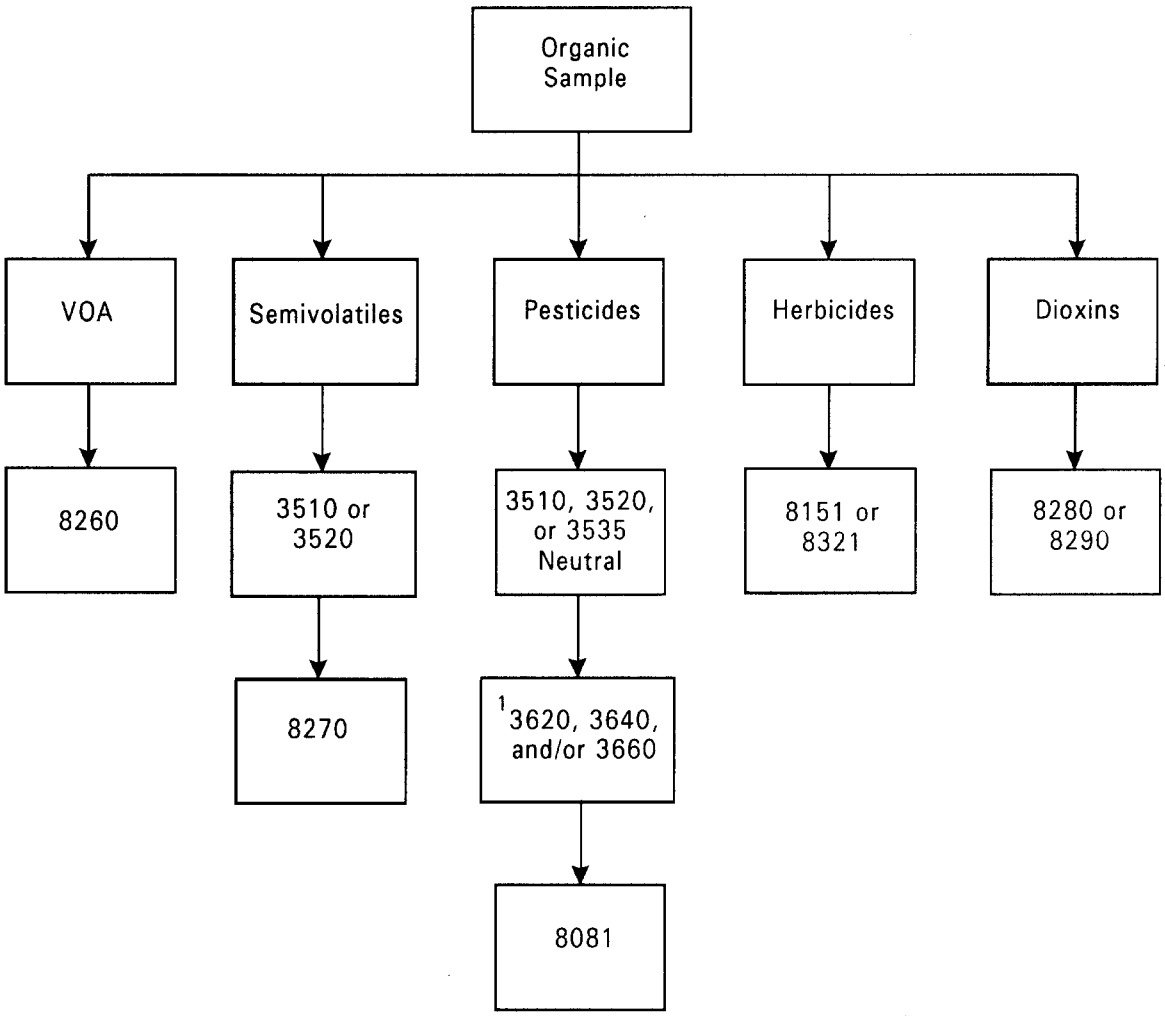
[a] The 7760 digestate may be analyzed using Method 6010.

FIGURE 2-3B
RECOMMENDED SW-846 METHODS OF ANALYSIS FOR TCLP LEACHATES



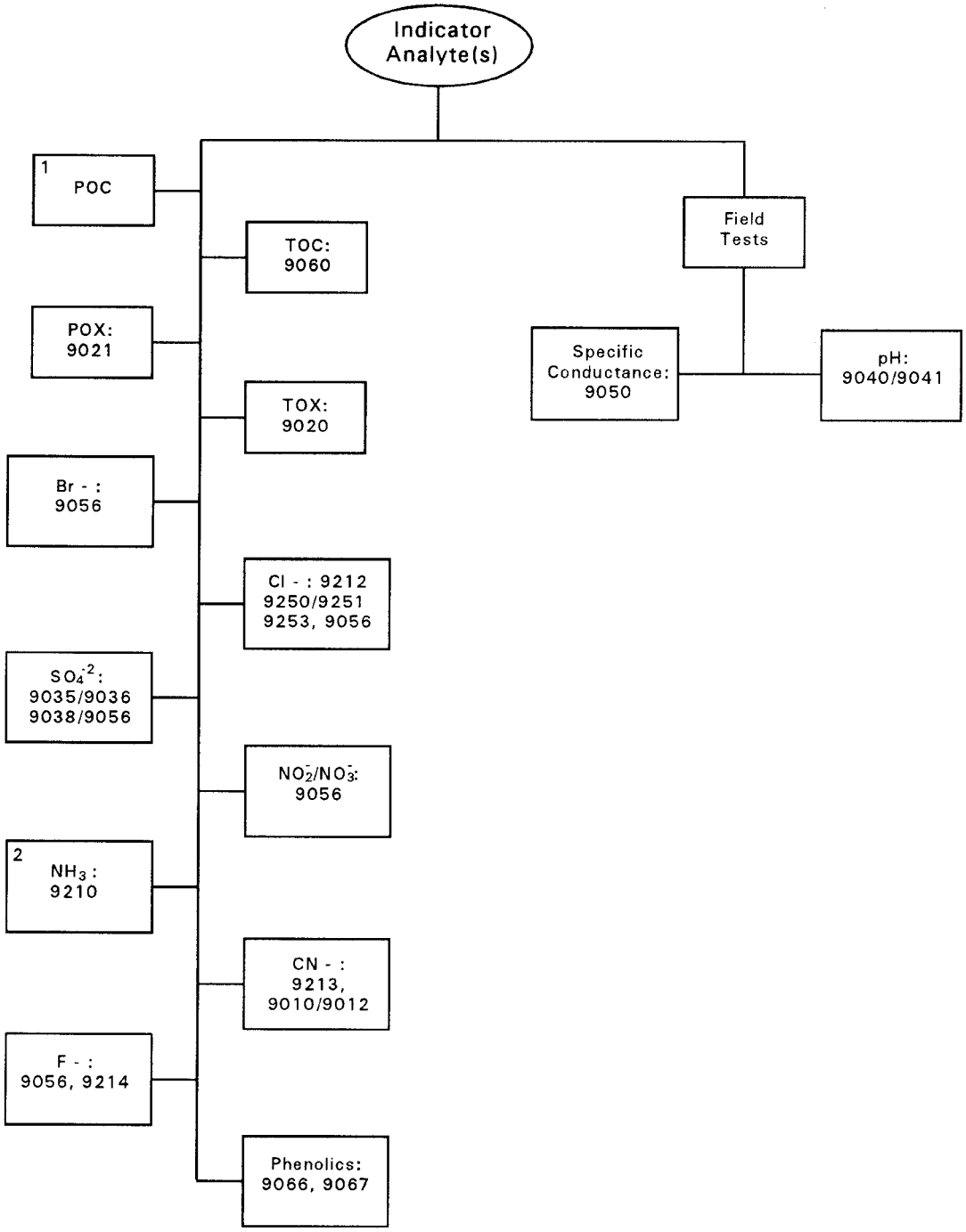
[a] The 7760 digestate may be analyzed using Method 6010.

FIGURE 2-4A.
GROUND WATER ANALYSIS: ORGANIC ANALYTES



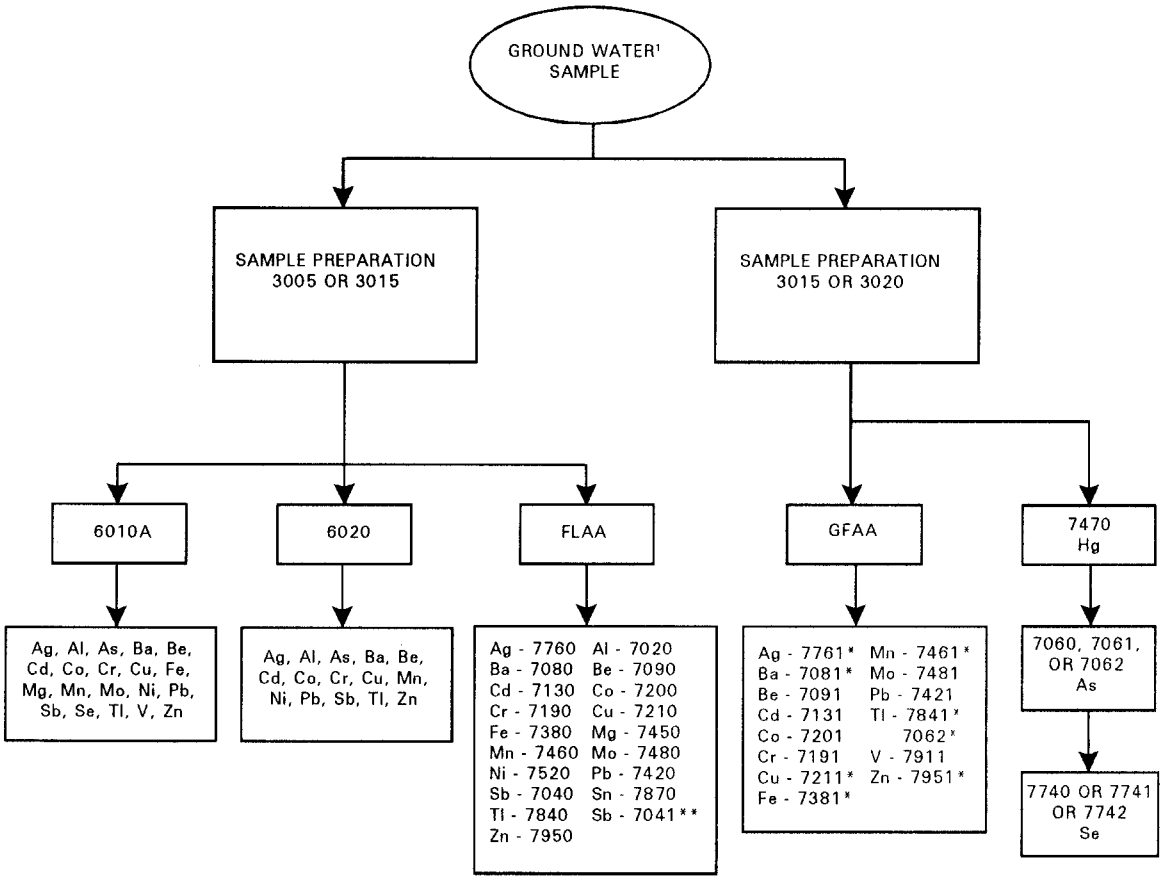
1 - Optional: Cleanup required only if interferences prevent analysis.

FIGURE 2-4B.
GROUND WATER ANALYSIS: INDICATOR ANALYTES



1 - Barcelona, 1984, (See Reference 1)
2 - Riggin, 1984, (See Reference 2)

FIGURE 2-4C.
GROUND WATER ANALYSIS: INORGANIC ANALYTES



* Follow the digestion procedures as detailed in the individual determinative methods.
** GFAA
[1] When analyzing for total dissolved metals, digestion is not necessary if the samples are filtered at the time of collection, and then acidified to the same concentration as the standards.