

SW-846 FOURTH EDITION METHOD STYLE GUIDE

July 6, 2004

See highlighted text for material that has been added/revised since began this round of Update IV methods. Just before each method goes final, the method should be checked against these changes and revised as appropriate. **Redlined text (within the highlighted text) indicates revisions since the immediately previous version of the style guide.**

I. PURPOSE OF THIS STYLE GUIDE

This style guide is for use by developers of new methods for SW-846 and editors of existing SW-846 methods. Its use will help assure consistent method format and minimize editorial errors during the development and maintenance of SW-846 Fourth Edition. The guidelines will also help assure high quality conversions to pdfs during method preparation for electronic distribution (e.g., via the Internet).

This guide begins with a discussion of general method format and style guidelines, followed by specific directions for each section of an SW-846 method.

II. GENERAL METHOD FORMAT, CONTENT, AND STYLE GUIDELINES

The instructions to follow are guidelines – not requirements. Do not follow a guideline if a method-specific situation dictates that a different approach will benefit method use. However, always follow these guidelines in the absence of such a situation or when in doubt about the most appropriate approach.

1. Section content and numbering

- Always follow the section numbering and content guidelines found in Sec. III of this style guide.
- Strive to present typical section information in the same order and level of detail for all methods, as available and applicable. Be especially consistent between methods involving the same analytical technologies.
- Avoid orphaned subsection numbers. For instance, do not precede a paragraph with "3.1.1" if a Sec. 3.1.2 does not follow.
- Avoid exceeding four levels of section numbers (e.g., avoid 9.3.3.3.5) by considering other approaches to organizing and presenting the information.

2. Grammar, style, and usage

- Except when otherwise specified in this guide, follow the ACS Style Guide with regard to grammar, style, and usage. The style adopted by ACS is for the most part taken from established authoritative sources, such as the GPO Style Manual and The Chicago Manual of Style; and in addition deals specifically with style and usage related to chemistry.
- Use an active voice whenever possible.

***3. Chemical nomenclature** also will have to check CAS numbers

- Follow IUPAC rules for chemical nomenclature except when deviations (e.g., use of common names or other nomenclature typically used by the RCRA regulations) is more appropriate. The American Chemical Society's (ACS) Style Guide is recommended as a reference on chemical nomenclature.

4. Software

- Submit all method documents in WordPerfect (must be compatible with version 9.0).
- If you cannot use WordPerfect, then at least use a word processing software that can be easily converted to WordPerfect with minimal conversion errors.

5. Font

- Use Arial 11 point.

6. Margins

- Set the right and left margins at a spacing of one inch (1"). Set the top and bottom margins at one half (½) inch.

7. Justification

- Use left justification for method text alignment unless otherwise specified in this style guide.

8. Tabs and indents

- Do not tab major sections (e.g., 1.0, 2.0, etc.). Subsections (e.g., 1.1, 2.2, etc.) are first line tabbed. All subsequent subdivisions (e.g., 1.1.1, 2.2.2.2, etc.) are tabbed or indented to show their relative sub-categorization.
- Use the following left tab settings:

1.0", 1.38", 1.88", 2.5", 3.25", and 4.13" (see the settings of this document at this point for what is meant by these settings)

For example, using up to three levels:

9.0 QUALITY CONTROL

9.1 Quality control related to the use of a test kit for RDX or HMX analysis.

9.1.1 Follow the manufacturer's instructions for the quality control procedures specific to the test kit being used.

- The above tab settings accommodate up to five levels of numbered subsections, e.g., through 9.5.1.2.3. (However, please avoid exceeding four levels, see item no. 1 above.) If the section number includes a lot of double digits (e.g., 11.11.3.11), adjust the tab settings as necessary to allow sufficient spacing between the section number and section text.

- Use **tabs** to wrap the text of the second line of a section to the left of the first line.

For example:

1.1 This method provides procedures for the gas chromatographic (GC) determination of organophosphorus (OP) compounds.

- Use **indents** when the text of the second line is not intended to wrap to the left of the first line.
- For third level and higher subsections, use indents to move the subsection number away from the left margin, followed by one tab immediately before the subsection number, and another tab after the number, and before the text. The use of the indent keeps the second line from wrapping all the way back to the left margin. For example:

11.3.2 Take two drops of methyl blue and add it to a 50-mL vessel containing 5 mL of NAOH and fill to volume with sample aliquot. Stir the mixture briskly.

9. Spacing

- Triple space (two blank lines) before each major section (1.0, 2.0, etc.). Double space between other sections. Single space within sections, as appropriate (sometimes double spacing within a section or paragraph is necessary to accommodate "notes," "warnings," equations, or other information).
- Use two spaces after periods and colons in sentences.
- Spacing in tables can vary, as long as the content is readable.

10. Capitalization

- Put major section titles in all capital letters (e.g., 9.0 QUALITY CONTROL). Capitalize only the first letter of the titles of other subsections. For example:

9.0 QUALITY CONTROL

9.1 Surrogate recovery

11. Use of notes, warnings, and cautions

- Use the following conventions regarding the content and purpose of any notes, warnings, or cautions:

WARNING: Provides information to prevent personal injury.

CAUTION: Provides information to prevent damage to equipment or other significant occurrences to be avoided during application of the method.

NOTE: Provides useful tips and background relating to the current topic.

- As illustrated above, present each of the above headings in all capital letters, underlined, with a colon, then an indent (with a "custom" tab setting of two spaces after the colon), such that the text after the colon is aligned even to the left.
- As necessary, modify the document section tabs to accommodate the indent for a "NOTE," "WARNING," or "CAUTION" . Restore the default method tab after the note, warning, or caution.
- Indent notes, warnings, cautions only as far as the left of the preceding text; or NOT as far as the section number is tabbed, but to the point where the text wraps to the left. For example:

6.1 Columns

6.2 Drying column - 20 mm ID Pyrex® chromatographic column with Pyrex® glass wool at bottom and a PTFE stopcock.

NOTE: Fritted glass discs are difficult to decontaminate after highly contaminated extracts have been passed through. Columns without frits may be purchased. Use a small pad of Pyrex® glass wool to retain the adsorbent. Prewash the glass wool pad with 50 mL of acetone followed by 50 mL of elution solvent prior to packing the column with adsorbent.

12. Keeping Text Together and Page breaks

- To avoid the separation of section headings (including subsection headings, such as "9.1 Surrogate recovery") from the section text at a page break, use "keep text together" features provided by the WordPerfect software, such as "Block Protect" or "Conditional End of Page."
- Never use hard page breaks in the text portion of the method.
- Always use hard page breaks between the last page of text (i.e., after the sentence under the title of Sec. 17.0) and the first table and all other subsequent pages to separate tables and figures.

13. Page numbering

- Position page numbers at the bottom center of the page as part of the footer. Begin the page number with the appropriate method number (including any letter suffix), followed by a hyphen, and then the page number starting with the number one (1). Place one space on either side of the hyphen. Use the automatic number sequencing in the software to accomplish this task. For example:

3562 - 1

14. Units

- Use the System Internationale (SI) units as the standard units of measurement.
- For the unit "micro", use the Greek symbol notation. This symbol (μ) can be located under the Greek character set (number 8,25) in WordPerfect.
- Use the following standard types of units:

mg/L (not µg/mL)
ng/µL (not µg/mL)

- When using a number and a unit as an adjective to modify a noun, put a hyphen between the number and unit. However, do not insert a hyphen if the number and unit are instead used as a noun. For example: "Add 10 mL of distilled water to a 25-mL beaker, weigh a 10-g portion of the field blank sample and add 100 µL of the solution containing the nine internal standards diluted with 1.0 mL of acetone."

15. Equations

- Triple space between section text and an equation (bottom and top). Do not place the equations any closer to the text. Otherwise, pdf conversions compress the document material and may move the equations so close to the text that the equation cannot be fully read. Center the equations and set the height and width of the equation boxes large enough to view the whole equation when printed. Do not italicize equations. In WP 8 or 9, this requires that the equation be written as a "function," which is accomplished by beginning the equation with "func" and enclosing it all in curved brackets. Use the equation editor. For example:

Bottom line of preceding text here.

$$\% \text{ dry weight} = \frac{\text{g of dry sample}}{\text{g of sample}} \times 100$$

Top line of following text here.

- Be consistent with equation formats.
- Use units in the equation that are consistent with the method procedure and sample matrix.
- Define all equation variables.
- Do not number equations in a method.

16. Acronyms

- Prior to the first use of an acronym in a method, spell out the term it represents and then include the acronym in parentheses. For example:

supercritical fluid extraction (SFE)

Afterwards, use just the acronym, as appropriate.

- A proper noun is the name of a particular person (e.g., Dr. Paul Jones), place (e.g., New York) or thing (e.g., Table 1). Capitalize only proper nouns within a sentence (unless of course you are quoting a document title which includes the use of initial capitalization). Use of an acronym does not turn its full word into a proper noun. In other words, the conventional use of capitals in an acronym does not mean that capitals must be used in the full word -- unless the word is already a proper noun. For example:

This is correct:

"The use of supercritical fluid extraction (SFE) . . . "

This is incorrect, because "supercritical fluid extraction" **is not** a proper noun):

"The use of Supercritical Fluid Extraction (SFE) . . . "

However, this is correct, because "Office of Solid Waste" **is** a proper noun:

"The Office of Solid Waste (OSW)..."

17. Method and SW-846 manual references in the text of a method

- In general, do not refer to the method itself by its method number within its own text -- instead refer to it only as "this method."
- Usually, do not refer in the method text to "SW-846," as though the method is a separate document and not an integral part of the SW-846 manual. Instead, refer to "this manual." Exceptions apply in certain boilerplate statements which address use of the manual in general.
- Only use method numbers with their letter suffixes (e.g., 3500A) in the method number of the method title and page number. Do not include method number suffixes in the text of the methods, unless the method reference is part of a document title quote. For example, state "See Method 3510," even if the latest version of this method is "3510A." Otherwise, the text of many methods might have to be updated to reflect new suffixes each time a referenced method is revised. (See Sec. III below for information on the purpose of letter suffixes in method numbers.)

18. Section references in the text

- When referring to an SW-846 method section, capitalize and abbreviate the term section, for example: Sec. 1.5
- When referencing sections in other methods, only go to the first level, e.g., 2.0, because the subsection content and numbering of any method may change in future updates. Also, for similar reasons, do not reference specific chapter sections, only reference the chapter number (exceptions to this may apply due to a boilerplate referral).

19. Document references in the text

- Cite references in the text by directing the reader to a specific reference listed in the references section (Sec. 16.0), using such phrases as "refer to" or "see". For example:

For complete method performance data, see Reference 2.

20. Use of the terms "must (shall), should and may" and "required"

- Avoid use of the term "shall" -- use "must" instead as appropriate.
- In general, follow the NACE method Style Manual for guidance regarding the proper use of the terms "must, should, and may." Specifically:

Use "must" to indicate mandatory instructions -- when not following the instruction will cause the method to not work.

Use "should" to indicate that which is considered good and is recommended but is not absolutely mandatory. In this case, for instance, changes may be made to improve method performance or to meet certain project-specific needs.

Use "may" to indicate that which is considered optional (and which of course might depend on method performance goals and project-specific needs).

- As appropriate, use the term "designated" instead of "required", e.g., "designated" volume instead of "required" volume. In SW-846 methods, the term "required" is most often used in the context of something necessary to properly perform a particular function or step of the procedure, and is not typically used to indicate a regulatory requirement. The term "regulatory" or "regulation" usually appears with the word "required" if its use addresses a regulatory requirement. However, minimizing the use of the word "required" in the methods will help dispel this confusion.

21. Terms to use or avoid (exceptions may apply, dependent on sentence content)

Correct: "described" steps

Incorrect: "specified" steps -- unless referring to what is written in a planning document -- those steps/criteria would be "specified" - per Barry on 12/15/03

Correct: "designated" volume

Incorrect: "specified" volume

Correct: "professional judgement" of the . . .

Incorrect: "discretion" of the . . .

Correct: "appropriate" calibration compound

Incorrect: "acceptable" calibration . . .

22. Detection or Quantitation Limits

- In general, do not include or mention MDLs or EQLs, in either the text or tables. If necessary or useful, only include a generic description of anticipated method sensitivity for the matrix. The focus should be on actual measured performance, based on spike recoveries in the matrix of concern or of method performance on a certified reference material of the appropriate matrix and within the appropriate calibration range for the application. Also, clearly note that the information is provided as guidance only, and that such limits are highly-matrix dependent and not always achievable. In some cases, such as in the immunoassay methods, the values quoted as "MDLs" are real measured values and thus should be left in the method with a change in the terminology (e.g., the lower limits of detection).

23. Footnotes

- Only use footnotes in the tables, avoid using them in the method text.

24. Other miscellaneous style guidelines

- **Negative ionic charge symbol** -- Use the WordPerfect "Math/Scientific" symbol "6,38" (⁻), not a hyphen superscript.

- **Dot in chemical formulas** -- Use the WordPerfect "Typographical" symbol "4,3" (•). Some of the other symbols commonly used are too large or too small.
- **Temperature** -- For degrees, use the WordPerfect "Math/Scientific" symbol "6,36" (°). As directed by the ACS Style Guide, put a space right after the number and keep the degree symbol and "C" together. For example: 10 °C
- **Trade names for materials** -- Avoid use of trade names if something more generic is also appropriate. For example, use "polytetrafluoroethylene (PTFE) in place of "Teflon."
- **Measurement abbreviations for liter** -- Designate liter using an upper case "L" and milliliter as "mL".
- **Plurals of measurement abbreviations** -- Do not use plurals for abbreviated units of measure. For example: 50 mg *not* 50 mgs
- **Quotation marks** -- Use straight quotation marks (e.g., " or ') instead of smart quotes. That style is better suited to the serif-free Arial font.
- **En dash with numbered items** -- Use en dash (typed as a hyphen) with three or more numbered items, with no spaces before or after the en dash. For example: 20-30 mL, References 3-5 . . .
- **Apostrophes** -- Do not use an apostrophe in plurals of chemical name acronyms. For example:

Correct: PCBs

Incorrect: PCB's

III. SECTION-SPECIFIC GUIDELINES

This section of the style guide provides general guidance regarding method numbers, method titles, and the content of the 17 sections of SW-846 methods. (See Attachment A for a one-page summary listing of the 17 sections of SW-846 methods.) It also provides general boilerplate sections that should appear in most SW-846 methods -- when appropriate. Please note that the directions in this section are guidelines and not rules. For example, other instructional "boilerplate" phrases, or revisions to those that appear in this guide, may be more appropriate to individual methods or groups of methods (e.g., based on similar technologies or steps used by the methods). This style guide does not include the many examples of such information. Therefore, developers of new methods should review recently published and technically similar methods for additional insight regarding section content, and consult with EPA for direction.

METHOD NUMBER AND TITLE

- Present the title in capital letters, underlined and centered.
- Use succinct method titles. The most important item, usually the analytes of concern, should be mentioned first. For example, begin with the analytes of concern followed by the matrix and the technology used by the method. An exception to that example, however, might be "SCREENING OF VOAs IN SOIL," where the fact that it is a screening method is the most important item.
- Do not begin the title with "ANALYSIS OF" or "DETERMINATION OF."
- Place the method number two lines above the title. (Method numbers are assigned by EPA based on the type of technology and analytes. See Attachment B to this style guide for the guidelines used by EPA.)

For example:

METHOD 8275

SEMIVOLATILE ORGANIC COMPOUNDS (PAHs AND PCBs)
IN SOILS/SLUDGES AND SOLID WASTES USING
THERMAL EXTRACTION/GAS CHROMATOGRAPHY/MASS SPECTROMETRY (TE/GC/MS)

- *- Any method included for the first time in SW-846 Fourth Edition will be "Revision 0" of that method. A method formally increases in revision status each time it is revised and published as a final update to an SW-846 edition. During development of a new revision, the method revision number is increased once and that revision number is used when the method is final. Therefore, a method revision number does not increase as a result of each review within the technical work group, or as it goes from a "draft" or "proposed" status to a "final" update status. It only increases with each final publication, and its revision number is the same at "proposal" or "draft" as it will be at final.
- Letter suffixes (e.g., A, B, C) to a method number identify the revision status of the method. New methods, i.e., Revision 0 methods, do not have a letter suffix. A suffix of "A" in a method number indicates Revision 1 (the method has been revised once and distributed as final). A suffix of "B" indicates Revision 2, etc.

Title Boilerplate:

Place the following paragraphs between the title and Sec. 1.0 of all methods (triple space before and after): The second paragraph is new.

SW-846 is not intended to be an analytical training manual. Therefore, method procedures are written based on the assumption that they will be performed by analysts who are formally trained in at least the basic principles of chemical analysis and in the use of the subject technology.

In addition, SW-846 methods, with the exception of required method use for the analysis of method-defined parameters, are intended to be guidance methods which contain general information on how to perform an analytical procedure or technique which a laboratory can use as a basic starting point for generating its own detailed Standard Operating Procedure (SOP), either for its own general use or for a specific project application.

1.0 SCOPE AND APPLICATION

- In the first section, describe the purpose and technology of the method, including what types of analytes or attributes are being measured (e.g., this method is a colorimetric screening procedure that may be used to determine . . . in soil samples). Mention all applicable matrices.
- As appropriate, tabulate a list of analytes (put in a table even if only one analyte) validated by the method, by common name, with any common abbreviations, and the Chemical Abstract Service Registry number. Only include those analytes regulated under RCRA in this first table. Precede the table with this statement: The following RCRA compounds (or use the word "analytes" if "compounds" is not appropriate) have been determined by this method." Do not say "can be" determined . . . For cross-method consistency, the header title for the target analytes column should be "Analytes", although this is not critical.
- Create a separate table for any other possible analytes (e.g., those not adequately validated for analysis using the subject method or those validated which are not RCRA analytes), set up exactly as in the previous table of analytes, but with a qualifying statement.
- Indicate any important relationships to other SW-846 methods, as applicable.
- Specify method limitations (e.g., what the method will not accomplish that the analyst may be looking for).
- As noted earlier in this style guide, do not address or include method detection or estimated quantitation limit discussions or data in Sec. 1.0 or anywhere else in the method. If necessary or useful, only include a generic description of method sensitivity, and clearly note that the information is provided as guidance only, and that such limits are highly-matrix dependent and not always achievable.
- In preparation or extraction methods, note that other solvent systems may be employed, and that for any solvent system used, including those mentioned in the method, one needs to demonstrate adequate performance for the analytes of interest. (Also note this in Sec. 7.0 of the method, see example of such text given later in this document for Sec. 7.0.)
- Include any other method application information that would be particularly useful to the chemist during method selection (including, for example, particularly critical safety information, with a reference to Sec. 5.0 for details).
- Include boilerplate statements (see below) regarding intended method flexibility and required uses and regarding experience of analysts.

Sec. 1.0 boilerplate regarding method flexibility and required uses:

Generally in laboratory methods, include the next two paragraphs as the next to the last subsection under Sec. 1.0. The first sentence of the first paragraph may not be necessary for some methods (e.g., those not involving the use of base laboratory methods), and revise the "e.g." as necessary based on the subject method:

1.X Prior to employing this method, analysts are advised to consult the base method for each type of procedure that may be employed in the overall analysis (e.g., Methods 3500, 3600, 5000, and 8000) for additional information on quality control procedures, development of QC acceptance criteria, calculations, and general guidance. Analysts also should consult the disclaimer statement at the front of the manual and the information in Chapter Two for guidance

on the intended flexibility in the choice of methods, apparatus, materials, reagents, and supplies, and on the responsibilities of the analyst for demonstrating that the techniques employed are appropriate for the analytes of interest, in the matrix of interest, and at the levels of concern.

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. The information contained in this method is provided by EPA as guidance to be used by the analyst and the regulated community in making judgments necessary to generate results that meet the data quality objectives for the intended application.

For those methods which include the use of manufacturer kits and which allow less flexibility in material use, instead include the next two paragraphs (revise as appropriate for specific methods):

1.4 Prior to employing this method, analysts are advised to consult the base method for each type of procedure that may be employed in the overall analysis (e.g., Method 4000) and the manufacturer's instructions for additional information on quality control procedures, development of QC acceptance criteria, calculations, and general guidance. Analysts also should consult the disclaimer statement at the front of the manual and the information in Chapter Two for guidance on the responsibilities of the analyst for demonstrating that the techniques employed are appropriate for the analytes of interest, in the matrix of interest, and at the levels of concern.

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. The information contained in this method is provided by EPA as guidance to be used by the analyst and the regulated community in making judgments necessary to generate results that meet the data quality objectives for the intended application.

Sec. 1.0 boilerplate regarding analyst experience:

Include this boilerplate paragraph as the last subsection under Sec. 1.0. The first example of this paragraph is a generic approach and the second examples illustrates a more specific approach. Example 2 might be the preferred to mention specific method instrumentation, e.g., GC, ICAP, etc.

Example 1:

1.X Use of this method is restricted to use by, or under supervision of, appropriately experienced and trained personnel. Each analyst must demonstrate the ability to generate acceptable results with this method.

Shen Yi change 2/5: delete "appropriately", and add "properly" before "trained". Do for just inorganic methods, the above is okay for organic methods.

Example 2:

1.X Use of this method is restricted to use by, or under supervision of, personnel appropriately experienced and trained in the use of <add method technology here>. Each analyst must demonstrate the ability to generate acceptable results with this method.

Sec. 1.0 boilerplate regarding use of other solvent systems:

Include this boilerplate sentence in the subsection of Sec. 1.0 that identifies what solvent system was used for method validation, or which one is addressed directly in the method (identify at Sec. 7.X which subsection of Sec. 7.0 provides the complete boilerplate and more details regarding the use of solvent systems):

Other solvent systems may be employed, provided that adequate performance can be demonstrated for the analytes of interest (see. Sec. 7.X).

Sec. 1.0 boilerplate for those methods that may not be appropriate for aqueous samples with high levels of suspended solids (edit as appropriate for the specific method):

1.X This method may not be appropriate for aqueous samples with high levels of suspended solids greater than 1%. However, if the particulate matter is not considered to be part of the sample composition based on specific project objectives and intended data usage, samples may be allowed to settle before measuring the aliquot to be extracted. If significant particulate matter is present and the total sample is of concern, then the sample should be treated as a multi-phase sample per Chapter Two.

2.0 SUMMARY OF METHOD

- Provide a brief summary of the method's major steps -- in the detail necessary to best prepare the analyst regarding what will be necessary during method application.
- Make this section complete enough for the analyst to anticipate possible interferences or other application problems.
- Do not include details of exact volumes or weights, etc.

3.0 DEFINITIONS

- *- There will be a separate chapter or appendix in the Fourth Edition for definitions of terms and acronyms. Therefore, include a boilerplate section (see below) in each Fourth Edition method which refers the method user to that part of the manual for definitions. Do not add this boilerplate to methods published by EPA (e.g., posted on the web) before completion of the Fourth Edition because the definition chapter does not exist in the Third Edition.
- This section can also include definitions of terms and acronyms particularly relevant to the method and those which may not be familiar to the reader. However, do not include particularly extensive lists of method-specific definitions (i.e., more than three definitions) -- instead include those definitions in a glossary (as a method appendix) at the end of the method and refer to it in this section.

Sec. 3.0 boilerplate:

The Fourth Edition of SW-846 will include a chapter of definitions, which is not included in the Third Edition. Therefore, different boilerplates should be used if you are editing Third Edition methods. The boilerplates are as follows:

- * **For Fourth Edition** (this may be revised later when nearer to final product):

Refer to the SW-846 chapter of terms and acronyms for potentially applicable definitions.

If you are editing Third Edition methods (e.g., Final Update IV), use instead the following boilerplates:

For inorganic methods found in Third Edition Chapter Three:

Refer to Chapter One, Chapter Three, and the manufacturer's instructions for definitions that may be relevant to this procedure.

For all other methods found in Third Edition:

Refer to Chapter One and the manufacturer's instructions for definitions that may be relevant to this procedure.

4.0 INTERFERENCES

- Discuss known and potential problems and interferences that could affect method performance or an evaluation of the results.
- As appropriate, describe procedures that may be employed to prevent or minimize the problems. If such procedures are already included in Sec. 11.0 (Procedure), a reference to these subsections should be included in this section.
- If appropriate, include the boilerplate regarding demonstrating that materials used during analysis are free of interferants (see below).

Sec. 4.0 boilerplate:

Include this boilerplate in most methods, when appropriate to method application. Do not include it in field test kit methods or similar applications.

4.1 Solvents, reagents, glassware, and other sample processing hardware may yield artifacts and/or interferences to sample analysis. All of these materials must be demonstrated to be free from interferences under the conditions of the analysis by analyzing method blanks. Specific selection of reagents and purification of solvents by distillation in all-glass systems may be necessary. Refer to each method to be used for specific guidance on quality control procedures and to Chapter < include the specific chapter number > for general guidance on the cleaning of glassware.

*need to check methods for the "to be used" phrase above. Organic 8000 series determinatives from Update IV have it, need to check others

5.0 SAFETY

- Discuss personnel health and safety issues specific to performance of the method and beyond the scope of routine laboratory practices. This includes information regarding specific toxicity of target analytes and reagents, special precautions to avoid harm, and any special protective equipment required for performing the method.
- Safety warnings may also occur in other sections of the method, for example, in the procedure at the step of concern. However, you must repeat in Sec. 5.0 all safety concerns found in any other section of the method.
- Add the appropriate boilerplate statement (see below) regarding safety issues not directly addressed by the method.

Sec. 5.0 boilerplate (this is now different -- only one option, regardless whether there are safety warnings anywhere in the method):

Include as the first section in Sec. 5.0 for those methods that involve the handling of any chemicals: This boilerplate is now the only one to be used (there used to be two options), unless the method has no chemicals (see just below).

5.1 This method does not address all safety issues associated with its use. The laboratory <or replace "laboratory" with "user" if the method is not a laboratory method> is responsible for maintaining a safe work environment and a current awareness file of OSHA regulations regarding the safe handling of the chemicals listed in this method. A reference file of material safety data sheets (MSDSs) should be available to all personnel involved in these analyses.

Include as the first section in Sec. 5.0 for those methods that do not involve the handling of any chemicals:

5.1 This method does not address all safety issues associated with its use. The laboratory <or replace "laboratory" with "user" if the method is not a laboratory method> is responsible for maintaining a safe work environment.

6.0 EQUIPMENT AND SUPPLIES

- List method-specific equipment and supplies (those other than reagents and standards), without mentioning a specific vendor whenever possible. Include the phrase "or equivalent" as appropriate when vendor-specific instrumentations or supplies are listed. If specific equipment is necessary based on method studies, clearly state what equipment and supplies were tested. If necessary, include sufficient information for locating and purchasing the correct equipment.

Common laboratory apparatus, e.g., beakers, flasks, stirring bars, graduated cylinders, etc., should not be mentioned, unless there is a specific need for one with an unusual or non-standard characteristic, e.g., a specific chemical-resistant coating for a stirring bar, tinted glass flasks, Class A graduated cylinders, etc. All other apparatus should be mentioned in this section, e.g., pH meter, hot plate stirrer, analytical balance, etc. Generally, mention only the more expensive and unique equipment.

- If appropriate (see note before boilerplate), add the boilerplate (below) regarding how the mention of trade names is for illustrative purposes only (if such names are given in the method).
- If appropriate, also include the boilerplate (below) regarding glassware for solvent recovery, edited as appropriate to the specific method.
- Do not include more sensitivity specifications (significant figures) than necessary. For instance, a balance capable of weighing to "0.0001 g" is too sensitive of a specification for the weighing of 10-g samples. A specification of 0.01 g may be more appropriate.

Sec. 6.0 boilerplate regarding trade names:

Include this boilerplate in most methods, depending on the application and whether trade names for equipment are mentioned. However, do not include this boilerplate in immunoassay test kit methods or similar applications that depend on use of a specific commercial product.

The mention of trade names or commercial products in this manual is for illustrative purposes only, and does not constitute an EPA endorsement or exclusive recommendation for use. The products and instrument settings cited in SW-846 methods represent those products and settings used during method development or subsequently evaluated by the Agency. Glassware, reagents, supplies, equipment, and settings other than those listed in this manual may be employed provided that method performance appropriate for the intended application has been demonstrated and documented.

NEW Sec. 6.0 boilerplate regarding listing of common equipment:

This should follow the previous boilerplate as a new single-sentence paragraph, or stand alone if the previous boilerplate does not exist. Do not give it a section number, treat it as an introductory paragraph:

This section does not list common laboratory glassware (e.g., beakers and flasks).

Sec. 6.0 boilerplate regarding a listed solvent recovery system:

Include this boilerplate when appropriate:

NOTE: This glassware is recommended for the purpose of solvent recovery during the concentration procedures requiring the use of <identify the technology here, e.g., "Kuderna-Danish evaporative concentrators">. Incorporation of this apparatus may be required by Federal, State or local municipality regulations that govern air emissions of volatile organics. EPA recommends the incorporation of this type of reclamation system as a method to implement an emissions reduction program. Solvent recovery is a means to conform with waste minimization and pollution prevention initiatives.

6.0 boilerplate regarding GC columns (from 8041, to be adapted to other methods as applicable):

CHECK ALL METHODS WITH THE SECOND PARAGRAPH TO MAKE SURE IT ENDS WITH "ARE APPROPRIATE" AND NOT "IS APPROPRIATE".

6.X GC columns

This method describes procedures for both single-column and dual-column analyses. The single-column approach involves one analysis to determine that a compound is present, followed by a second analysis to confirm the identity of the compound (Sec. 11.8 describes how GC/MS confirmation techniques may be employed). The dual-column approach involves a single injection that is split between two columns that are mounted in a single gas chromatograph. Both the single-column approach and the dual-column approaches employ wide-bore (0.53-mm ID) columns.

The columns listed in this section were the columns used to develop the method performance data. The listing of these columns in this method is not intended to exclude the use of other columns that may be developed. Laboratories may use these columns or other capillary columns provided that the laboratories document method performance data (e.g., chromatographic resolution, analyte breakdown, and sensitivity) that are appropriate for the intended application.

This method contains example retention time data for the analysis of the derivatized phenols on Columns 1 and 2, and data for the analysis of the underivatized phenols on Columns 1 and 3. These data are provided for illustrative purposes only.

7.0 REAGENTS AND STANDARDS

- Provide sufficient detail on necessary grades, the concentration, and the preparation of all reagents and standards to allow the work to be duplicated. Do not include lengthy discussions on common procedures.

Exception regarding information on preparation of standard: If a standard must be prepared when it is about to be used (e.g., as in Method 8151), the description of standard preparation can appear at that location in the method (e.g., in Sec. 11), and a reference to that section should appear here in Sec. 7.0 as appropriate.

- List each chemical as follows: chemical name, concentration in parenthesis, and the formula. For example: Sodium hydroxide (2M), NaOH (i.e. formula in parenthesis -- need final input)
- Be consistent with the standard or reagent name throughout the method (and the manual as possible), and include all standards and reagents mentioned by the method in any section.
- Keep a 1:1 correlation between the information in this section and the others, e.g., if the procedure calls for both 2N and 1N H₂SO₄, then include in this section both 2N and 1N H₂SO₄.
- As necessary, include specific information regarding the storage of the reagent or standard.
- List reagents before standards, particularly if the standards are to be prepared from the reagents. List the standards in descending order based on which are made from which, i.e., list the stock standards before the dilution standards. As compatible with these conditions, also match the listing order with the first appearance of the chemical in the procedure.
- Include boilerplate instructions (see below) regarding the reagent grade of chemicals and references to water, when appropriate. This boilerplate may not be appropriate for some methods. (In old methods, replace references to "ASTM Type II" water with "reagent." Also, because of the boilerplate for this section, reagents throughout the method need not be referred to as "analytical-grade.")

[Note: These instructions may change in the future upon development of the separate chapter of definitions. In that case, there may just be a link from this method section to the definition for reagent water. Global adjustments can be made to all methods after completion of the new definitions chapter of the manual. The definitions for reagent water will be different for organic and inorganic methods.]

- In preparation or extraction methods, note that other solvent systems may be employed, provided that adequate performance can be demonstrated for the analytes of interest with any solvent employed, whether or not it is listed in the method.

Sec. 7.0 reagent grade chemical boilerplate:

Include the following paragraph when appropriate as the first section; this boilerplate may not be appropriate for some methods, such as field test kits <add "or pesticide-grade" if applicable>:

7.1 Reagent-grade <or pesticide-grade> chemicals must be used in all tests. Unless otherwise indicated, it is intended that all reagents conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

Sec. 7.0 extraction solvent system boilerplate:

Include text similar to the following paragraphs (taken from Method 3546), edited as appropriate for methods involving solvent extraction systems:

7.X Extraction solvents

This method has been validated using a 1:1 mixture of hexane and acetone from matrices such as soil, glass-fibers, and sand. Other solvent systems may have applicability in microwave extraction, provided that at least one component absorbs microwave energy.

The choice of extraction solvent will depend on the analytes of interest and no single solvent is universally applicable to all analyte groups. Whatever solvent system is employed, *including* those specifically listed in this method, the analyst *must* demonstrate adequate performance for the analytes of interest, at the levels of interest. At a minimum, such a demonstration will encompass the initial demonstration of proficiency described in Method 3500, using a clean reference matrix. Method 8000 describes procedures that may be used to develop performance criteria for such demonstrations as well as for matrix spike and laboratory control sample results.

Hexane is a water-immiscible solvent and acetone is a water-miscible solvent. The purpose of the water-miscible solvent is to facilitate the extraction of wet solids by allowing the mixed solvent to penetrate the layer of water of the surface of the solid particles. The water-immiscible solvent extracts organic compounds with similar polarities. The polarity of acetone may also help extract polar analytes in mixed solvent systems.

All solvents should be pesticide quality or equivalent. Solvents may be degassed prior to use.

8.0 SAMPLE COLLECTION, PRESERVATION, AND STORAGE

- Provide any method-specific information on sample collection, preservation, shipment, and handling or storage. In general, this section should not deal with general field sampling information, nor refer to such guidance. However, include field sampling components in those methods for which such procedures are an integral part of the method, e.g., Method 5035/Appendix A.
- When appropriate, add a boilerplate referral (see below) to the method chapter for additional, or for any, guidance on sampling procedures that may be particular to the methods contained in that chapter.

Sec. 8.0 boilerplate:

Add this boilerplate when appropriate (i.e., if such guidance exists somewhere in the chapter):
No longer say in it "this chapter".

See the introductory material to Chapter <no.>, "<put title of chapter here>."

9.0 QUALITY CONTROL

- Describe method-specific quality control measures.
- Do not include general QC information that is redundant to that already contained in Chapter One.
- Do not include calibration information in Sec. 9.0.
- As appropriate for a laboratory method, add the first boilerplate referral (see below) to the SW-846 Chapter One for guidance on additional quality assurance and quality control protocols. When this boilerplate is not appropriate (e.g., for a field test kit method), then add the second boilerplate.

Sec. 9.0 boilerplate for laboratory methods:

Include this section in methods used in a laboratory.

(Highlights and redline/strikeout indicate changes made on 1/26/04 and later to reflect BL wishes)

9.1 Refer to Chapter One for guidance on quality assurance (QA) and quality control (QC) protocols. When inconsistencies exist between QC guidelines, 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. Any effort involving the collection of analytical data should include development of a structured and systematic planning document, such as a Quality Assurance Project Plan (QAPP) or a Sampling and Analysis Plan (SAP), which translates project objectives and specifications into directions for those that will implement the project and assess the results. Each laboratory should maintain a formal quality assurance program. The laboratory should also maintain records to document the quality of the data generated. All data sheets and quality control data should be maintained for reference or inspection.

Also, for organic determinative methods, the language below for additional subsections in 9.0 should be included in each method as appropriate. These paragraphs may be expanded or revised to meet the needs of the specific determinative method, however, the order of these concepts should be identical or very similar to what follows. The subsections to follow are examples of what might be included in many organic determinative laboratory methods:

<Note, per Barry, some of the differences in the QC sections may be because of differences in detectors, some may be more susceptible to interferences and less stable than others. If dealing with the same detectors, the QC should be similar. Method 8000C (or the 4th Edition version as it will become) will be the determining factor in what we include in the QC sections of the other 8000 series methods. So he wants to worry about content of this section in detail at that time. He may need some workgroup advice on some details.

9.2 Refer to Method 8000 for specific determinative method QC procedures. Refer to Method 3500 or 5000 for QC procedures to ensure the proper operation of the various sample preparation techniques. If an extract cleanup procedure is performed, refer to Method 3600 for the appropriate QC procedures. Any more specific QC procedures provided in this method will supersede those noted in Methods 8000, 5000, 3500, or 3600.

9.3 Quality control procedures necessary to evaluate the GC system operation are found in Method 8000 and include evaluation of retention time windows, calibration verification and chromatographic analysis of samples.

<Note to method editor: Some methods also have method-specific information as subsections to this section. Current applicability of this information can be reviewed as each method is edited.>

9.4 Initial demonstration of proficiency

Each laboratory must demonstrate initial proficiency with each sample preparation and determinative method combination it utilizes by generating data of acceptable accuracy and precision for target analytes in a clean matrix. The laboratory must also repeat the demonstration of proficiency whenever new staff are trained or significant changes in instrumentation are made. See Method 8000 for information on how to accomplish a demonstration of proficiency.

<make sure there is no comma between "utilizes" and "by" in first sentence of 9.4.>

<Note to method editor: Some methods also have method-specific information about the demonstration as additional sentences or subsections. Current applicability of this information can be reviewed as each method is edited.>

9.5 Before processing any samples, the analyst should demonstrate that all parts of the equipment in contact with the sample and reagents are interference-free. This is accomplished through the analysis of a method blank. Each time samples are extracted, cleaned up, and analyzed, and when there is a change in reagents, a method blank should be prepared and analyzed for the compounds of interest as a safeguard against chronic laboratory contamination. If a peak is observed within the retention time window of any analyte that would prevent the determination of that analyte, determine the source and eliminate, if possible, before processing the samples. The blanks should be carried through all stages of sample preparation and analysis.

9.6 Sample quality control for preparation and analysis

The laboratory must also have procedures for documenting the effect of the matrix on method performance (precision, accuracy, method sensitivity). At a minimum, this **should** include the analysis of QC samples including a method blank, a matrix spike, a duplicate, and a laboratory control sample (LCS) in each analytical batch and the addition of surrogates to each field sample and QC sample when surrogates are used. Any method blanks, matrix spike samples, and replicate samples should be subjected to the same analytical procedures (Sec. 11.0) as those used on actual samples.

9.6.1 Documenting the effect of the matrix should include the analysis of at least one matrix spike and one duplicate unspiked sample or one matrix spike/matrix spike duplicate pair. The decision on whether to prepare and analyze duplicate samples or a matrix spike/matrix spike duplicate must be based on a knowledge of the samples in the sample batch. If samples are expected to contain target analytes, laboratories may use a matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, the laboratories should use a matrix spike and matrix spike duplicate pair. **Consult Method 8000 for information on developing acceptance criteria for the MS/MSD.** ~~All matrix spike samples and replicate samples should be subjected to the same preparation and analytical procedures as those used on actual samples.~~

<Note to method editor: Sometimes the above subsection is replaced with other text (as in Method 8261, which states that the surrogate use makes matrix spike samples unnecessary (Per Barry, Method 8261, a GC/MS method, is a special case as far as

method handling is concerned -- the method developer included built-in recovery correction); or the subsection contains other method-specific information. These approaches will be reviewed as each method is edited.>

9.6.2 A laboratory control sample (LCS) should be included with each analytical batch. The LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume. The LCS is spiked with the same analytes at the same concentrations as the matrix spike, when appropriate. When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix. **Consult Method 8000 for information on developing acceptance criteria for the LCS.**

9.6.3 Also see Method 8000 for the details on carrying out sample quality control procedures for preparation and analysis. In-house method performance criteria for evaluating method performance should be developed using the guidance found in Method 8000.

<Note to method editor: Sometimes other subsections are included, which will be reviewed as each method is edited.>

9.7 Surrogate recoveries

If surrogates are used, the laboratory should evaluate surrogate recovery data from individual samples versus the surrogate control limits developed by the laboratory. See Method 8000 for information on evaluating surrogate data and developing and updating surrogate limits. Procedures for evaluating the recoveries of multiple surrogates and the associated corrective actions should be defined in an approved project plan.

<Add the first words "if surrogates are used" if surrogates are not specifically mentioned in the method. Also Barry prefers "should" in the first sentence.>

9.8 It is recommended that the laboratory adopt additional quality assurance practices for use with this method. The specific practices that are most productive depend upon the needs of the laboratory and the nature of the samples. Whenever possible, the laboratory should analyze standard reference materials and participate in relevant performance evaluation studies.

Sec. 9.1 boilerplate for other methods (e.g., field test kits):

9.1 Follow the manufacturer's instructions for the quality control procedures specific to use of the testing product. Any effort involving the collection of analytical data should include development of a structured and systematic planning document, such as a Quality Assurance Project Plan (QAPP) or a Sampling and Analysis Plan (SAP), which translates project objectives and specifications into directions for those that will implement the project and assess the results.

10.0 CALIBRATION AND STANDARDIZATION

- If preferred, calibration and standardization information need not be separated from the procedure information in Sec. 11 and put into this section. Instead, simply refer to the text on calibration and standardization found in Sec. 11, Procedure. (At a minimum, this referral approach must be used for the organic methods.) Include the first boilerplate below.
- Use the second boilerplate below for methods to which calibration information does not apply.
- If calibration information will be included in Sec. 10, provide the information listed below. Keep instrument operating conditions in the procedure section (Sec. 11).
 - As appropriate, describe initial calibration procedures, with details on how to do them.
 - Indicate acceptance limits for the calibration, or refer back to a base method if appropriate.
 - Provide guidance on what to do if the relevant performance criteria are not met.
 - As appropriate, describe calibration verification. At the least, include an indication of verification frequency.

Sec. 10.0 boilerplate when calibration information is kept in the procedure section:

See Sec 11.X for information on calibration and standardization.

Sec. 10.0 boilerplate for methods with no applicable calibration information, e.g., sample preparative or cleanup methods:

There are no calibration or standardization steps directly associated with this procedure.

11.0 PROCEDURE

- Provide detailed step-by-step instructions for using the method. Write in an active voice, as much as possible. Include a description of sample processing and instrumental or physical analysis steps. Include those steps that are essential to the procedure, and avoid unnecessary restrictive instructions.
- Strive for cross-method consistency in the presentation of procedures, especially for similar technologies.

11.0 boilerplate (from Method 8041) that Barry likes regarding confirmation -- wants in all non-specific chromatographic methods, including inorganics, adapted to the specific method as necessary:

Note: Ray defined non-specific as any chromatographic detection technique that could possibly use more than one column for analysis or, in the case of Method 9058, the primary column is prone to false positives. In his opinion, even if there is only one available column, confirmation is also a good recommendation when the results are critical and the sample matrices are not well characterized. He noted that we have some language to that effect in Method 8082A -- pertaining to PCB confirmation.

11.8 Confirmation

Tentative identification of an analyte occurs when a peak from a sample extract falls within the daily retention time window. Confirmation is necessary when the sample composition is not well characterized. Confirmatory techniques such as gas chromatography with a dissimilar column or a mass spectrometer should be used. See Method 8000 for information on confirmation of tentative identifications.

When results are confirmed using a second GC column of dissimilar stationary phase, the analyst should check the agreement between the quantitative results on both columns once the identification has been confirmed. See Method 8000 for a discussion of such a comparison and appropriate data reporting approaches.

When the dual-column approach is employed, the target phenols are identified and confirmed when they meet the identification criteria on both columns.

% dry weight boilerplate -- use Method 3562 text.

12.0 DATA ANALYSIS AND CALCULATIONS

- Describe quantitative and qualitative information for deriving final sample results from typical instrumental data. Otherwise, include a reference to a base method or to Sec. 11.0 for the information (e.g., to avoid a disruption of the procedural flow).
- Include any of the various boilerplates provided below, as appropriate.

Sec. 12.0 boilerplate for referral to Sec. 11 (In organic methods, always put any data analysis and calculations information in Sec. 11.0 and use a referral in Sec. 12.0 to the appropriate subsection of Sec. 11.0):

See Sec. 11.X for information on data analysis and calculations.

or just:

See Sec. 11.X.

Sec. 12.0 boilerplate regarding units: <awaiting input for when at a minimum this should appear>

12.X Results must be reported in units commensurate with their intended use and all dilutions must be taken into account when computing final results.

Sec. 12.0 boilerplate for methods like the 4XXX series or other field methods that rely on manufacturer's kits/instructions:

See the manufacturer's instructions regarding data analysis and data calculations.

Sec. 12.0 boilerplate for methods with no data calculation steps (e.g., preparative methods):

There are no determinative data analysis and calculation steps directly associated with this procedure. Follow the directions given in the determinative method.

<Or use what Barry put in one of his methods:>

There are no calculations explicitly associated with this extraction procedure. See the appropriate determinative method for the calculation of final sample results.

Sec. 12.0 boilerplate for referral to a base method:

See Method 8000 (or whatever is the appropriate base method) for information regarding data analysis and calculations.

12.0 DATA ANALYSIS AND CALCULATIONS

There are no calculations explicitly associated with this extraction procedure. See the appropriate determinative method for the calculation of final sample results.

13.0 METHOD PERFORMANCE

- Provide summaries regarding sources of performance data examples, with brief descriptions of the studies and the results. Also, include references to the data sources and performance data found in tables of the method. (Important: List all of these data sources in the reference section (Sec. 16.0) and provide complete copies to EPA for the central method file.)
- Clearly indicate that the performance data are examples of what might be achieved and that the data are not intended to be used as acceptance criteria (also add the word "example" to referenced table titles, as appropriate).
- Do not address or include method detection limit discussions or refer to tables of such data anywhere in the method. If necessary or useful, only include a generic description of anticipated method sensitivity for the matrix. The focus should be on spike recovery performance and the calibration range. Also, clearly note that the information is provided as guidance only, and that such limits are highly-matrix dependent and not always achievable. In some cases such as in the immunoassay methods, the values quoted as "MDLs" are real measured values and thus should be left in the method with a change in the terminology.
- Include the boilerplates below, as appropriate.

Sec. 13.0 boilerplate applicable to most methods:

13.1 Performance data and related information are provided in SW-846 methods only as examples and guidance. The data do not represent required performance goals for users of the methods. Instead, performance goals should be developed on a project-specific basis, and the laboratory should establish in-house QC performance criteria for the application of this method.

Sec. 13.0 boilerplate for end of paragraphs referring to or discussing performance data studies and examples:

These data are provided for guidance purposes only.

Sec. 13.0 boilerplate for preparative methods without performance information:

13.X Refer to the determinative method for performance data examples and guidance.

Sec. 13.0 boilerplate for field test kits:

13.1 Performance data and related information are provided by the manufacturer in the package insert.

Sec. 13.0 boilerplate applicable to other methods without performance data (rare):

13.X Performance data examples and guidance for this method currently are not available.

14.0 POLLUTION PREVENTION

- At a minimum, add the boilerplate below regarding EPA's stance on pollution prevention.
- Include any method-specific aspects that minimize or prevent pollution.

Sec. 14.0 boilerplate:

Include as the first two subsections:

14.1 Pollution prevention encompasses any technique that reduces or eliminates the quantity and/or toxicity of waste at the point of generation. Numerous opportunities for pollution prevention exist in laboratory operations. The EPA has established a preferred hierarchy of environmental management techniques that places pollution prevention as the management option of first choice. Whenever feasible, laboratory personnel should use pollution prevention techniques to address their waste generation. When wastes cannot be feasibly reduced at the source, the Agency recommends recycling as the next best option.

14.2 For information about pollution prevention that may be applicable to laboratories and research institutions consult *Less is Better: Laboratory Chemical Management for Waste Reduction* available from the American Chemical Society's Department of Government Relations and Science Policy, 1155 16th St., N.W. Washington, D.C. 20036, <http://www.acs.org>.

<make sure in above paragraph the phone number has been replaced by the web site address

15.0 WASTE MANAGEMENT

- At a minimum, add the boilerplate below regarding EPA's stance on laboratory waste management.
- If necessary, also include any method-specific aspects of laboratory waste management.

Sec. 15.0 boilerplate:

Include as the first paragraph or subsection (if more subsections follow):

The Environmental Protection Agency requires that laboratory waste management practices be conducted consistent with all applicable rules and regulations. The Agency urges laboratories to protect the air, water, and land by minimizing and controlling all releases from hoods and bench operations, complying with the letter and spirit of any sewer discharge permits and regulations, and by complying with all solid and hazardous waste regulations, particularly the hazardous waste identification rules and land disposal restrictions. For further information on waste management, consult *The Waste Management Manual for Laboratory Personnel* available from the American Chemical Society at the address listed in Sec. 14.2.

16.0 REFERENCES

- List those method source documents (specifically those documents used as a text source during method writing and development), and publications that document method performance and are directly referenced by the method. This list should not include general educational references regarding the method technology or its analytes, or other such documentation that was not used during method development. If such indirect references are included in the method, list them as a final subsection to Sec. 13, Method Performance, preceded by the statement: "The following documents may provide additional guidance and insight on the performance and application of this method technology: . . ."
- List the author(s)'s name(s) first, using the first initial then middle initial separated by a period, followed by the surname and a comma. The title follows the comma. Articles from magazines or journals, and reports and studies are enclosed in quotation marks, while books are not. A comma follows the title within the quotes, then publisher, research institute, or other publishing body's information is listed along with project number, and document date, separated by commas, where applicable. Journal names are written in italics (not applicable to the example given below.) For example:

T. F. Jenkins, P. G. Thorne and M. E. Walsh, "Field Screening Method for TNT and RDX in Groundwater," US Army Cold Regions Research and Engineering Laboratory, Special Report, Hanover, New Hampshire 03755, 1994.
- All references must have dates. If a report is "in progress" or not yet published, a version must be dated and referenced as such -- and included in the method file. Do not simply put "in progress" or "to be published."

17.0 TABLES, DIAGRAMS, FLOW CHARTS, AND VALIDATION DATA

- Directly following the Sec. 17.0 title, add the following brief boilerplate (revised as appropriate): The following pages contain the tables and figures referenced by this method.

If the method has an appendix or a glossary before or after the tables and figures, include reference to it in the 17.0 boilerplate. For example:

The following pages contain the appendix, tables, and figures referenced by this method.

- Follow the above statement by a hard page break, followed in turn by the tables and then the figures (with hard page breaks as appropriate). Always place tables before figures. In the event of a "natural" occurrence of a soft page break between tables or figures, replace it with a hard page break
- Include only those tables and figures which were mentioned and briefly described in the method. Place the tables or figures within Sec. 17.0 in the order referenced by the text. Do not include tables or figures within the method at other locations. (The only exceptions to including tables in the text are the table of analytes and the table of additional analytes that may appear in Sec. 1.0. However, those tables are not numbered.)
- Diagrams or figures should only include new or unusual equipment or aspects of the method.
- Completely identify sources of all figures and tabulated data. Do not include copyrighted figures or data, unless permission has been obtained (submit the record of permission to EPA for inclusion in the central method file). Include complete source citations in Sec. 16.0 of the method for the figures and table data .
- Do not include flow diagrams of procedure steps in the organic analysis methods. If preferred, procedural flow diagrams can be included at the end of other Fourth Edition methods.

Table formatting

- Except in instances where clarity is compromised, omit table grid lines. Use a double line across the top and bottom of the table. Use a single line below the header row with the table. Identify the source of the information using "Data taken from Reference ___" as a footnote to the table with proper document number from the references section.

For example:

Element	10 mL HNO ₃ Digest	9 mL HNO ₃ + 3 mL HCL Digest	Total Analyte Concentration
Cd	3.40 ± 0.34	3.62 ± 0.17	3.45 ± 0.22
Ni	45.5 ± 5.9	42.2 ± 3.2	44.1 ± 3.0

Data taken from Reference 12.

Table titles

- Number tables in a sequential manner. Center the title of each table at the top of the page, separated by a blank line below the top label of table number. Present the title in all capital letters. For example:

TABLE 1

CHROMATOGRAPHIC CONDITIONS FOR
1,2-DIBROMOETHANE (EDB) AND 1,2-DIBROMO-3-CHLOROPROPANE (DBCP)

- For large tables, the font for the contents of the table (not the title) may be a size smaller than "11" if necessary. However, keep the material readable.

Figure titles

- Designate figures in a sequential manner. Begin with "FIGURE 1" centered at the top of the page, skip a line, then provide the title of the figure. Present the title in all capital letters. For example:

FIGURE 1

CALIBRATION CURVE FROM A COMPETITIVE IMMUNOASSAY

Figure formatting

- Place "Figure taken from Reference ___" somewhere on the figure page as a reference to the source of the figure, with proper reference number included.
- If you are a method developer submitting a method to EPA for consideration as an SW-846 method, do not embed figures in the text. Provide separate electronic copies and clear prints of the figures. The Agency will import the figures into the method documents in the format currently used for SW-846 methods.

ATTACHMENT A

ORDER OF PARTS AND SECTIONS IN FOURTH EDITION SW-846 METHODS

METHOD NUMBER

TITLE

- 1.0 SCOPE AND APPLICATION
 - 2.0 SUMMARY OF METHOD
 - 3.0 DEFINITIONS
 - 4.0 INTERFERENCES
 - 5.0 SAFETY
 - 6.0 EQUIPMENT AND SUPPLIES
 - 7.0 REAGENTS AND STANDARDS
 - 8.0 SAMPLE COLLECTION, PRESERVATION, AND STORAGE
 - 9.0 QUALITY CONTROL
 - 10.0 CALIBRATION AND STANDARDIZATION
 - 11.0 PROCEDURE
 - 12.0 DATA ANALYSIS AND CALCULATIONS
 - 13.0 METHOD PERFORMANCE
 - 14.0 POLLUTION PREVENTION
 - 15.0 WASTE MANAGEMENT
 - 16.0 REFERENCES
 - 17.0 TABLES, DIAGRAMS, FLOW CHARTS, AND VALIDATION DATA
- APPENDICES (e.g., GLOSSARY)

ATTACHMENT B

NUMBERING SYSTEM FOR SW-846 METHODS

<u>Method No.</u>	<u>Method Type</u>
0000 Series	Sampling Methods
001x	Air Sampling - Stack - Volatile Organics
002x	Air Sampling - Stack - Semivolatile Organics
003x	Air Sampling - Stack - Volatile Organics
004x	Air Sampling - Stack - Volatile Organics
005x	Air Sampling - Stack - Acid Gases
006x	Air Sampling - Stack - Metals
01xx	Air Sampling - Ambient
1000 Series	Certain Characteristics Methods (Also see 9XXX, e.g., for pH method)
10xx	Ignitability
11xx	Corrosivity
13xx	Extraction/Leaching Procedures
3000 Series	Sample Preparation Methods
30xx	Metals/Inorganics
32xx	Metals/Inorganics Speciation
35xx	Organic Extraction or Dilution
36xx	Extract Cleanup
38xx	Organic Screening
4000 Series	Immunoassay Methods
40xx	Organic Analytes (Screening)
45xx	Metals/Inorganics (Screening)
46xx	Organic Analytes (Assay)
5000 Series	Volatile Organics/Combustion Preparative Methods
50xx	Volatile Organic Preparation/Sample Introduction
505x	Combustion Preparative Methods
6000 Series	Metals/Inorganic Determinative Methods
60xx	ICP Determinative
62xx	X-ray Determinative
65xx	Electrochemical Determinative
68xx	HPLC Determinative
7000 Series	Individual Metals/Inorganic Determinative Methods (Primarily AA with Some Other Techniques)
8000 Series	Organic Determinative Methods
80xx	GC Determinative/Various Detectors
81xx	GC Determinative/Various Detectors
82xx	GC Determinative/Mass Spec Detectors
83xx	HPLC Determinative/Various Detectors
832x	HPLC Determinative/Mass Spec Detectors
84xx	IR Determinative
85xx	UV/Vis Determinative

<u>Method No.</u>	<u>Method Type</u>
9000 Series	Miscellaneous Analytes and Tests Methods
901x	Cyanide
902x	Organic Halogen
903x	Sulfur Containing Anions
904x	pH
905x	Specific Conductance/Ion Chromatography (Anions) Determinative
906x	Nonspecific Organics (TOC, Phenolics)
907x	Oil and Grease/Chlorine in Used Oil
908x	Cation Exchange Capacity
909x	Land Disposal Restrictions Test
910x	Saturated Hydraulic Conductivity, Saturated Leachate Conductivity and Intrinsic Permeability
913x	Microbiological
92xx	Anions - Nitrate/Chloride
921x	Anions Determinative - Ion-Selective Electrode
93xx	Radionuclides
931x	Radioactivity