

ENVIRONMENTAL PROTECTION AGENCY**40 CFR Parts 261, 271, and 302**

[SWH-FRL-5551-3]

RIN 2050-AD84

Hazardous Waste Management System; Identification and Listing of Hazardous Waste; Solvents; CERCLA Hazardous Substance Designation and Reportable Quantities**AGENCY:** Environmental Protection Agency.**ACTION:** Notice of proposed rulemaking.

SUMMARY: After extensive study of 14 chemicals potentially used as solvents, characterization of the wastes generated from solvent uses, and a risk assessment evaluating plausible mismanagement scenarios for these wastes, the U.S. EPA is proposing not to list those additional wastes from solvent uses as hazardous waste under 40 CFR Part 261. This action is proposed under the authority of Sections 3001(e)(2) and 3001(b)(1) of the Hazardous and Solid Waste Amendments (HSWA) of 1984, which direct EPA to make a hazardous waste listing determination for solvent wastes.

The determinations in this proposed rule are limited to specific solvent wastes, and are made pursuant to the current regulatory structure that classifies wastes as hazardous either through a specific listing or as defined under the more generic hazardous waste characteristics. Many of the solvent wastes addressed in this proposed rule are already regulated as hazardous wastes due to their characteristics. It is important to note that the proposal not to list these solvent wastes as hazardous wastes is not a determination that these chemicals are nontoxic. It is a determination only regarding the need for specifically adding these solvent wastes to the lists of hazardous waste.

DATES: EPA will accept public comments on this proposed rule until October 15, 1996. Comments postmarked after this date will be marked "late" and may not be considered. Any person may request a public hearing on this proposal by filing a request with Mr. David Bussard, whose address appears below, by August 28, 1996.

ADDRESSES: The official record for this proposed rulemaking is identified by Docket Number F-96-SLDP-FFFFF and is located at the following address. The public must send an original and two copies of their comments to: RCRA Information Center, U.S. Environmental Protection Agency (5305W), 401 M Street, SW, Washington, D.C., 20460.

Although the mailing address for the RCRA Information Center has not changed, the office was physically moved in November 1995. Therefore, hand-delivered comments should be taken to the new address: 1235 Jefferson Davis Highway, First Floor, Arlington, Virginia. Copies of materials relevant to this proposed rulemaking are located in the docket at the address listed above. The docket is open from 9:00 a.m. to 4:00 p.m., Monday through Friday, excluding Federal holidays. The public must make an appointment to review docket materials by calling (703) 603-9230. The public may copy 100 pages from the docket at no charge; additional copies cost \$0.15 per page.

EPA is asking prospective commenters to voluntarily submit one additional copy of their comments on labeled personal computer diskettes in ASCII (TEXT) format or a word processing format that can be converted to ASCII (TEXT). It is essential to specify on the disk label the word processing software and version/edition as well as the commenter's name. This will allow EPA to convert the comments into one of the word processing formats utilized by the Agency. Please use mailing envelopes designed to protect physically the submitted diskettes. EPA emphasizes that submission of comments on diskettes is not mandatory, nor will it result in any advantage or disadvantage to the commenter. Rather, EPA is experimenting with this procedure as an attempt to expedite our internal review and response to comments. This expedited procedure is in conjunction with the Agency "Paperless Office" campaign. For further information on the submission of diskettes, contact the Waste Identification Branch at the phone number listed below.

Requests for a hearing should be addressed to Mr. David Bussard at: Office of Solid Waste, Hazardous Waste Identification Division (5304W), U.S. Environmental Protection Agency, 401 M Street, SW, Washington, D.C. 20460, (703) 308-8880.

FOR FURTHER INFORMATION CONTACT: The RCRA/Superfund Hotline toll-free, at (800) 424-9346, or at (703) 920-9810 in the Washington, D.C. metropolitan area. The TDD Hotline number is (800) 553-7672 (toll-free) or (703) 486-3323 in the Washington, D.C. metropolitan area. For technical information or questions regarding the submission of diskettes, contact Mr. Ron Josephson, U.S. EPA Office of Solid Waste, Waste Identification Branch (5304W), 401 M St., SW, Washington, D.C. 20460, (703) 308-8890.

SUPPLEMENTARY INFORMATION: There are no regulated entities as a result of this action.

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I. Background

A. Statutory and Regulatory Authorities

This investigation and listing determination was conducted under the authority of Sections 2002(a), 3001(b) and 3001(e)(2) of the Solid Waste Disposal Act (42 U.S.C. 6912(a), and 6921 (b) and (e)(2)), as amended (commonly referred to as RCRA).

Section 102(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C. 9602(a), is the authority for the CERCLA aspects of this proposed rule.

Section 3001(e)(2) of RCRA (42 U.S.C. 6921(e)(2)) requires EPA to determine whether to list as hazardous several specified wastes, including solvent wastes.

The Environmental Defense Fund (EDF) and EPA entered into a consent decree to resolve most of the issues raised in a civil action undertaken by the Environmental Defense Fund (*EDF v. Browner*, Civ. No. 89-0598 (D.D.C.)), in which the Agency agreed, among other things, to a schedule for making a listing determination on spent solvents. The consent decree was approved by the court on December 9, 1994. As modified, the consent decree provides

that the listing determination is scheduled to be proposed for public comment on or before July 31, 1996; upon notification to EDF, this date may be extended for up to 15 days. Under the agreement, EPA must promulgate the final rule on or before May 31, 1997. This listing determination includes the following spent solvents, still bottoms from the recovery of the following solvents, and spent solvent mixtures thereof: cumene, phenol, isophorone, acetonitrile, furfural, epichlorohydrin, methyl chloride, ethylene dibromide, benzyl chloride, *p*-dichlorobenzene, 2-methoxyethanol, 2-methoxyethanol acetate, 2-ethoxyethanol acetate, and cyclohexanol.

For an additional set of solvents, EPA agreed to conduct a study, in lieu of a listing determination, and issue a final report. The study is scheduled to be issued by August 30, 1996. This study is to discuss the wastes associated with the use of the materials as solvents, the toxicity of the wastes, and a description of the management practices for the wastes. These additional chemicals are: diethylamine, aniline, ethylene oxide, allyl chloride, 1,4-dioxane, 1,1-dichloroethylene, and bromoform.

As part of its regulations implementing Section 3001(e) of RCRA, EPA published a list of hazardous wastes that includes hazardous wastes generated from nonspecific sources and a list of hazardous wastes from specific sources. These lists have been amended several times and are published in 40 CFR 261.31 and 40 CFR 261.32, respectively. In today's action, EPA is proposing not to amend 40 CFR 261.31 to add wastes from nonspecific sources generated during the use of the 14 solvents. This is not a determination that these chemicals are nontoxic. Many of these solvent wastes are, in fact, already regulated as hazardous waste because they exhibit a hazardous waste characteristic under 40 CFR 261 Subpart B, and/or because they are mixed with other solvent wastes that are, themselves, listed hazardous waste. Rather, this is a determination only regarding the need for adding these specific wastes to the RCRA hazardous waste listings based on the specific criteria in the listing regulations. Although the consent decree does not require a listing determination for the solvents covered by the study, the Agency may decide to make a listing determination for those solvents in a future rulemaking.

B. Existing Solvent Listings and the Regulatory Definition of Solvent

Five hazardous waste listings for solvents have been promulgated to date

(40 CFR 261.31(a)): F001, F002, F003, F004, and F005. EPA has defined the universe of wastes covered by today's listing determination to include only those wastes generated as a result of a solvent being used for its "solvent" properties. This approach is consistent with the existing solvent listings (50 FR 53316; December 31, 1985); this is also consistent with the term "spent" in the Consent Decree.

This definition of "solvent use" was included in the RCRA 3007 Solvent Use Questionnaire used to obtain information to support today's proposed rulemaking.

Solvents are used for their "solvent" properties—to solubilize (dissolve) or mobilize other constituents. Examples of such solvent use include degreasing, cleaning, and fabric scouring, use as diluents, extractants, and reaction and synthesis media, and for other similar uses. A chemical is not used as a solvent if it is used only for purposes other than those described above.

Spent solvents are solvents that have been used and are no longer fit for use without being regenerated, reclaimed, or otherwise processed (50 FR 53316, December 31, 1985). The listing investigation undertaken to support today's proposal covered spent solvents, still bottoms from the recovery of spent solvents, and mixtures of spent solvents after use with other solid wastes. The Agency also investigated the residuals generated by processes that use the solvents of interest. Residuals include spent solvents, residuals generated during solvent recovery, and any residuals generated after the solvent has been introduced into the process that might include some concentration of spent solvent. The existing solvent listings in 40 CFR 261.31 apply to spent solvents that contain at least 10 percent (by volume), before use, of the listed solvents are used for their "solvent properties," as defined in the December 31, 1985 Federal Register (50 FR 53316). In evaluating spent solvent wastes for today's determination, however, EPA considered all reported solvent uses, including those reported to be below the 10% threshold.

EPA's listing investigation did not consider processes where the constituents of interest are used as raw materials or principally sold as commercial products (i.e., where the constituent is not used for its solvent properties) because the materials used as raw materials or products are not generally considered wastes under RCRA. This also is discussed in the December 31, 1985 FR, ("* * * process wastes where solvents were used as reactants or ingredients in the formulation of commercial chemical

products are not covered by the listing"). EPA could examine the wastes from such nonsolvent uses, if deemed necessary. However, with a backlog of listing determinations to complete under court-ordered deadlines, EPA has focussed its current efforts on those determinations required by law. An example of the use of solvents as ingredients is the use of solvents contained in paints, coatings, or photoresist.

EPA solvent listings are distinct from most other hazardous waste listings in 40 CFR Part 261 Subpart D because they cover hazardous wastes from the use of, rather than the production of, specified chemicals. As noted above, the Agency has used the same approach in this listing determination as in previous listings. EPA believes that applying this definition of spent solvent in today's rulemaking is a reasonable approach. RCRA 3001(e)(2) directs EPA to make a listing determination on "solvents," but provides no further direction on the meaning of that term. EPA therefore has the discretion to reasonably define the scope of the listing determination. The Consent Decree identifies a subset of solvent wastes that are potential candidates for listing, and specifies that the listing determination applies to "spent solvents." Use of the definition has allowed the Agency to place reasonable limits on the scope of its listing investigation for this rulemaking. Given the ubiquity of "solvents" in general, the Agency cannot take a census of a particular industry for a study (as other recent listing determinations have done) to arrive at a regulatory determination. Instead, the Agency has used the existing definition of solvent use and attempted to identify facilities and industries that use these chemicals as solvents.

For this listing determination, this definition proved particularly useful as many of the chemicals (where used as solvents) are rather specialized in their solvent uses. The Agency has, therefore, retained the interpretations used in the past to define "solvent use" and "spent solvent" waste generation.

Finally, in a previous proposed hazardous waste listing for wastes from the production of dyes and pigments (59 FR 66072, December 22, 1994) EPA presented the general approach the Agency uses for determining whether to list a waste as hazardous pursuant to 40 CFR 261.11(a)(3). The discussion focussed on the selection of waste management scenarios used in assessing risk and the use of information on risk levels in making listing determinations. This approach was further developed in EPA's proposed listing for petroleum

refining process wastes (60 FR 57747, November 20, 1995). EPA is employing the same general approach in today's proposal. Readers are referred to these notices for a description of EPA's listing policy. Also, Section II.C.2., "Risk Assessment," contains a discussion of how elements of EPA's listing policy were applied in today's listing determination.

II. Today's Action

A. Summary of Today's Action

This action proposes not to list as hazardous wastes from solvent uses of the following 14 chemicals from the EDF consent decree: acetonitrile, 2-ethoxyethanol acetate, 2-methoxyethanol, 2-methoxyethanol acetate, cyclohexanol, cumene, phenol, furfural, isophorone, methyl chloride, 1,4-dichlorobenzene, benzyl chloride, epichlorohydrin, and ethylene dibromide. The Agency has determined that these wastes do not meet the criteria for listing set out in 40 CFR 261.11. Sections II.D through II.M of this preamble present waste characterization, waste management, mobility, persistence, and risk assessment data that are the bases for the Agency's proposal not to list these wastes.

For the first 10 chemicals, EPA found that the management of residuals from the use of these chemicals as solvents does not pose a risk to human health and the environment under the plausible mismanagement scenarios. The data used as the bases for these determinations are presented in Sections II.F through II.M of today's proposal. Detailed information is presented in the background documents supporting today's proposal, which are available in the docket (see ADDRESSES).

For the last four chemicals, the decision not to list residuals from the use of these chemicals as solvents is due to EPA's belief that these chemicals are extremely unlikely to be used as solvents based on a lack of data indicating widespread solvent use for these chemicals. These chemicals were originally put on the list in the consent decree because of initial indications that some solvent use may have existed. However, EPA did not find significant solvent use for these chemicals. One of the chemicals (p-dichlorobenzene) is a solid at room temperature, and the other three (benzyl chloride, epichlorohydrin, and ethylene dibromide) are relatively reactive chemicals not well suited to solvent use. EPA's information shows that the reported use of these four chemicals as solvents is linked to bench-scale or experimental laboratory

settings, and no significant solvent uses were found.

In short, the Agency is proposing not to list as hazardous benzyl chloride, epichlorohydrin, ethylene dibromide, and p-dichlorobenzene as hazardous spent solvents because these chemicals are extremely unlikely to be used as solvents. For more detailed Agency findings on these chemicals, see Sections II.N through II.Q of today's proposal and the background document supporting today's proposal. The Agency requests comment for new information on other solvent uses not covered in this proposal. If the Agency receives new data during the comment period, the Agency may use these data to revise risk assessment methodology and assumptions.

B. EPA's Evaluation of Solvent Use

1. Development of Study Universe

Spent solvents differ from other listed wastes among EPA's waste listings in that they are not principal waste streams generated by manufacturing processes. Rather, they are used in a host of manufacturing and allied applications, such as cleaning, degreasing, extraction, purification, etc.

As part of the solvent use study, the Agency researched uses for all 14 chemicals being considered in this listing determination (See Section II.B). Following the data gathering, the Agency sent out almost 1,500 preliminary questionnaires in an attempt to characterize industrial solvent use. After compiling the data and conducting follow up phone calls to facilities, the Agency mailed out 156 questionnaires to facilities to further characterize solvent uses. Summary information from these questionnaires forms part of the basis of the listing determination and may be found in the background document supporting today's proposal.

The solvents listing investigation focuses on facilities using specific chemicals for their solvent properties. At the outset of this investigation, EPA set out to identify probable solvent uses for these chemicals. The Agency conducted a thorough literature search to characterize the potential solvent uses. This search is fully described in the background document supporting today's proposal. The Agency identified industrial processes known or suspected of using the 14 chemicals being investigated as solvents through such sources as chemical engineering and industrial manufacturing reference books. Also central to the results of the literature search was the location of four to ten years of abstracts from scientific

publications that referenced the use of the 14 chemicals of concern as solvents. From these sources, the Agency developed profiles of known, suspected, and potential uses of these 14 chemicals as solvents.

The solvent uses identified were correlated with specific industries, using Standard Industrial Classification (SIC) Codes. The list of SIC codes developed was cross-referenced, by solvent, with other Agency data sources, including the Toxic Release Inventory (TRI) reporters list, Office of Water facility lists, and other sources to obtain a final list of facilities that might reasonably be expected to use one of the 14 chemicals as a solvent. The other sources utilized included (1) the mailing list for EPA's RCRA 3007 Petroleum Industry Questionnaire, (2) EPA's effluent guidelines questionnaire recipients for the Pharmaceuticals and Organic Chemicals, Plastics, and Synthetic Fibers industries, (3) facilities included in the Agency's National Air Toxics Inventory of Chemical Hazards (NATICH) database, and (4) pulp and paper mills studied during an investigation of pulp and paper mill sludge disposal. Additional facilities were included that were identified by EPA's Office of Pollution Prevention and Toxics (OPPT) during an evaluation of solvents. The Agency also met with trade groups representing pharmaceutical, chemical, synthetic organic chemical, and semiconductor manufacturers.

Where a suspected use of a chemical would affect industries other than those discussed above, EPA refined the facility mailing list through the use of publicly available industrial address books and product manufacturer listings. This approach to developing a mailing list is discussed in detail in the background document to support today's proposed rule.

The Agency used a preliminary questionnaire to prescreen for solvent use by facilities on the mailing list. The RCRA 3007 Preliminary Questionnaire of Solvent Use was mailed to 1,497 facilities in May 1993. Facilities were asked to provide the quantity of the chemical used as a solvent in 1991 and 1992. As a result of the preliminary questionnaire, the Agency removed more than 900 facilities from further analysis because they reported no use of the 14 chemicals as solvents.

The Agency attempted to refine the results of the preliminary questionnaire further before sending out the full 3007 survey. Several hundred of the facilities were contacted to confirm and clarify the information reported. Some facilities misreported the use of a solvent (i.e.,

reported methyl chloride when methylene chloride was used), and such errors were corrected. (Telephone logs for these contacts are contained in the docket to today's rule.) Further, because EPA estimated that very little useful information would be gained from smaller facilities, EPA eliminated from further consideration those facilities that used less than a combined total of 1,200 kilograms of all of the chemicals of concern. The Agency chose this cutoff because it represents the maximum annual quantity of waste that would be generated by a conditionally exempt small quantity generator (i.e., one that generates less than 100 kilograms per month of a hazardous waste). Further, EPA's data collection effort showed that most facilities (90%) reporting less than 1,200 kg/year were in fact using significantly less than 1,200 kg/year, i.e., 120 kg/year or less. In all the Agency eliminated approximately 400 facilities from further study, either due to reporting errors, discontinued use, or use of small quantities of the solvents. As a result of this refinement, 156 facilities received a RCRA 3007 Questionnaire of Solvent Use.

EPA believes that the elimination of most small quantity users does not significantly affect the risk assessment, because the volumes used were small compared to the larger volume users that were sent the full survey. The risk assessment results are based on the *highest* waste volumes (and solvent loadings) reported for each management practice (see section II.C.2), therefore any significant risks would be found in EPA's evaluation of the larger quantity users.

The Agency did not conduct a sampling and analysis program for the spent solvent wastes. EPA found that obtaining representative samples would be almost impossible due to potential use of these solvents in a variety of different industries. The cost of such a program would have been prohibitive to the Agency.

2. Applicability to National Use

For the solvents under review, the Agency believes that the industry study results obtained through the methodology described above accurately characterize solvent uses of the chemicals mandated for review. In addition, the industry study completed gives the Agency an accurate idea of the nationwide uses of these chemicals, whether or not the chemicals are used in large or small quantities as solvents. The Agency is confident that the collected information on solvent use covers the large solvent users.

Once the industry study was completed, the resulting data for each of the 14 chemicals was evaluated to determine whether or not large users may have reasonably been missed during the RCRA § 3007 survey process. Several considerations were evaluated for this review, including:

- the scope of anticipated solvent use obtained during the extensive literature search prior to pre-questionnaire mailing list development;
- whether or not the chemical was required to be reported in the 1990 Toxics Release Inventory;
- the number of facilities and type of solvent use eventually identified and characterized in the full RCRA § 3007 survey; and
- comparison of § 3007 survey solvent use quantities with total chemical production volume and, where available, volume of the chemical used as a non-solvent.

Three chemicals under evaluation (cyclohexanol, isophorone, and furfural) were not TRI chemicals in 1990, a primary data source for the RCRA § 3007 pre-questionnaire mailing list. However, EPA believes that large users of these chemicals were captured through other data sources. Literature searches suggested limited solvent uses for these chemicals across several industries. Results from the full RCRA § 3007 questionnaire confirmed limited solvent uses of greater than 1,200 kg/year for two chemicals: a single facility for cyclohexanol and four facilities for isophorone. The one cyclohexanol facility was a petroleum refinery and all identified petroleum refineries were sent a pre-questionnaire.

Isophorone solvent use was identified at four facilities across four SIC codes. Three of these facilities used isophorone as a solvent in a similar process (in the coating industry). As with cyclohexanol, no TRI data existed for isophorone to identify specific facilities.

Furfural was used in large quantities as a solvent, however nearly all of the solvent use (>99.9%) was found in the petroleum industry, which EPA surveyed. Given that the major use of this solvent was very specialized (e.g., extraction of lube oil), the Agency believes that the collected information on solvent use covers all large solvent users.

A detailed description of the methodology used to evaluate the coverage of the Agency's industry study for the 14 chemicals of concern is contained in the background document contained in the docket for today's rule (Hazardous Waste Listing Determination Background Document for Solvents). Statistics on production and solvent use

for each solvent are also summarized in the discussions of the listing determination for each respective chemical (Sections II.D through II.N). The Agency requests comment on the use of these chemicals as solvents EPA may not have uncovered in its data collection efforts.

3. Comparison of Questionnaire and Prequestionnaire Data

After the receipt of responses to the RCRA 3007 Questionnaire of Solvent Use, EPA compared the 1992 solvent use reported in the Preliminary Questionnaire with the solvent use reported in the 1993 Questionnaire. With the exception of acetonitrile, for which a slight increase in solvent use is noted, the reported use of the remaining 13 chemicals decreased. For all of the chemicals, the solvent use reported in the preliminary questionnaire included amounts of wastes containing the chemicals reported as managed by commercial treatment, storage, and disposal facilities (TSD). In some cases, such as benzyl chloride, ethylene dibromide and p-dichlorobenzene, nearly all quantities reported as used in 1992 were actually wastes received by TSDs. Other apparent decreases resulted from incorrect reporting of chemicals used, or because further review by EPA showed that the use did not meet EPA's definition of solvent use (see below). In addition to apparent changes that resulted from corrections to the data base, there were decreases in actual quantities used for some solvents. Specifically, significant decreases were noted for glycol ethers (e.g., 2-ethoxyethanol acetate, 2-methoxyethanol, and 2-methoxyethanol acetate), because facilities were phasing out their use as solvents. Additional decreases were attributable to plant closures and other discontinued use.

Based on a detailed review of the full Questionnaire responses, the Agency determined that certain uses reported in 1992 did not meet EPA's definition of solvent use. For example, further reductions from quantities reported in 1992 are attributable to the elimination from consideration of the use of a solvent as an ingredient in a photoresist in semiconductor and printed circuit board manufacture, and use of a solvent as a component of a paint or coating. (For example, for photoresist uses, Agency staff determined that such uses did not comport with the definition of "solvent use" as described earlier because the chemicals were not carriers, reaction media, extractants, etc. Rather, they were used in a way that suggested they were components of the manufacturing process.) Finally,

variations in usage are to be expected. For many solvents, facilities reported either increases or decreases in use between 1992 and 1993 that indicate changes in production schedule or product slate. Additional details on these changes, on a solvent-by-solvent basis, are presented in the Background Document for today's rulemaking. EPA believes that all large users of the 14 solvents were identified and surveyed as part of today's determination because of the specialized nature of solvent use for such chemicals as observed in its literature search. EPA also notes that users of small amounts of one solvent were captured in many cases because they are large users of another solvent. For example, one refinery uses a large amount of phenol but also was captured as an acetonitrile user.) Further, the Agency believes that the solvent use reported in response to the full Questionnaire provides a more accurate characterization of solvent use patterns than the Preliminary Questionnaire because of the greater level of detail provided by the respondents.

C. Description of Health and Risk Assessments

In determining whether waste generated from the use of these 14 chemicals as solvents meets the criteria for listing a waste as hazardous as set out at 40 CFR 261.11, the Agency evaluated the potential toxicity of the solvents, the fate and mobility of these chemicals, the likely exposure routes, and the current waste management practices.

1. Human Health Criteria and Effects

The Agency uses health-based levels, or HBLs, as a means for evaluating the level of concern of toxic constituents in various media. In the development of HBLs, EPA first must determine exposure levels that are protective of human health and then apply standard exposure assumptions to develop media-specific levels. EPA uses the following hierarchy for evaluating health effects data and health-based standards in establishing chemical-specific HBLs:

- Use the Maximum Contaminant Level (MCL) or proposed MCL (PMCL), when it exists, as the HBL for the ingestion of the constituent in water. MCLs are promulgated under the Safe Drinking Water Act (SDWA) of 1984, as amended in 1986, and consider technology and economic feasibility as well as health effects.

- Use Agency-verified Reference Doses (RfDs) or Reference Concentrations (RfCs) in calculating HBLs for noncarcinogens and verified

carcinogen slope factors (CSFs) in calculating HBLs for carcinogens. Agency-verified RfDs, RfCs, and CSFs and the bases for these values are presented in the EPA's Integrated Risk Information System (IRIS).

- Use RfDs, RfCs, or CSFs that are calculated by standard methods but not verified by the Agency. These values can be found in a number of different types of Agency documents and EPA uses the following hierarchy when reviewing these documents: Health Effects Assessment Summary Tables (HEAST); Human Health Assessment Group for Carcinogens; Health Assessment Summaries (HEAs) and Health and Environmental Effects Profiles (HEEPs); and Health and Environmental Effects Documents (HEEDs).

- Use RfDs or CSFs that are calculated by alternative methods, such as surrogate analysis, including structure activity analysis and toxicity equivalency.

All HBLs and their bases for this listing determination are provided in the risk assessment background document entitled Assessment of Risks from the Management of Used Solvents, which can be found in the RCRA docket for this rule at EPA Headquarters (see **ADDRESSES** section). That document also includes the evaluation of acute toxicity data, such as lethal doses for the oral and dermal routes, and lethal concentrations for the inhalation route.

2. Risk Assessment

The risk characterization approach follows the recent EPA Guidance on Risk Characterization (Browner, 1995) and Guidance for Risk Assessment (EPA Risk Assessment Council, 1991). The guidance specifies that EPA risk assessments will be expected to include (1) the central tendency and high-end portions of the risk distribution, (2) important subgroups of the populations such as highly susceptible groups or individuals, if known, and (3) population risk. In addition to the presentation of results, the guidance also specifies that the results portray a reasonable picture of the actual or projected exposures with a discussion of uncertainties. These documents are available in the public docket for this action (see **ADDRESSES** section).

Individual Risk

Individual risk descriptors are intended to convey information about the risk borne by individuals within a specified population and subpopulations. These risk descriptors are used to answer questions concerning the affected population and the risk for

individuals within a population of interest. The risk methodology section specifies the process used by EPA to assess individual risk for these solvents.

Due to the unique circumstances of this listing determination (e.g., variety of industries using solvents, limitations of the available data), EPA was unable to assess population risks. The generic management scenarios devised for this risk assessment were not industry-specific and EPA did not have sufficient data to allow for specific population risk assessment; such an assessment would have required inappropriate assumptions and with little accuracy in results. There is no need to conduct population risk assessment, however (even were it feasible), for today's action, because EPA did not find any significant individual risks of concern for any of the 14 chemicals examined.

Uncertainties Associated With the Risk Assessment

One source of uncertainty derives from the generically constructed management scenarios used; EPA had to make a variety of assumptions in order to model releases and exposures. Due to data limitations, as noted above, EPA was also not able to characterize actually exposed populations. Another uncertainty stems from the assumptions of plausible mismanagement, as described below in the following section.

The Agency completed an enormous task in the data gathering effort. These data helped EPA to identify the major waste generators, and the quantities of solvent waste most likely to pose a risk to human health and the environment. The questionnaire asked for detailed information on waste generation, management, and disposal for these chemicals when used as solvents. By closely examining facilities that use these chemicals as solvents, the Agency identified where these chemicals are used as solvents, and where wastes of interest are generated and managed. The Agency then used this information to focus on the appropriate exposure scenarios. Because EPA relied on the data provided from the questionnaires, the resulting analysis is dependent on the quality of the data collected.

a. Selection of Waste Management Scenarios. EPA's regulations at 261.11(a)(3)(vii) require the Agency to consider the risk associated with "the plausible types of improper management to which the waste could be subjected" because exposures to wastes (and therefore the risks involved) will vary by waste management practice. The choice of which "plausible management scenario" (or scenarios) to

use in a listing determination depends on a combination of factors which are discussed in general terms in EPA's policy statement on hazardous waste listing determinations contained in the Dyes and Pigments Listing Determination (59 FR 24530, December 22, 1994). EPA applied this policy, with some specific modifications that reflect unique characteristics of the industry, in the petroleum refining listing determination (60 FR 57747, November 20, 1995). The general use of the policy described in the dyes and pigments listing determination and applied in the petroleum rule is continued here.

The following discussion explains the selection of plausible management scenarios for the solvents listing determination. EPA's basic approach to selecting which waste management scenarios to model for risk analysis in listing determinations is to examine current management practices and assess whether or not other practices are available and would reasonably be expected to be used. Where a practice is actually reported in use, that practice is generally considered "plausible" and may be considered for potential risk. EPA then evaluates which of these current or projected management practices for each wastestream are likely to pose significant risk based on an assessment of exposure pathways of concern associated with those practices. There are common waste management practices, such as landfilling, which the Agency generally presumes may be plausible for solid wastes and will evaluate it for potential risk. There are other practices which are less common, such as land treatment, where EPA will consider them plausible only where the disposal methods have been reported to be practiced. In some situations, potential trends in waste management for a specific industry suggest the Agency will need to project "plausible" mismanagement even if it is not currently in use in order to be protective of potential changes in management and therefore in potential risk.

As experience is gained in listing determinations, the Agency recognizes the need to more specifically describe its approach to plausible management selection for the circumstances related to each listing. EPA believes it necessary to do so here, in part because of the unique nature of the solvents listing determination.

Selection of plausible management scenarios can better be described by noting that there are three important elements of this selection that must be considered in the risk assessment process: selection of the management practice(s) considered "plausible",

selection of waste volumes evaluated as going to each plausible practice, and selection of exposure pathways for each practice evaluated.

The first element is selection of plausible management practices. As described above, plausible practices are ones that are reported by generators and can also be ones that are common practices, such as landfilling. EPA may project less common or unreported practices as plausible if there are compelling reasons for doing so. For the solvents listing determination, all practices EPA considers common were reported.

In general, solvent wastes were wastewaters, high concentration organic wastes, or treatment residuals. Facilities also had losses of solvents gases due to process vents, flares, or other air releases, but these releases are not typically considered spent solvent wastes because they are process-related. Wastewaters were typically fairly dilute and are generally managed in a biological wastewater treatment system or sent to a Publicly Owned Treatment Works (POTW). In most cases, wastewater treatment occurred in tanks, however, some treatment in surface impoundments did occur. Wastewaters for one solvent (acetonitrile) were reported to go to underground injection wells, however, essentially all (>99.99%) such discharges were to Subtitle C hazardous waste injection wells.

Questionnaire data show that a high percentage of the high organic nonwastewaters go to thermal treatment in incinerators, industrial boilers, or fuel blenders. Because many of these solvent wastes are either characteristic hazardous wastes (primarily due to ignitability) and/or are mixed with listed hazardous wastes, the vast majority of these wastes are handled as hazardous. The other major category of nonwastewaters was treatment residuals (e.g., wastewater treatment sludges, incinerator ash) and were typically landfilled.

The Agency evaluated potential risk for the following practices: storage, combustion, wastewater treatment tanks and surface impoundments, and underground injection wells. There were no compelling reasons for projecting other practices as plausible.

Second, there is the selection of the volumes of each wastestream the Agency considers could be disposed of in that management practice. (Note that EPA must also consider the "loading" of waste going to disposal sites. The "loading" is the amount of the solvent itself contained in the volume of the wastestream reported.) Here the Agency

must determine what the volume of a wastestream is or could be going to a selected plausible management practice. Because different volumes are reported by generators, the Agency most often puts these reported volumes into a distribution and selects a high percentile volume to be representative of a reasonable volume that could go to the disposal scenario, usually a volume falling at or above the 90th percentile of volumes reported. That volume is then used as the volume input parameter for the risk assessment model. For solvents, EPA used the highest reported volumes (and loadings) going to the different management practices, because the number of volumes (and loadings) were limited to a few data points in many cases. The Agency did not attempt to project higher volumes than those reported in this listing determination for the following reasons:

- Use of these solvents is mostly specialized. The volume distribution was often skewed by one or two very high volume users. EPA used these higher volumes in its risk assessment modeling and therefore believes the conservative high volumes were in fact modeled.
- For purposes of this listing determination, the Agency has assumed that wastestreams reported to be managed as hazardous waste will continue to be managed in that way in the future. In this listing determination in particular, that assumption is considered reasonable because solvent use most often requires very high concentrations of chemical. Spent solvent as initially generated is therefore often very high concentration waste, meaning that the wastestreams are often and will continue to be characteristically hazardous for ignitability. In addition, many solvents are often used as mixtures containing other solvents that are listed as hazardous when spent (i.e., the F001 through F005 listings), or exhibit a characteristic (e.g., ignitability). Such wastestreams would have to continue to be managed as hazardous, and stringent requirements are in place to ensure that hazardous wastes do not pose a threat to human health or the environment. This also means that certain waste management practices could not be employed. It would be unreasonable to assume that large amounts of such concentrated organic wastestreams would be shifted from combustion or recycling to waste management practices for which they were not reported, such as landfilling, especially when the concentrated organic waste streams are already hazardous wastes

subject to the land disposal restriction rules.

- Spent solvents with relatively high value are also recovered by onsite distillation/fractionation in a closed-loop recycle stream. These residuals would not usually be considered wastes (see 40 CFR 261.2), and, therefore, these volumes (if reported) were not used in the risk assessment modeling.

- Investment by industry in waste management practices suggests that dramatic changes in reported volumes going to specific waste management practices would not occur. For example, it would be unreasonable to assume that a generator with a large investment in a wastewater treatment plant would abandon that management practice for another.

For these reasons, the Agency has concluded that the use of reported volumes of solvent wastestreams going to specific waste management practices is a reasonable way to project potential risk from spent solvent waste management.

The third element in selecting plausible management scenarios is the selection of the actual exposure pathways that could be expected to be created via that management practice. The exposure scenarios examined are discussed in the following section.

b. Exposure Scenarios. For each management scenario, EPA chose the pathways through which the solvents could affect human health or the environment. EPA initially considered a wide range of direct and indirect exposure pathways, including direct inhalation, ingestion of groundwater, inhalation of soil and dust, ingestion of soil, ingestion of surface water, ingestion of crops, ingestion of animal/dairy products, and ingestion of fish and shellfish. Exposure through the ingestion of fish and shellfish were not quantitatively evaluated because the solvents are nearly all highly water soluble, and therefore are not expected to be absorbed or bioaccumulated. Vapor phase releases will have little tendency to deposit to soil or surface water and, thus, little tendency to enter the food chain or crops.

Based on the physical and chemical properties of the constituents of concern and current management practices, direct inhalation was identified as the primary exposure route of concern. EPA also evaluated the groundwater pathway, where appropriate. Given the plausible waste management practices and the physical properties of the solvents, the following exposure scenarios were evaluated.

Management practice	Pathway	Exposure route
Combustion	Air	Inhalation of emissions from combustion.
Storage Tanks	Air	Inhalation of volatilized solvents.
Wastewater treatment tanks	Air	Inhalation of volatilized solvents.
Wastewater treatment surface impoundments	Air and Groundwater	Inhalation of volatilized solvents; ingestion of ground-water contaminated by solvents leaching.

To assess the risks posed by thermal treatment, EPA chose to model potential releases from a boiler as a plausible management practice. For preliminary screening, wastes currently managed in permitted hazardous waste management units (e.g., incinerators) were assumed to be managed in similar types of non-hazardous waste management units (e.g., Subtitle D industrial boiler). This approach results in risk estimates that are quite conservative, since the non-hazardous units are less protective than their hazardous counterparts. In addition, EPA modeled possible air releases from an open accumulation tank, because many solvent wastes are reported to be stored before treatment; for this analysis, EPA assumed that any waste that was thermally treated could be stored prior to treatment. To model potential air releases from wastewater treatment, EPA modeled aerated tanks and surface impoundments.

EPA evaluated two scenarios, landfills and deepwell injection, and found that modeling was not necessary to determine that risks from these pathways would not be significant, as discussed below. A third scenario, treatment of wastewaters in surface impoundments, also did not require extensive analysis to determine that risks from potential releases to groundwater would not be significant (see below).

The data from the 3007 Survey show that wastes that were sent to landfills contained negligible amounts of solvent; landfilling of wastes high in solvent content did not occur. As noted previously, solvent wastes are generally wastes with high organic content (spent solvent liquids, residuals from recycling), or dilute wastewaters. The vast majority of concentrated solvent wastes are hazardous due to characteristic or mixing with other listed wastes, and could not be landfilled, but are thermally treated. Therefore, organic or aqueous liquid wastes are not expected to be managed in a landfill. Few solids were generated that contained any residual solvent. The total loading of all solvents reported going to landfills was <500 kg per year, and nearly all went to Subtitle C landfills. Treatment residuals (wastewater treatment sludges and incineration residuals) were reported to

be landfilled; however, they had negligible solvent levels. The lack of solvent in treatment residuals is expected because these solvents are efficiently treated by combustion and in wastewater treatment systems.

Therefore, because the wastes that reported to go to landfills contained little or no solvent, and considering that nonwastewaters with any appreciable solvent content are generally hazardous and thus are managed as hazardous waste already, the Agency had no reason to model the landfill scenario.

EPA also considered the potential for groundwater risks posed by treatment in surface impoundments for all solvents that had wastewater going to surface impoundments for treatment. EPA found that these wastes are diluted by the flow of other dilute wastewaters (i.e., at the "headworks"). EPA gathered data on headworks flow in the 3007 Survey, and this allowed EPA to estimate headworks concentrations of all solvents going to surface impoundments based on the loading of solvent in each waste and the total wastewater flow to the headworks. Solvent levels were generally found to be below the HBLs at the headworks. Thus, no modeling was needed to "bound out" nearly all reported impoundment practices for possible groundwater risks. EPA closely examined the few remaining cases for which solvent levels might enter impoundments above HBLs, and completed bounding analysis when appropriate. Potential risks from surface impoundment treatment are discussed in more detail in the specific sections for each solvent.

The practice of deep-well injection was reported to occur for only one solvent (acetonitrile); nearly all of it was hazardous waste (except for wastes containing 2 kg of solvent), and all went to Subtitle C wells. Given that nearly all of the waste was hazardous and was disposed of in RCRA permitted units, the waste is adequately regulated. EPA found no evidence of any disposal in nonhazardous deepwells. Therefore, EPA did not evaluate this practice further.

Finally, even though EPA could not find scenarios that could lead to significant releases to ground water, the Agency also considered whether the

spent solvent wastes had the potential to form non-aqueous phase liquids (NAPLs) that might move as a separate phase either above or below the ground water table. These NAPLs may present special problems, especially in assessing their transport and potential impact. However, EPA found that nearly all solvents under consideration are miscible or very soluble in water and are not likely to form NAPLs in groundwater. One chemical with some solvent use, cumene, is only slightly soluble in water. However, EPA found no significant land disposal of cumene wastes. The solubilities of the solvents are given in the section specific to each solvent.

Potential Risks From Spills

The Agency considers significant risk from spillage of spent solvents to be unlikely for several reasons. First, most of the actual volume of residuals reported were low concentration wastestreams, i.e., wastewaters and treatment residuals. Their "loading" or mass of constituent in the reported waste is typically very low. These low reported concentrations (often reported as "trace" concentrations) were due to both treatment efficiencies of the spent solvents in wastewater treatment systems and dilution in the treatment system itself. Spills of such dilute wastestreams would not be of concern in terms of risk. The high concentration spent solvent wastes would be of most concern, but EPA found the vast majority to be already subject to hazardous waste management requirements as characteristically hazardous waste, or due to use or mixing with other listed solvents.

c. Risk Assessment Methodology. The general approach used for this risk assessment involved successive iterations of risk screening. At each step, risk from waste management scenarios was compared to these levels of concern: for non-carcinogens, a hazard quotient exceeding 1.0, and for carcinogens, a lifetime cancer risk factor in the range of 1×10^{-6} to 1×10^{-4} . For further explanation of levels of concern, see "EPA's Hazardous Waste Listing Determination Policy" in 59 FR 66073 (December 22, 1994). The overall risk assessment was conducted in three steps, as outlined below. The results of

the risk assessment for each solvent are described in Sections II.D to II.M.

First Phase of Risk Screening—Bounding Analysis: For each of the scenarios evaluated, EPA applied a screening methodology to arrive at “bounding” estimates of risk. These estimates gauge the risk posed by the particular scenario under worst-case conditions: i.e., risk to the most exposed populations under the most conservative assumptions about releases, transport, and exposure. Bounding estimates therefore purposely overestimate the exposure for the purpose of screening out those scenarios which cannot pose any significant risk under any real-life conditions. The scenarios that did not pose a significant risk under a bounding analysis were considered to have been screened out, and were not studied any further.

Second Phase of Risk Screening—High-End and Central Tendency Analysis: For each scenario where bounding analysis risk was above a level of concern, EPA estimated the high-end and central tendency risks. High-end risk describes the individual risk for those persons at the upper end (above the 90th percentile) of the risk distribution; central tendency represents the typical risk using average or median values for all exposure parameters. For this analysis, high-end estimates were determined by identifying the two most sensitive exposure parameters and then using maximum (or near-maximum) values for these parameters. Median or average values were used for all other parameters.

Third Phase of Risk Screening—Wastes Already Regulated as Hazardous: As stated above, EPA noted that many of the waste streams were already hazardous wastes; they were either characteristically hazardous (generally because of ignitability), or mixed with listed solvents (either during use or after waste generation). Current requirements for managing these wastes mean that they will not pose a threat to human health and the environment.

Therefore, EPA applied a third phase of risk screening to those wastes which had not screened out in either of the first two phases. This third phase consisted of a bounding analysis restricted to wastestreams that could plausibly be managed as nonhazardous waste.

d. Consideration of Damage Cases. EPA investigated damage incidents that contained reports of the 14 chemicals under evaluation as contaminants at the site. Sources for this investigation included the Record of Decision Database, the Damage Incident Database, and a literature search. The Record of

Decision (ROD) is generated by EPA to document how the Agency plans to clean up a Superfund Site, and contains the results of a detailed study of the contamination at the site. Unlike industry studies in which wastes under study are generated from set processes that are site-specific, in the solvent’s industry study it was not possible to determine a contaminant was used as a solvent meeting EPA’s definition of solvent use. Wastes disposed at many sites were categorized only in broad terms as “oily wastes,” “pesticide wastes,” “organic wastes,” or “solvent wastes;” the uses of specific wastes prior to disposal were not identified. Furthermore, sites were typically contaminated by a wide variety of chemicals, many of which are widely used F-listed solvents, and wastes containing these chemicals are more likely to represent any vaguely identified “solvent wastes.” In other damage incidents, waste categorization for buried drums or landfilled hazardous materials was not possible. Based on a review of identified damage instances, no single instance of damage was identified that could be tied to use of the target chemicals as a solvent.

Most of the damage cases found for these solvents resulted from disposal that took place many years ago, typically well before 1980. Waste management regulations have changed dramatically since the RCRA regulations were first promulgated (1980), and the damage cases appear to reflect management practices that are no longer legal or likely. Therefore, these cases do not provide a useful guide to current or future disposal practices that may occur.

Also, many of the 14 chemicals are produced in relatively large volumes, and only small percentages of most are used as a solvent. Some of the chemicals have been widely used as chemical intermediates (e.g., phenol) or as ingredients in products (e.g., cumene in paint and 2-methoxyethanol in jet fuel). The presence of others may often be traced to their occurrence as an impurity in other chemicals (e.g., p-dichlorobenzene is a common impurity in the listed solvent 1,2-dichlorobenzene). Therefore, EPA believes that reported contamination is more likely to arise from nonsolvent uses. Furthermore, the solvent uses identified for the target chemicals studied were typically limited to a few industries, and none of these sectors were represented by facilities reported in the damage case databases.

Many of the damage cases arose from mismanagement at older municipal or industrial landfills, and it is difficult to determine how a chemical may have

been used prior to disposal. These sites invariably accepted a wide variety of wastes and were contaminated with many different chemicals. Some of the target chemicals are possible breakdown products from the degradation of other contaminants (e.g., phenol, methyl chloride). Therefore, because the ROD database does not specifically cite the uses of any of the wastes found at the site, the cases did not provide any direct evidence that contamination by any other chemicals evaluated in this listing determination was linked to disposal of spent solvents.

Finally, the 2007 Survey showed that high percentages of most of the nonwastewater residuals reported are classified as hazardous, and are subject to strict regulation under RCRA. Thus, the solvent wastes currently generated generally could not be legally managed in the manner that led to the damage cases (e.g., landfills). Therefore, EPA did not find that the damage cases provided any relevant information on the potential risks posed by solvent wastes. The sections for each target chemical presents a more specific discussion for the damage cases identified.

e. Risk Assessment Results. Sections II.D to II.N present a more specific analysis by each solvent of the waste generation and management information to justify the individual regulatory determinations. Risk assessment evaluations were not conducted for the four chemicals (benzyl chloride, epichlorohydrin, ethylene dibromide, and p-dichlorobenzene) for which EPA found no significant solvent use. The risk tables for each of the remaining 10 constituents indicate the estimated health risk associated with the current and plausible management scenarios. For greater detail, see the listing and risk assessment background documents available in the docket to this rulemaking proposal.

EPA requests comment on all aspects of its listing determinations, including comments pertinent to the adequacy of the data base and the methodology used to evaluate the data, and comments regarding the extent to which EPA has adequately characterized solvent uses, users of the solvents and management practices for the solvent waste streams. EPA is also soliciting comment on the risk assessment methodology and assumptions, including the Agency’s rationale for choosing plausible management scenarios.

Comments suggesting changes to the Agency’s data base or risk assessment methodology, or to the Agency’s listing determination for any of the 14 solvent waste streams, should be accompanied by any relevant data or supporting

information. If EPA receives new data or information during the comment period, EPA may use this information to augment its data base or revise its methodology or assumptions for purposes of the final rule. If EPA receives relevant new information during the comment period on solvent uses, users or management practices for any of the specific solvent wastes addressed in this rulemaking, EPA may revise its individual listing determinations based on this information.

In particular, EPA notes that while a number of these solvents might cause an unacceptable groundwater risk if significant volumes were land disposed in concentrated form, such a scenario does not appear to be plausible. Much of EPA's assessment of the risks from the use of these solvents derives from evidence that such wastes are not likely to be discarded on the land in significant concentrations. Nine of these chemicals are already listed as commercial chemical products and thus cannot be legally land disposed in their unused form without treatment; furthermore, they would be subject to manifesting and other RCRA controls when discarded. Many of the more concentrated wastes are ignitable as generated, or already covered by an existing hazardous waste listing, and are thus subject to RCRA regulation. Solid treatment residuals appear to contain negligible or very low concentrations of these solvents, because of the efficacy of treatment. Wastewaters do not pose significant risk to groundwater or air, because the wastewaters are generated in relatively dilute form, are further diluted in integrated wastewater treatment systems, and then effectively treated in those systems.

If EPA receives comments that leads it to conclude that unregulated land disposal of concentrated wastestreams from the use of these solvents is likely, EPA will consider promulgating a listing to address those concerns. However, EPA currently believes that such a listing should be limited to those circumstances in which significant concentrations causing significant risk are plausible, such as listing only wastes with high concentrations of solvents. EPA would consider that approach in this case, given the analysis presented in this proposal indicating that the existing or plausible waste management scenarios do not pose significant risk. In particular, EPA believes that it may be inappropriate to list the full range of wastes that might otherwise be brought under regulation through application of the mixture and derived-from rule to

such waste. EPA invites comment on such an approach.

D. Acetonitrile

1. Industry Identification

Almost all acetonitrile is manufactured as an acrylonitrile by-product. U.S. production of acetonitrile is estimated to be between 8 and 11 million kilograms per year, of which more than 60 percent is believed to be used in solvent applications and about 40 percent in non-solvent applications.

Acetonitrile may be used for many non-solvent purposes such as the production of nitrogen-containing compounds, including amides, amines, higher molecular weight mono- and dinitriles, ketones, isocyanates, and heterocyclic compounds. However, acetonitrile finds its primary use as a solvent in various industries, particularly in the pharmaceutical industry where it is used in the production of drugs and medicinal chemicals.

2. Description of Solvent Usage and Resulting Wastes

a. **Solvent Use and Questionnaire Responses.** In response to the RCRA 3007 Preliminary Survey of Solvent Use, 178 facilities reported the use of 5.8 million kilograms of acetonitrile as a solvent in 1992. The full RCRA 3007 Survey of Solvent Use Questionnaire was sent to the 74 largest users of the 178 facilities that reported 1992 use of acetonitrile. Most (>94%) of the respondents to the preliminary survey that were not sent the full questionnaire reported using less than 120 kg per year of acetonitrile as a solvent. Some of the facilities sent the 3007 survey used small quantities of acetonitrile, but were included because the total amount of target solvents used was above 1200 kg. The facilities responding to the full 3007 survey reported a 1993 use of 9.3 million kilograms of acetonitrile as a solvent.

Literature searches indicate that acetonitrile is a common, versatile, polar solvent often used as an extraction medium or a recoverable reaction medium. Its high dielectric strength and dipole moment make it an excellent solvent for both inorganic and organic compounds, including polymers. RCRA 3007 Questionnaire responses indicate that acetonitrile is used across a broad range of industries as: a product and equipment wash; the mobile phase in high pressure liquid chromatography (HPLC) at laboratory, pilot, and production scale; a reaction, crystallization, or synthesis medium; an extractant or extractive distillation

medium; a diluent; and a dissolution medium.

Its largest use is in the pharmaceutical industry for the production of drugs and medicinal chemicals, where its applications range from laboratory use to pilot production in Food and Drug Administration drug trials to full-scale batch product preparation. It also is used in the organic chemicals industry as an extraction medium and in the petrochemical industry for the separation of butadiene from C₄ hydrocarbons by extractive distillation. Literature searches indicated that acetonitrile may be used in electroplating operations, however, this use was not confirmed.

A detailed discussion of the processes in which acetonitrile is employed is presented in the background document for today's proposal, which is available in the docket (see **ADDRESSES** section).

b. **Physical/Chemical Properties and Toxicity.** Acetonitrile is a relatively polar compound and is completely miscible in water. Because of its miscibility, it is not expected to form a nonaqueous phase layer in groundwater (NAPL). It has a relatively low boiling point (82 °C), and it has a moderate evaporation rate from water, as evidenced by its Henry's Law Constant (2.007×10^{-5} atm·m³/mole). Acetonitrile has a high vapor pressure at ambient temperature, and is also flammable and ignitable, with a flash point of 6 °C. Therefore, concentrated residuals from the use of acetonitrile as a solvent are expected to exhibit the characteristic of ignitability.

The octanol-water partition coefficient (Log K_{ow}) for acetonitrile is -0.34; this indicates that acetonitrile has a low tendency to sorb to soil organic matter, and is not expected to bioaccumulate in organisms.

Acetonitrile is not classified as a carcinogen. The chemical has an RfC of 0.05 mg/m³ and an RfD of 0.006 mg/kg/day; these correspond to an air HBL of 0.05 mg/m³, and a water HBL of 0.2 mg/L.

c. **Waste Generation, Characterization, and Management.** The respondents to the RCRA 3007 Survey of Solvent Use Questionnaire reported a combined total of greater than 9.15 billion kilograms of residuals generated from processes using acetonitrile as a solvent. The vast majority of the residuals, 9.13 billion kilograms, were wastewaters usually containing low to negligible concentrations of acetonitrile (average concentrations less than 1%). The remaining residuals, a combined total of greater than 15.0 million kilograms, are nonwastewaters containing widely varying levels of acetonitrile. Some

nonwastewaters usually have low to negligible solvent concentrations, such as filter-related materials, containers, and wastewater treatment sludges; other nonwastewaters, such as spent solvents and heavy ends from solvent recovery operations, typically have high levels of acetonitrile and/or other organic wastes.

Nearly all wastewater residuals (98.4% by waste volume, and 79% by loading) are managed in on-site wastewater treatment systems; treatment in most cases included biological treatment in tanks, with a small amount (0.1% by loading, or 294 kg total) reported to be sent to surface impoundments. Some wastewaters (1.6% by volume, or 21% by loading) also went to Subtitle C deepwell injection as a hazardous waste. Very small quantities were reported to be discharged to Publicly Owned Treatment Works (POTWs).

In 1993, more than 67 percent by volume of all nonwastewater residuals containing acetonitrile were classified as hazardous waste. However this percentage is skewed by one large volume (4.2 million kg, or 30% of nonwastewaters) of nonhazardous wastewater treatment sludge that had negligible acetonitrile concentration (see discussion below). Nonwastewaters with high organic content, such as spent solvent and heavy ends/distillates, were managed by some form of thermal treatment, including incineration, energy recovery in a BIF, or blending for fuel for future energy recovery.

Based on the reported waste volumes and concentrations of the acetonitrile in the wastes, loadings of acetonitrile in the waste were calculated by multiplying the volume (in kilograms) by the concentration (in percent) and dividing by 100 (percent conversion). This calculation provides the total loading of acetonitrile in the waste that is available for potential release via management. Table 1 presents the reported volumes and acetonitrile loadings by management practice for the wastes that contain spent acetonitrile from use as a solvent.

EPA believes that the waste management practices reported in the questionnaires by industry capture the plausible management scenarios of concern for acetonitrile wastes. The full RCRA 3007 Questionnaire was sent to 74 facilities, and information was obtained concerning the management of over 250 wastestreams. The Agency

believes that this sample of facilities revealed likely waste management practices that are or could be used in the management of these wastes. Therefore, EPA does not think it is warranted to project other management practices that could be employed. Further, the Agency anticipates the loadings to these different practices will not change significantly over time.

To assess the potential risks for management of acetonitrile wastes, EPA selected several management practices for modeling. To represent the thermal treatment process (incineration, industrial boilers, fuel blending, critical oxidation), EPA chose an industrial boiler. To account for risks from the accumulation of residuals for thermal treatment, EPA modeled an uncovered storage tank. To assess risks arising from wastewater treatment, EPA modeled treatment in an aerated wastewater treatment tank.

The Agency considered potential risks that might arise from the land-based management of acetonitrile wastes, i.e., deepwell injection, landfills, and surface impoundments. EPA does not believe that these management practices present significant risk for the following reasons.

Concerning deepwell injection, as noted above, all of the disposal by this method occurs in Subtitle C units that are permitted to accept hazardous waste. Therefore, EPA does not believe that these wastes present any significant risk. Nearly all of the wastes sent to deepwell injection were classified as hazardous waste; only a total of 97 kg of wastes (containing 2 kg of solvent) sent to deepwell injection were nonhazardous. Thus, the Agency believes that future disposal of nearly all of these wastes will continue to be in a permitted unit, and EPA did not evaluate this practice further.

EPA examined the practice of landfilling acetonitrile wastes and found that only four out of the 254 waste streams containing spent acetonitrile were reported to go to landfills. Of these four wastes, three were sent to Subtitle C landfills (2 after treatment, and 1 was small volume of filter material), and one wastewater treatment sludge was sent to a Subtitle D landfill. While the volume of the one waste sent to the Subtitle D landfill was relatively large (4.2 million kg), the sludge was reported to contain only a "trace" of miscellaneous organics. This specific sludge, and

wastewater treatment residuals in general, are unlikely to contain significant levels of acetonitrile, because the chemical is removed by such treatment due to its volatility and susceptibility to biodegradation (>98%; see the U.S. EPA RREL Treatability Database). EPA also considered whether the practice of landfilling spent acetonitrile wastes was likely to increase, but could find no evidence to support this. To the contrary, the facility that had been sending the largest acetonitrile loading to a Subtitle C landfill (454 kg loading, 45,400 kg volume), indicated that it had ceased this practice during 1993 and started sending the waste for thermal treatment because of the waste's fuel value.

Only three wastes with spent acetonitrile were reported to go to surface impoundments, and these were impoundments that were part of a wastewater treatment train. In all cases the annual loadings were very small (294 kg total), and acetonitrile levels would be negligible (i.e., orders of magnitude below the health-based level) after mixture with other wastewaters at the headworks prior to entering an impoundment. (For example, the largest loading reported treated in a surface impoundment, 230 kg per year, was mixed into a wastewater flow of more than 30 million gallons a day; thus, the estimated concentration at the headworks would be less than 0.04 ppm, well below the health-based level of 0.2 ppm.) Furthermore, acetonitrile is removed during wastewater treatment, such that any acetonitrile in treatment impoundments would be further reduced. Except for these three wastes, all reported wastewater treatment of acetonitrile wastes occurs in tanks. EPA has no reason to believe this practice would change, given the capital and regulatory costs associated with siting a new surface impoundment, and the investments already made in tank-based treatment systems.

Overall, EPA concludes that nonwastewaters with all but negligible acetonitrile loadings are usually managed as hazardous under Subtitle C (because of the ignitability of these wastes, and/or the common practice of mixing with other hazardous solvent wastes), or recycled onsite. Wastewaters are primarily handled either as hazardous through deepwell injection, or treated in tank-based wastewater treatment systems.

TABLE 1.—GENERATION STATISTICS FOR ACETONITRILE

Management Practice	# of facilities	# of streams	Total volume (kg)	Total loading (kg)
Incineration	33	79	¹ <6,000,000	¹ <700,000
BIF	11	73	2,410,944	1,650,764
Fuel Blending	19	46	622,870	337,437
WWT—Tank	15	29	8,988,222,016	206,159
WWT—Surface Impoundment	3	3	95,118	294
POTW	4	6	16,911	16
Landfill, Subtitle C	2	3	72,755	459
Landfill, Subtitle D	1	1	4,181,818	trace
Deepwell Injection, Hazardous	4	8	150,123,631	54,706
Critical Oxidation	1	2	315,000	18,900
Distillation/Fractionation	3	4	771,966	429,300

¹ Exact value is withheld because some of the data for this practice are claimed as confidential business information.

3. Basis for Proposed No-List Determination

a. Risk Assessment. The Agency performed risk bounding and high end risk estimates using the approaches described earlier (see Section II.C) to obtain a hazard quotient (HQ) for each plausible mismanagement scenario. Where the HQ exceeds 1, exposure is expected to pose a risk to human health and the environment. The results of these analyses are shown in Table 2.

Using bounding assumptions, the Agency estimated that management of acetonitrile residuals in a boiler could result in an inhalation HQ of 0.0000006. Risk based on bounding assumptions for the other plausible mismanagement scenarios (an aerated tank and on site accumulation) exceeded an inhalation HQ of 1, and EPA then conducted high end and central tendency risk analyses for these scenarios.

The estimated high-end risk assessment with plausible mismanagement of acetonitrile wastes in an aerated tank is an inhalation HQ of 0.002, which indicates minimal risk through the inhalation pathway for this scenario. However, the high-end risk estimate for the plausible mismanagement of acetonitrile wastes through on site accumulation resulted in an inhalation HQ of 200; the central tendency HQ was 0.09. This was the only management scenario with a high-end HQ greater than 1.

EPA then conducted a third phase of risk screening on these acetonitrile wastes modeled in accumulation tanks. The 3007 survey data showed that the vast majority of these wastes are either characteristically hazardous (generally ignitable) or co-managed with other listed hazardous wastes. Since these wastes are already regulated under

RCRA Subtitle C, this third phase of risk screening focused on the risk from waste streams that are not currently being managed as hazardous. A bounding analysis of these wastes resulted in an HQ of 0.44, revealing risks below the HQ level of concern.

Since all the other acetonitrile waste streams also showed hazard quotients below 1, EPA concluded that the risks from the portion of wastes that are nonhazardous are not significant. EPA also believes that the risk assessment overstates the risks from tank storage because the bounding and high end risk analyses assumed that all of the stored solvent would volatilize from the tank; such an assumption is very conservative because these wastes are being accumulated for thermal treatment or fuel blending.

TABLE 2.—RISK ASSESSMENT RESULTS FOR ACETONITRILE

Plausible mismanagement practice	Hazard quotient (HQ)		
	Central tendency	Bounding	High end
Wastewaters:			
• Treatment in Aerated Tanks	0.00002	2.4	0.002
Nonwastewaters:			
• On Site Accumulation:			
—Phase I & II (all wastes)	0.09	346	200
—Phase III (nonhazardous wastes)		0.44	
• Boiler		0.00000061	

All risks are direct inhalation. For a complete description of the risk assessment methodology and results, see the background document Assessment of Risks from the Management of Used Solvents.

b. Environmental Damage Incidents. Acetonitrile has been identified as a constituent of concern at one site investigated using the Hazard Ranking System (HRS). However, there are no sites that have undergone a Record of Decision (ROD) that identify acetonitrile as a constituent. In no instances has the use of acetonitrile as a solvent been

linked to environmental damage in either the ROD or HRS databases.

c. Conclusion. EPA believes that acetonitrile does not satisfy the criteria for listing in 40 CFR 261.11(a)(3). Therefore, EPA is proposing that wastes from the use of acetonitrile as a solvent should not be listed as hazardous waste under 40 CFR 261.31. While risk analyses indicate some potential risk

from air releases of acetonitrile stored in open tanks, EPA believes that this risk would not be significant for these residuals because most of the nonwastewater residuals stored are regulated as hazardous waste. Some of those wastes are already listed; others are regulated as hazardous waste because of their characteristics (generally ignitability). EPA believes

that regulating the wastes this way is protective of human health and the environment. The wastes which are regulated as characteristically hazardous are being managed through incineration, an efficient mechanism for destroying the hazardous constituents. EPA believes that it is implausible that these wastes will be managed in an unsafe manner (as explained in section II-D-2-c). Regulations controlling air releases from storage of hazardous waste have recently been promulgated. (See December 6, 1994 at 59 *FR* 62896, and February 9, 1996 at 61 *FR* 4903). These regulations address volatile organic compounds at levels much less (i.e., 100 ppm) than those that yielded the potential risks for acetonitrile. Furthermore, EPA believes that the risk assessment overstated the risks presented by storage in tanks because the scenario assumed that all of the stored solvent would escape; this seems unlikely if the waste is being stored expressly to send for further treatment or fuel blending. Therefore, given that nearly all of the nonwastewater acetonitrile residuals are either already being handled as hazardous, or contain negligible amounts of the solvent, EPA believes that spent solvent residuals are not likely to pose a significant hazard to human health and the environment.

E. 2-Methoxyethanol (2-ME)

1. Industry Identification

In 1993, 24 million kilograms of 2-methoxyethanol, also known as ethylene glycol monomethyl ether, or 2-ME, were produced. Data on imports and exports are not available. 2-Methoxyethanol is widely used as a jet fuel additive to inhibit icing in fuel systems, with 76 percent consumed for this purpose. It is used as a chemical intermediate (9 percent in 1993) in the production of the specialty plasticizer di-(2-methoxyethyl) phthalate (DMEP); as a chemical intermediate in the manufacture of esters such as 2-methoxyethyl acetate; and in the synthesis of the dimethyl ethers of ethylene glycol.

The remaining 14 percent of 2-ME is used in a variety of applications, including the solvents use discussed in greater detail below.

2. Description of Solvent Usage and Resulting Waste

a. Solvent Use and Questionnaire Responses. In the RCRA 3007 Prequestionnaire of Solvent Use, 111 facilities reported the use of 15.4 million kilograms of 2-methoxyethanol as a solvent in 1992. Of the 111 facilities reporting use in 1992, 47 were sent the

RCRA 3007 Solvent Use Questionnaire (nearly all of the remaining facilities used less than 100 kg). In the RCRA 3007 Questionnaire, 35 facilities reported the use of 3.7 million kilograms of 2-methoxyethanol, a decline from the previous year. This is primarily attributable to the elimination of use of 2-methoxyethanol at 12 facilities, and a large drop in use at five other facilities. In addition, EPA determined from the responses to the full questionnaire that some uses reported in the semiconductor industry and by TSDs were not solvent uses.

Information from the RCRA 3007 Questionnaire indicates that 2-methoxyethanol is used for cleaning purposes, including removal of product buildup from tanks and removal of polymer film during the production of integrated circuits. 2-Methoxyethanol is used as a reaction medium for the production of various products. It can be used as a diluent in the production of lacquers and coating formulations that subsequently are applied to a substrate, which may be aluminum, metal, or nonwoven fiber. It also is a diluent in the production of specialty chemicals. Additionally, 2-methoxyethanol is used in specialized laboratory analyses.

2-Methoxyethanol is used in the formulation of a photoresist system used in the semiconductor manufacturing industry. Where the 2-methoxyethanol is part of the formulation of purchased photoresist, its use does not constitute solvent use. However, in at least one case, 2-methoxyethanol is used as a solvent for cleaning the edge of the semiconductor wafer after application of the photoresist; this use does meet the RCRA definition of solvent use. Discussions with the semiconductor industry and engineering site visits to many of these facilities leads EPA to believe that the use of 2-methoxyethanol, along with other lower order glycol ethers, is being phased out.

Literature searches indicated that 2-methoxyethanol has the potential for use as a solvent in: the manufacture of polymeric materials, composite membranes, resins, and recording materials; the preparation of specialty chemicals; electroplating; and dye processing. However, the Agency could find no confirmation of these uses from the RCRA 3007 Questionnaire. In light of the Agency's extensive investigation of actual solvent use in connection with the 3007 Survey, EPA believes it is reasonable to consider only those solvent uses actually confirmed by the survey results.

b. Physical/Chemical Properties and Toxicity. 2-Methoxyethanol is miscible

in water, and is useful as a solvent for polar and nonpolar chemicals. 2-Methoxyethanol is flammable when exposed to heat or open flame, and is ignitable, with a flash point of 39.4°C. Residuals with high concentrations of 2-methoxyethanol are expected to exhibit the characteristic of ignitability. With a vapor pressure of 6.2 mm Hg at 20°C, 2-methoxyethanol is volatile, and the Henry's Law Constant for 2-methoxyethanol is 2.9×10^{-3} atm-m³/mole, indicating that 2-methoxyethanol rapidly evaporates from water.

The Log K_{ow} for 2-methoxyethanol is -0.77, indicating that 2-methoxyethanol has a low tendency to sorb to soil organic matter and bioaccumulate in organisms. In the atmosphere, 2-methoxyethanol is subject to photodegradation, with a half-life of less than one day.

2-Methoxyethanol is not classified as a carcinogen. The chemical has an RfC of 2×10^{-2} mg/m³ and a provisional reference dose (RfD) of 5.7×10^{-3} mg/kg/day. The corresponding air HBL is 2×10^{-2} mg/m³ and the provisional water HBL is 0.2 mg/L.

c. Waste Generation, Characterization, and Management. Twenty-three facilities reported a total of 3.14 billion kg of waste generated in 1993. The vast majority (>99%) of the residuals generated are wastewaters contaminated with relatively low concentrations of 2-methoxyethanol (average concentration of 0.01%). These wastes also include 2.1 million kg of nonwastewaters, containing variable amounts of 2-methoxyethanol, including spent solvents, sludges, and containers and rags. Where 2-methoxyethanol is incorporated into the final product, wastes may include off-specification materials and tank cleanout wastes.

In 1993, over 96 percent by volume of nonwastewaters were reported to be hazardous. A large fraction (70%) of the nonwastewaters was recovered through distillation or fractionation, and most of the rest (29%) was managed by some type of thermal treatment, either by incineration, energy recovery in a boiler, or fuel blending. The wastewaters containing spent 2-methoxyethanol were all reported to be treated in tank-based wastewater treatment systems.

Based on the reported waste volumes and concentration of the 2-methoxyethanol in the wastes, loadings of 2-methoxyethanol were calculated by multiplying the volume (in kilograms) by the concentration (in percent) and dividing by 100 (percent conversion). This calculation provides the quantity of 2-methoxyethanol in the waste that is available for potential release via management. Table 3 presents the

reported volumes and 2-methoxyethanol loadings by management practice for the wastes that contain spent 2-methoxyethanol.

EPA believes that the waste management practices reported in the questionnaires represent the plausible management scenarios of concern for 2-methoxyethanol. EPA surveyed all significant users of this solvent, and collected information on the waste management practices for 54 wastestreams. The Agency believes that these facilities provide a good indication of all likely waste management practices. Furthermore, with the use of this chemical as a solvent declining, new management practices are unlikely to occur.

To assess the potential risks for management of 2-methoxyethanol

wastes, EPA selected several management practices for modeling. To represent thermal treatment (incineration, industrial boilers, fuel blending), EPA chose an industrial boiler. To account for risks from the accumulation of residuals in tanks, EPA modeled an uncovered storage tank. Finally, to assess risks arising from wastewater treatment, EPA modeled treatment in an aerated wastewater treatment tank.

None of the 56 wastestreams were reported to go to land disposal in landfills or impoundments. Solids containing spent solvent are incinerated, and wastewaters are all treated in tanks. Wastewater treatment sludges generated do not contain significant levels of 2-methoxyethanol, because the chemical is efficiently

removed by such treatment due to its volatility. In the face of the existing practices, EPA finds it implausible that high organic wastes or aqueous liquids currently sent to thermal treatment would be managed in a landfill. Essentially all of the nonwastewater residuals that contain spent 2-methoxyethanol are thermally treated or recovered, and more than 96% of this treatment is as a hazardous waste. The large percentage of spent 2-methoxyethanol wastes that are already hazardous are precluded from land disposal in Subtitle D units, and no evidence exists to suggest that any wastes containing spent 2-methoxyethanol would be placed in a landfill. Any change from the current practice of treatment of wastewaters in tanks to treatment in

TABLE 3.—WASTE STATISTICS FOR 2-METHOXYETHANOL

Management practice	Number of facilities	Number of streams	Total volume (kg)	Total loading (kg)
Incineration	11	20	297,522	52,839
Energy Recovery	6	13	129,369	57,760
Fuel Blending	5	11	224,530	104,444
WWT-Aerated Tanks	6	6	3,139,049,350	452,030
WWT-Other Tanks	2	2	2,558	486
Fractionation/Distillation	1	2	1,463,068	14,631
Storage (for unspecified offsite hazardous treatment)	2	2	14,802	704

Impoundments also seems unlikely given the associated costs for such a change. As noted above, however, this solvent is easily removed from wastewaters by volatilization, therefore even if treatment in an aerated impoundment occurred, it would be expected to rapidly remove the solvent and make any releases to groundwater unlikely.

3. Basis for Proposed No-List Determination

a. Risk Assessment. The Agency performed risk bounding and high end risk estimates using the approaches described earlier (see Section II.C) to obtain a hazard quotient (HQ) for each plausible mismanagement scenario. Where the HQ exceeds 1, exposure is expected to pose a risk to human health and the environment. The results of these analyses are shown in Table 4.

Using bounding assumptions, the Agency estimated that management of 2-

methoxyethanol wastewater in an aerated tank could result in an inhalation HQ of 0.98 and management of nonwastewater in a boiler could result in an inhalation HQ of 6×10^{-8} . Risk based on bounding assumptions for the other plausible mismanagement scenario (on site accumulation) exceeded an inhalation HQ of 1, and EPA then conducted high end and central tendency risk analyses for these scenarios.

The estimated high-end risk assessment for plausible mismanagement of 2-methoxyethanol wastes through on site accumulation is an inhalation HQ of 16. This was the only management scenario where the high-end HQ was higher than 1.

EPA then conducted a third phase of risk screening on these 2-methoxyethanol wastes in open accumulation tanks. Since wastestreams which are hazardous are already being

regulated under RCRA Subtitle C, this third phase of risk screening focused on the risk from waste streams that are not currently being managed as hazardous.

EPA's data showed no waste streams in this management scenario which were nonhazardous; all of the waste streams were already being managed under RCRA Subtitle C. Since all the other 2-methoxyethanol waste streams showed hazard quotients below 1, EPA concluded that there was insignificant risk reduction which could be gained by listing 2-methoxyethanol as a hazardous waste. EPA also believes that the risk assessment overstates the risks from tank storage because the bounding and high end risk analyses assumed that a large fraction of the stored solvent would volatilize from the tank; such an assumption is very conservative because these wastes are being accumulated for thermal treatment or fuel blending.

TABLE 4.—RISK ASSESSMENT RESULTS FOR 2-METHOXYETHANOL

Plausible mismanagement practice	Hazard quotient (HQ)		
	Central tendency	Bounding	High end
Wastewaters:			
• Treatment in Aerated Tanks	3×10^{-9}	0.98	.....

TABLE 4.—RISK ASSESSMENT RESULTS FOR 2-METHOXYETHANOL—Continued

Plausible mismanagement practice	Hazard quotient (HQ)		
	Central tendency	Bounding	High end
Nonwastewaters:			
• On Site Accumulation			
—Phase I & II (all wastes)	0.007	59	16
—Phase III (non-haz wastes) .....	.....	None	.....
• Incineration .....	.....	6×10^{-8}	.....

All risks are direct inhalation. For a complete description of the risk assessment methodology and results, see the background document *Assessment of Risks from the Management of Used Solvents*.

b. Environmental Damage Incidents. 2-Methoxyethanol has been detected at three Superfund sites, however, based on a review of identified damage instances, no single instance of damage was identified that could be tied to use of 2-methoxyethanol as a solvent. The RODs report that 2 methoxyethanol was detected, however, no concentrations were provided for any of the three sites. Two of the sites were landfills that accepted a wide variety of industrial and municipal wastes. One landfill ceased operation in 1980, and received liquid wastes (including latex and "spent organic solvents") from 1968–1972. The other landfill received municipal wastes from 1969 until 1984, and drummed industrial wastes between 1973 and 1975. The use of the 2-methoxyethanol prior to disposal at these landfills is impossible to ascertain. In both cases a wide variety of other contaminants were found. The third facility was a used oil recycling site that ceased operations in 1981, and was primarily contaminated by oil, PCBs, metals, and VOCs. 2-methoxyethanol has been used as a jet fuel additive, and it is likely that 2-methoxyethanol is present in used oil from this source.

The solvent uses identified for 2-methoxyethanol (e.g., pharmaceutical manufacturing, coatings and lacquers, electronics, photographic chemicals, and laboratory use) are not represented in any of the facilities identified as having 2-methoxyethanol contamination. Therefore, it is not likely that the damage incidents identified were the result of mismanagement of 2-methoxyethanol following use as a solvent, and the Agency did not consider the damage incidents relevant to the listing determination. In addition, disposal of the wastes that are the potential sources of 2-methoxyethanol occurred well before RCRA regulations were in place. The vast majority of the nonwastewater solvent wastes identified in the 3007 Survey were reported to be hazardous waste, and are now subject to strict regulation. Therefore, the kind of disposal that led to these Superfund

sites cannot occur for nearly all nonwastewaters resulting from solvent use of 2-methoxyethanol.

c. Conclusion. EPA believes that 2-methoxyethanol does not satisfy the criteria for listing in 40 CFR 261.11(a)(3). Therefore, EPA is proposing that wastes from the use of 2-methoxyethanol as a solvent should not be listed as hazardous waste under 40 CFR 261.31. While risk analyses indicate some potential risk from air releases of 2-methoxyethanol stored in open tanks, EPA believes that this risk from residuals that are currently regulated hazardous waste would not be significant because all of the nonwastewater residuals were stored as regulated hazardous waste. Therefore, these wastes are already hazardous, and listing is not necessary. Regulations controlling air releases of volatile organics from storage of hazardous waste have recently been promulgated. (See 59 *FR* 62896, December 6, 1994, and February 9, 1996 at 61 *FR* 4903). Furthermore, EPA believes that the risk assessment overstated the risks presented by storage in tanks because the scenario assumed that a large fraction of the stored solvent would escape; this seems unlikely if the waste is being stored expressly to send for further treatment or fuel blending. For the foregoing reasons, spent solvent residuals are not likely to pose a significant hazard to human health and the environment.

F. Methyl Chloride

1. Industry Identification

In 1993, U.S. production of methyl chloride was estimated to be 218.8 million kilograms, of which 78 percent was used as an intermediate in the manufacture of chlorosilanes; 16 percent was used in the production of quaternary ammonium compounds, agricultural chemicals, and methycellulose; approximately 3 percent was exported; and the remainder is used for other purposes, including use as a solvent.

2. Description of Solvent Usage and Resulting Waste

a. Solvent Use and Questionnaire Responses. In the RCRA 3007 Prequestionnaire of Solvent Use, 32 facilities reported the use of a combined total of 1.04 million kilograms of methyl chloride in 1992. In the RCRA 3007 Questionnaire, seven facilities reported the use of 623,645 kilograms of methyl chloride as a solvent. This reduction occurred because EPA determined from responses to the full questionnaire that methyl chloride was not used as a solvent in some facilities. Of the seven facilities, three reported the use of small quantities in laboratories, primarily for liquid/liquid extraction. The major use was reported by two butyl rubber manufacturers, which accounted for greater than 99% of the solvent use of methyl chloride.

Literature searches indicated that methyl chloride may be used commercially as a liquid (under pressure) and has solvent applications in the production of butyl rubbers, which was confirmed by the Questionnaire respondents. Other potential solvent uses include the dealumination of aluminosilicates; a polymerization medium; a blowing agent for Styrofoam; a medium for the synthesis of tert-chlorine-ended polyisobutylenes with allyltrimethylsilane; and a specialty solvent in laboratory applications. These uses were not confirmed by the RCRA 3007 Questionnaire respondents.

b. Physical/Chemical Properties and Toxicity. Methyl chloride has a moderate solubility in water of 0.648 percent by weight at 30°C. Methyl chloride is a gas under ambient conditions, and will have a high rate of evaporation from water to air, as evidenced by its Henry's Law Constant of 4.5×10^{-2} atm-m³/mole. It has a Log K_{OW} of 0.91, indicating that methyl chloride has a low potential for absorption to soil and bioaccumulation in organisms.

Methyl chloride can biodegrade anaerobically. It will also hydrolyze in water to give methanol; at ambient temperatures, the half life in water is estimated to be about one year. Just considering hydrolysis alone, this means that in less than 10 years the concentration of methyl chloride would be decreased by a thousand-fold.

Methyl chloride is a suspected carcinogen. Using an oral carcinogen slope factor (CSF) of 1.3×10^{-2} (mg/kg/day)⁻¹, EPA calculated that exposure to a water concentration of 0.003 mg/L for 70 years would correspond to a cancer risk of 1×10^{-6} . The inhalation CSF is 1.8×10^{-6} (ug/m³)⁻¹, which corresponds to a 10^{-6} risk HBL in air of 6×10^{-4} mg/m³.

c. Waste Generation, Characterization, and Management. Seven respondents to the RCRA 3007 Questionnaire reported the generation of more than 1.19 billion kg of residuals resulting from the use of methyl chloride as a solvent; nearly all of the waste from the production of butyl rubber. The vast majority of this volume was wastewaters (1.1 billion kg), with relatively low solvent concentrations. The remaining wastes included residuals generated from treatment of the wastewaters (89 million

kg of wastewater treatment sludge and 6.6 million kg of sludge/ash from further treatment of the sludge), and 0.52 million kg of spent solvent.

The wastewaters were all sent to wastewater treatment systems, which included aeration/biological treatment in tanks or surface impoundments. The vast majority (89 million kg) of the nonwastewaters were further treated and ultimately landfilled (6.6 million kg). The balance of the nonwastewaters (0.52 million kg) were managed by thermal treatment (incineration or energy recovery in a boiler/industrial furnace).

Based on the reported waste volumes and concentration of the methyl chloride in the wastes, loadings of methyl chloride to the environment were calculated by multiplying the volume (in kilograms) by the concentration (in percent) and dividing by 100 (percent conversion). This calculation provides the quantity of methyl chloride in the waste that is available for potential release via management. Table 5 presents the reported volumes by management practice, and the amount of methyl chloride contained in the wastes.

EPA believes that the waste management practices reported in the

questionnaires represent the plausible management scenarios for spent methyl chloride wastes. Nearly all of the solvent use of this chemical was accounted for by the two facilities that produce butyl rubber. The other facilities that reported any waste containing methyl chloride reported corresponding loadings that were extremely small (2 kg total loading). One company owns both butyl rubber plants, and is the sole producer of butyl rubber in the country. Given this highly specialized solvent use of this chemical, the Agency is confident that no other significant waste management practice for the associated wastes exists.

To assess the potential risks associated with the management of these wastes, EPA chose to model an industrial boiler to represent the thermal treatment practices (incineration and fuel blending). To account for storage prior to thermal treatment, EPA modeled the accumulation of spent methyl chloride in an open storage tank. To assess risks from wastewater treatment, EPA also modeled potential releases from wastewater treatment in a surface impoundment.

TABLE 5.—WASTE STATISTICS FOR METHYL CHLORIDE RESIDUALS

Management practice	Number of facilities	Number of streams	Total volume (kg)	Total loading (kg)
Incineration	4	4	89,296,310	2
Energy Recovery (BIFs)	1	1	225,000	2,250
Land Disposal	1	2	6,550,550	<5.5
WWT—Tanks	1	1	60,000,000	600
WWT—SI	1	1	1,036,517,000	175,000

EPA considered the potential risks that might arise from the land-based management of methyl chloride wastes in landfills and surface impoundments. EPA does not believe that these management practices present a significant risk for the following reasons.

Two wastes were reported sent to Subtitle D landfills. The larger volume waste (6.55 million kg) is a residual from a sludge treatment unit, which includes an incinerator, that was sent off-site for stabilization and placement in a landfill. The residual was reported to have only a “trace” of hydrocarbons. Methyl chloride is readily treated by biodegradation and volatilization in an aerated system with activated sludge. Removal efficiencies for methyl chloride from industrial wastewater treatment systems are reported to be high (greater than 98.9%; see the U.S. EPA RREL

Treatability Database). Therefore, it is unlikely that any appreciable level of the chemical remains in this treatment residual. The other waste sent to a landfill was a small volume of spent desiccant (550 kg), containing relatively little solvent (<5.5 kg). Neither of these wastes is expected to present any significant risk due to negligible amounts of solvent present.

One other major wastestream (89 million kg) was reported as wastewater treatment sludge, however, as noted previously, this waste was actually the waste that entered the sludge treatment unit, where it was treated to give the 6.55 million kg sludge/ash wastestream noted above. For the reasons described previously, EPA believes that these very low-concentration wastes are typical of the types of wastes that are likely to be landfilled. Therefore, EPA believes that no significant risks are likely to arise

from landfills for methyl chloride wastes. Furthermore, methyl chloride will also undergo hydrolysis in water with a half-life of less than one year, and hydrolysis would be significant for any methyl chloride reaching the groundwater. For example, over a ten year period (which would correspond to rapid movement off-site from a landfill in groundwater), the concentration of methyl chloride would drop to less than 0.001 of the level leaving the landfill.

The two wastewater streams reported were sent to wastewater treatment systems; one included treatment in tanks, the other used treatment in an aerated surface impoundment. The wastewater sent to the impoundment was reported to contain relatively high amounts of methyl chloride (175,000 kg); thus, EPA examined this process in detail for risks from possible releases to air and groundwater. Using the

estimated loading of methyl chloride reaching the surface impoundment, EPA modeled the potential risks from air releases (see risks given in the next section). The Agency does not believe that risks are likely to arise from releases to groundwater because the impoundment is reported in the 3007 survey to be a permitted hazardous waste management unit. EPA confirmed that the unit is regulated under RCRA. The unit is subject to the applicable regulations in 40 CFR 264 including: groundwater monitoring, corrective action, and closure requirements. Therefore, EPA does not believe that methyl chloride wastewaters in this unit present any significant risk via groundwater releases. Furthermore, methyl chloride is readily treated by biodegradation and volatilization in wastewater treatment systems in general; the impoundment in question is an aerated system with activated sludge that should efficiently remove methyl chloride. Removal efficiencies for methyl chloride from industrial wastewater treatment systems are reported to be high (greater than 98.9%; see the U.S. EPA RREL Treatability Database).

EPA also considered the possibility that the combustion of methyl chloride might lead to formation of toxic products of incomplete combustion (PICs) due to its chlorine content. The amount of methyl chloride in the wastes that go to incineration is relatively low. The actual loading in the wastes incinerated was reported to be 2 kg, and these wastes were reported to go to hazardous waste incineration. The waste sent offsite for combustion in a BIF had a higher loading (2,250 kg),

however this waste was hazardous due to ignitability (due to high levels of hydrocarbons such as hexane present) and the toxicity characteristic (due to the presence of benzene). Therefore, the wastes sent to combustion that contained an appreciable level of methyl chloride were burned as a hazardous waste. EPA recently proposed rules to address releases from hazardous waste combustion units (see 61 FR 17358, April 19, 1996). Therefore, EPA does not believe that combustion products are likely to be of concern for the thermal treatment of methyl chloride wastes.

3. Basis for Proposed No-List Determination

a. Risk Assessment. The Agency performed risk bounding and high end risk estimates using the approaches described earlier (see Section II.C) to obtain a risk for each plausible mismanagement scenario. Methyl chloride is a suspected carcinogen, and EPA used cancer risk estimations rather than hazard quotients (the latter are used to measure the risk for non-carcinogenic effects). Where the risk exceeds 10^{-6} and approaches 10^{-4} , exposure poses risks of concern to human health and the environment. The results of these analyses, given in terms of the increase in life-time cancer risk, over are shown in Table 6.

Using bounding assumptions, the Agency estimated that management of methyl chloride residuals in a boiler could result in an inhalation risk of 3.3×10^{-14} . Risk based on bounding assumptions for the onsite accumulation mismanagement scenario exceeded an inhalation risk of 10^{-6} , and EPA then conducted high end and central

tendency risk analyses for this scenario. The estimated high end risk assessment with plausible mismanagement of methyl chloride wastes by onsite accumulation in an uncovered tank resulted is an inhalation risk of 4×10^{-6} . The estimated high end risk assessment exceeds 1×10^{-6} only with the pairing of two high end parameters for (1) the waste stream and receptor distance and (2) the waste stream and storage duration. The estimated central tendency risk was 2×10^{-10} . EPA believes that the risk assessment overstates the risks from tank storage because the bounding and high end risk analyses assumed that all of the stored solvent would volatilize from the tank; such an assumption is very conservative because these wastes are being accumulated for fuel blending.

Risk for air releases from an aerated impoundment were estimated using bounding-type assumptions, in addition to the relatively large size of the one impoundment in question. EPA estimated the risk from the aerated impoundment to be 7×10^{-6} . The Agency did not attempt to calculate a high end risk for the impoundment, because the use of more realistic parameters was expected to reduce the risk level below levels of concern. For example, the closest residence to the only impoundment in question is 2300 feet, far beyond the bounding assumption distance of 100 meters. In addition, the surface impoundment is regulated as a hazardous waste management unit, and is therefore subject to the recently promulgated regulations limiting releases from impoundments (see Subpart CC in 40 CFR Part 264).

TABLE 6.—RISK ASSESSMENT RESULTS FOR METHYL CHLORIDE

Plausible mismanagement practice	Risk		
	Central tendency	Bounding	High end
Nonwastewaters:			
• On Site Accumulation	2×10^{-10}	1.8×10^{-5}	4×10^{-6}
• Incineration .....	.....	3.3×10^{-14}	.....
Wastewaters:			
• Surface Impoundment .....	.....	7×10^{-6}	.....

All risks are cancer risk for direct inhalation. For a complete description of the risk assessment methodology and results, see the background document Assessment of Risks from the Management of Used Solvents.

b. Environmental Damage Incidents. Methyl chloride has been detected at three Superfund sites. Two of the sites (a gravel pit and a landfill) ceased operation before 1980, and therefore disposal occurred prior to promulgation of the RCRA regulations. The third site was a manufacturing facility which was

in operation from 1902 to 1982, indicating that all but a limited amount of disposal predated the RCRA controls. The major activities at this third site included milling, refrigeration, circuit board manufacturing, and photo processing. The primary constituents of concern at all three sites are a variety of

volatile organic compounds, and it is possible that methyl chloride may be a degradation product from other chlorinated chemicals. The ROD database indicates that methyl chloride has contaminated the ground water at two of the sites (no information on

concentration levels or affected media is available for the third site).

Wastes deposited at the manufacturing site were reported to include cleaning solvents used in circuit board manufacturing processes, but the ROD database does not cite the uses of any of the wastes found at the site. Most important, however, this site was also used as a refrigeration plant, and methyl chloride was used as a refrigeration agent in the past. Because methyl chloride is a gas under ambient conditions, EPA does not believe that it is likely that wastes at these sites were derived from the use of methyl chloride as a solvent. The 3007 Survey indicated that the only significant use of this chemical as a solvent is in the butyl rubber industry, and none of the damage cases were from that industry. Furthermore, the vast majority of methyl chloride is used as a synthetic reactant in industrial chemical processes, with very little used as a solvent. Therefore, EPA did not consider these damage cases in its listing decision for methyl chloride.

c. Conclusion. EPA believes that methyl chloride does not satisfy the criteria for listing in 40 CFR 261.11(a)(3). Therefore, EPA is proposing that wastes from the use of methyl chloride as a solvent should not be listed as hazardous waste under 40 CFR 261.31. Under certain circumstances, the risk assessment indicates some potential risk from onsite accumulation of methyl chloride residuals. However, the estimated high-end cancer risk was 4×10^{-6} . This risk is at the low end of EPA's range of concern for listing (10^{-6} to 10^{-4}). Furthermore, EPA believes that the risk assessment overstated the risks presented by storage in tanks because the scenario assumed that all of the stored solvent would escape; this seems unlikely if the waste is being stored expressly to send for further treatment or fuel blending. In addition, EPA believes that this risk would not be significant for these residuals because they are regulated hazardous wastes. The air release from aerated wastewater treatment basins is a more plausible occurrence, and EPA calculated a bounding risk of 7×10^{-6} , also at the low-risk end of the Agency's range of concern. However, as noted previously, the wastewaters generating the potential risk due to aeration in an impoundment are going to a unit that is a permitted hazardous waste management unit. Thus, in both cases, the recently promulgated regulations limiting air releases from storage tanks and impoundments would apply (see Subpart CC, 40 CFR Part 264).

Furthermore, potential air releases of methyl chloride from the key waste generators are being addressed by other EPA programs. Under the authority of the Clean Air Act, the Agency investigated air releases of methyl chloride by butyl rubber manufacturers. EPA proposed standards (see Standards for HAP Emissions from Process Units in the Elastomers Manufacturing Industry, 60 FR 30801, June 12, 1995) that address releases from these facilities, including storage tanks and wastewater treatment systems. The Agency believes that air regulations that result from this activity can lead to a more integrated control of risks than the limited hazardous waste regulations that could be imposed. For all of these reasons, therefore, the Agency has made a determination that wastes resulting from the use of methyl chloride as a solvent should not be listed as hazardous waste under 40 CFR 261.31.

G. Phenol

1. Industry Identification

In 1993, U.S. production of synthetic phenol was estimated to be 1.6 billion kilograms, of which 34 percent was consumed in the production of phenolic resins (particularly phenol-formaldehyde resins), 34 percent was consumed in the production of bisphenol-A, 15 percent was consumed in the production of caprolactam and adipic acid, 3 percent was consumed in the production of aniline, 5 percent was consumed in the production of alkyl phenols, and 5 percent was consumed in the production of xylenols. Five percent was exported and the remaining 2 percent was used in other ways, including as a solvent.

2. Description of Solvent Usage and Resulting Wastes

a. Solvent Use and Questionnaire Responses. In response to the RCRA § 3007 Prequestionnaire of Solvent Use, 99 facilities indicated that 2.21 million kg of phenol were used as a solvent at the site in 1992. Thirty-one facilities reported a 1993 combined use of 1.43 billion kilograms of phenol as a solvent in response to the RCRA 3007 Questionnaire of Solvent Use. This large increase was due to a change in reporting by one facility resulting in an increased use of over one billion kilograms. The facility produces its own phenol for use and did not report this use correctly in the Prequestionnaire. This facility (a petroleum refining facility) reported the production of native phenol as a byproduct of other processes. This native phenol is not reflected in the synthetic phenol

production totals, although its use is reflected in 1993 totals. EPA surveyed all petroleum refineries and is confident that additional quantities of native phenol are not produced and subsequently used as a solvent in this industry.

Literature searches indicated that phenol may be used as an extraction solvent in petroleum refining, especially in the processing of lubricating oils; in biological applications; in other chemical industry and laboratory processes; and as a reagent in chemical analysis. Minor uses may include use as a general disinfectant, either in solution or mixed with slaked lime, etc., for toilets, stables, cesspools, floors, drains, etc.; for the manufacture of colorless or light-colored artificial resins, and in many medical and industrial organic compounds and dyes.

According to the respondents to the RCRA 3007 Questionnaire of Solvent Use, phenol is used as a solvent for four primary purposes: as an extraction medium in the production of lube oil stock using the "Duo-Sol" process; as a coating remover in the microelectronic and automotive industries; as a reaction or synthesis medium; and as a solvent in laboratory analysis.

The vast majority (>99.9%) of the solvent use of phenol is in the petroleum industry. The Duo-Sol process is used widely in the extraction of lube stock and fuel from crude oil residuals. In this process, phenol acts as an extraction medium to separate the extract (subsequently sent to fuels refining) and the raffinate (subsequently sent to a dewaxing unit). The extract and raffinate enter a second set of extraction units, where phenol is removed. The phenol is dried and forwarded to the first extractor along with makeup phenol and crude residual. The Duo-Sol solvent does not become spent. Losses are attributable to attrition to product and minor loss to wastewater. Phenolic wastewater is removed from the system and forwarded to waste management.

Although the industries are quite different, the use of phenol as a coating remover by the microelectronic and automotive industry is similar. Phenol is used to remove photoresist in the production of semiconductors. In the automotive industry, phenol is used in combination with other solvents to remove coatings from automotive wheels. It is also used (in conjunction with other solvents) in the aircraft maintenance industry for depainting purposes.

Finally, much smaller uses are attributable to the use of phenol as a reaction or synthesis medium in the

organic chemicals industry and as a laboratory solvent across a variety of industries.

b. Physical/Chemical Properties and Toxicity. Phenol is a solid at room temperature. It has a solubility in water of 80 grams per liter at 25°C, indicating that it is highly soluble. With a vapor pressure of 35 mm Hg at 25°C, phenol is moderately volatile at ambient temperatures. The Henry's Law Constant of 1.3×10^{-6} atm-m³/mole for phenol indicates that phenol has a relatively low evaporation rate from water. The Log K_{ow} for phenol is 1.46, indicating that it has a relatively low tendency to sorb to soil organic matter, and a low tendency to bioaccumulate in organisms.

Phenol rapidly biodegrades to CO₂ and water in soil, sewage, fresh water, and sea water. This biodegradation will slow under anaerobic conditions, but still occurs in groundwater.

Phenol is a Class D carcinogen and no carcinogen slope factor has been developed. Phenol has an provisional RfC of 2×10^{-2} mg/m³ and an RfD of 6×10^{-1} mg/kg/day; these correspond to an air HBL of 2×10^{-2} mg/m³ and a water HBL of 20 mg/L. These health-based numbers are provisional and have not undergone external peer review. The Agency plans to complete an external peer review of these health-based numbers prior to issuing a final

determination. EPA requests comments on the appropriateness of the provisional numbers, and seeks any additional data on the toxicity of phenol.

c. Waste Generation, Characterization, and Management. Twenty-four facilities reported the generation of residuals from the use of phenol as a solvent totaling 52.5 million kilograms. The largest portion of these wastes, 52.3 million kilograms, or 99.6 percent, were phenolic wastewaters containing from 0.01% to almost 8 percent phenol. The remaining nonwastewater residuals were high organic wastes, primarily spent solvent (197,000 kg), and small volumes of filter media, spent carbon, and debris containing low levels of phenol. In 1993, 92 percent of the nonwastewaters were classified as hazardous waste, and 8 percent was classified as nonhazardous.

Facilities generating high-volume wastewaters managed these wastes via wastewater treatment. These facilities consist predominantly of petroleum refineries and have sophisticated wastewater treatment systems in place that include primary treatment, biological treatment, and off-site secondary treatment. Facilities managed nonwastewaters through some form of thermal treatment, either blending of the residual for fuel or burning in a boiler or incinerator.

Based on reported waste volumes and concentration of phenol in the wastes, loadings of phenol to each waste management practice were calculated. Table 7 presents the total volumes of wastes and total solvent content for the waste management practices.

EPA believes that the waste management practices reported in the questionnaires represent the plausible management scenarios for spent phenol wastes. Nearly all of the solvent use of this chemical (>99.9%) was attributed the petroleum industry, which EPA surveyed. Furthermore, other minor uses were also examined in detail. Given that the major uses of this solvent were very specialized (e.g., extraction of lube oil), the Agency is confident that no other significant waste management practices for the associated wastes are likely to exist.

To assess the potential risks for management of phenol wastes, EPA selected several management practices for modeling. To represent the thermal treatment process (incineration, industrial boilers, fuel blending), EPA chose an industrial boiler. To account for risks from the accumulation of residuals for thermal treatment, EPA modeled an uncovered storage tank. To assess risks arising from wastewater treatment, EPA modeled treatment in an aerated wastewater treatment tank.

TABLE 7.—WASTE STATISTICS FOR PHENOL RESIDUALS

Management practice	Number of facilities	Number of streams	Total volume (kg)	Total loading (kg)
Incineration	14	28	103,055	23,110
Fuel Blending	4	4	97,526	12,764
Energy Recovery (BIFs)	1	1	9	<0.001
Storage	1	1	153	92
WWT—Tanks	1	1	40,000,000	3,600
WWT—SI	3	3	12,323,813	355,758

The Agency considered potential risks that might arise from the land-based management of phenol wastes, i.e., landfills, and surface impoundments. EPA does not believe that these management practices present significant risk for the following reasons.

None of the 38 wastestreams containing spent phenol were reported to go to a landfill. This is not surprising given that there are few phenol wastes that are generated as solids. The only waste solids that contained any significant level of phenol was spent carbon, and this was sent for regeneration or incineration. EPA also could find no reason to suggest that the practice of landfilling was likely to

increase. Wastewater treatment residuals may be landfilled, but are unlikely to contain significant levels of phenol, because the chemical is removed by such treatment due to its susceptibility to biodegradation (>99%; see the U.S. EPA RREL Treatability Database). Wastes with higher organic content were thermally treated, and most (about 92%) of the thermal treatment was in hazardous waste units or fuel blending. Therefore, none of the wastes with significant phenol concentration are likely to be placed in a landfill.

Three wastewaters with spent phenol were reported to go to surface impoundments, and these were impoundments that were part of a

wastewater treatment train. In two of these cases, the phenol concentration was below the water health-based level after mixing at the headworks, prior to reaching the surface impoundment. The phenol concentration for one wastewater sent to an off-site wastewater treatment system was reported to range from the HBL (20 mg/L) up to an order of magnitude higher (180 mg/L) at the headworks. However, as noted above, this level of phenol is expected to be efficiently treated (>99%) by the activated sludge, such that little phenol would be available for release to the groundwater. In general, facilities have effluent limitations for chemicals such as phenol, so that treatment must occur

prior to discharge. In addition, any phenol is quite susceptible to biodegradation, so that any of the chemical released to the groundwater is expected to undergo biodegradation, further reducing any potential risk. Information on the specific surface impoundment receiving the phenol wastewater of concern also indicates that groundwater releases from the unit are not likely to be significant. The ground water in the immediate area was reported to be a class 3 aquifer, which is not considered a potential source of drinking water, and the closest private or public well was reported to be 4,900 feet from the unit. Therefore, due to the dilution at the headworks, the susceptibility of phenol to

biodegradation, and the specific facts related to the surface impoundment of concern, EPA does not believe that the treatment of phenol wastes in surface impoundments presents a significant risk.

3. Basis for Proposed No-List Determination

a. Risk Assessment. The Agency performed risk bounding and high end risk estimates using the approaches described earlier (see Section II.C) to obtain a hazard quotient (HQ) for each plausible mismanagement scenario. Where the HQ exceeds 1, exposure is expected to pose a risk to human health and the environment. The results of these analyses are shown in Table 8.

Using bounding assumptions, the Agency estimated that management of phenol residuals in a boiler could result in an inhalation HQ of 1.1×10^{-5} . Risk based on bounding assumptions for the other plausible mismanagement scenarios (an aerated tank and on site accumulation) exceeded an inhalation HQ of 1, and EPA then conducted high end and central tendency risk analyses for these scenarios.

The estimated high-end risk assessment with plausible mismanagement of phenol wastes in an aerated tank is an inhalation HQ of 0.002, and on site accumulation is an inhalation HQ of 0.5. These results indicate minimal risk through the inhalation pathway for these scenarios.

TABLE 8.—RISK ASSESSMENT RESULTS FOR PHENOL

Plausible mismanagement practice	Hazard quotient (HQ)		
	Central tendency	Bounding	High end
Wastewaters			
• Treatment in Aerated Tanks	2×10^{-7}	3.3	0.002
Nonwastewaters:			
• On Site Accumulation	0.005	12	0.5
• Incineration		1.1×10^{-5}	

All risks are direct inhalation. For a complete description of the risk assessment methodology and results, see the background document Assessment of Risks from the Management of Used Solvents.

b. Environmental Damage Incidents. EPA investigated damage incidents at which phenol was an identified contaminant at the site. Based on a review of identified damage instances, no single instance of damage was identified that could be tied to use of phenol as a solvent. Phenol is identified as a contaminant at 25 sites in the ROD database, however, "phenol" is often listed as a class of compounds. Listings where the contaminant was listed as "phenols" or "phenolics" were not considered by EPA further, unless a specific concentration of phenol was identified.

Furthermore, most of the damage cases found for phenol were for sites at which disposal took place many years ago. Only seven facilities identified with phenol contamination appeared to have operated since the RCRA regulations were first promulgated (1980), and even at these sites, disposal typically occurred decades before 1980 and ceased in the early 1980's. These seven cases included: two landfills, three chemical manufacturers (including a pesticide manufacturer and a textile dye manufacturer), one cement production facility, and one chemical waste storage and processing facility.

Levels of phenol reported at these seven sites showed maximum

concentrations of 20 ppm in soils, 8 ppm in groundwater, and 0.47 ppm in surface water. However, a wide variety of chemicals were present at these sites, and it is possible that the phenol present may have been a contaminant or degradation product of these other chemicals. No damage case was identified that could be tied to use of phenol as a solvent. In addition, phenol is produced in relatively large volumes, and only a very small fraction is used as a solvent, except for the specialized use of phenol in the petroleum industry (none of these sites were related to the petroleum industry). The solvent uses identified for phenol were limited to several types of industries (petroleum refining, electronics, and automotive industries), and none of these sectors were represented by facilities identified as having phenol contamination on site.

The 3007 Survey showed that, of the phenol nonwastewater residuals reported to be generated in 1993, 92% were classified as hazardous. Therefore, most of the wastes currently generated from use of phenol as a solvent could not be legally managed under RCRA in the same manner as the wastes were at the contaminated sites. For all of the above reasons, therefore, EPA does not believe that the damage cases provide any relevant information on the

potential risks posed by phenol solvent wastes.

c. Conclusion

EPA believes that phenol does not satisfy the criteria for listing in 40 CFR 261.11(a)(3). Therefore, EPA is proposing that wastes from the use of phenol as a solvent should not be listed as hazardous waste under 40 CFR 261.31. The Agency's risk assessment indicates that spent phenol residuals are not considered to pose a substantial risk under the plausible management scenarios assessed. Thus, these residuals do not appear to be managed in a manner that poses a threat to human health and the environment. High-end analysis revealed air risks from wastewater treatment and storage tanks were below levels of concern. Furthermore, some of the assumptions made in these assessments are likely to have resulted in an overestimation of risk. For example, the storage tank scenario assumed the phenol would volatilize; this seems somewhat unlikely if the waste is being accumulated for subsequent incineration or fuel blending. Also, wastes with higher organic content were thermally treated, and most (92%) treatment was in hazardous waste units or fuel blending.

H. 2-Ethoxyethanol Acetate (2-EEA)

1. Industry Identification

The 1993, U.S. production of 2-ethoxyethanol acetate, also known as ethylene glycol monoethyl ether acetate, was 22.3 million kilograms. Data indicate a rapidly declining market for 2-ethoxyethanol acetate. In 1983, total estimated use was 59.5 million kilograms. By 1987, that had dropped to 36.8 million kilograms and dropped again in 1988 to 31.8 million kilograms. Exports have increased steadily and now represent 79 percent of the production in 1993. 2-Ethoxyethanol acetate is used primarily for its solvent properties. Its most extensive use, until recently, has been in the formulation of photoresist used in the manufacture of semiconductors. While the formulators of photoresist would be considered solvent users for the purposes of this study, photoresist users generally are not. Semiconductor manufacturers may fall within the scope of this industry study if they use 2-ethoxyethanol acetate to clean the edges of semiconductors. However, the use of a formulation that contains a solvent, such as photoresist, does not constitute use of the solvent.

The use of 2-ethoxyethanol acetate in the semiconductor industry is being phased out. Other solvents, including *n*-methyl pyrrolidone, *n*-butyl acetone, and higher order glycol ethers, such as propylene glycol ethers, are being used as substitutes.

2. Description of Solvent Usage and Resulting Waste

a. Solvent Use and Questionnaire Responses. In the RCRA 3007 Prequestionnaire of Solvent Use, 121 facilities reported the use of 1.16 million kilograms of 2-ethoxyethanol acetate. In the RCRA 3007 Questionnaire, 22 facilities reported the use of 0.27 million kilograms of 2-ethoxyethanol acetate. This decrease reflects the elimination from further analysis of 14 facilities that are semiconductor manufacturers whose sole use of 2-ethoxyethanol acetate is due to its presence in photoresist. Semiconductor manufacturers who reported the use of 2-ethoxyethanol acetate as an edge cleaner or for other cleaning purposes were included in the use study. One additional facility was eliminated from study because its sole use of 2-ethoxyethanol acetate was due to its presence in a paint used in coating operations.

The facilities who reported the use of 2-ethoxyethanol acetate in the RCRA 3007 Questionnaire use it most often for tank cleaning or degreasing in

conjunction with processes that incorporate the solvent into the products. 2-Ethoxyethanol acetate is used for tank cleaning at three facilities between batch manufacturing operations in which 2-ethoxyethanol is one of the materials in the formulation. At one facility, the tank clean out is incorporated into the next product batch, thus reducing losses to waste. Another facility uses 2-ethoxyethanol acetate to clean filter housings.

2-Ethoxyethanol acetate is used to adjust the viscosity of adhesives applied during the manufacture of circuit boards. A mixture of 2-ethoxyethanol acetate and methylene chloride (already regulated as Hazardous Waste Numbers F001 and F002) is used to clean curtain coating equipment in the same process. A small number of facilities in the semiconductor manufacturing sector use 2-ethoxyethanol acetate for thinning of photo lithographic materials. This 2-ethoxyethanol acetate is not part of the formulation of prepurchased photoresist and, thus, meets the Agency's definition of solvent.

2-Ethoxyethanol acetate also is used as a reaction, synthesis, or dissolution medium for raw materials in the chemical manufacturing sector. Finally, 2-ethoxyethanol acetate is used to a small extent in laboratories for specialty analyses. Literature searches suggested other uses for 2-ethoxyethanol acetate, however these uses were not confirmed by the industry study, and were not considered in EPA's listing analysis.

b. Physical/Chemical Properties and Toxicity. 2-Ethoxyethanol acetate has a solubility in water of 22.9 wt. percent in water, indicating that the solvent is highly water soluble. With a vapor pressure of 2.0 mm Hg at 20°C, 2-ethoxyethanol acetate is highly volatile and can be expected to volatilize to air from open tanks and containers. The Henry's Law Constant for 2-ethoxyethanol acetate is 1.9×10^{-6} atm-m³/mole, indicating that it has a moderate rate of evaporation from water. The Log *K*_{ow} for 2-ethoxyethanol acetate is not known, however, given its high water solubility, the chemical is not expected to sorb to soils or bioaccumulate in organisms.

2-Ethoxyethanol acetate is not classified as a carcinogen. The chemical has an RfC of 7×10^{-2} mg/m³ and a RfD of 2×10^{-2} mg/kg/day. These values correspond to an air HBL of 7×10^{-2} mg/m³ and a water HBL of 0.7 mg/L.

c. Waste Generation, Characterization, and Management. The 22 facilities reported the generation of 1.2 million kilograms of residuals from the use of 2-ethoxyethanol acetate as a solvent. The residuals include 0.95 million kilograms

of nonwastewaters containing variable levels of 2-ethoxyethanol acetate. These facilities also reported the generation of 0.25 million kilograms of wastewaters containing 2 percent or less of 2-ethoxyethanol acetate.

Essentially all (99.8%) of the nonwastewaters in 1993 were reported to be characteristically hazardous or mixed with listed hazardous waste, and therefore were managed as hazardous waste through some form of thermal treatment (fuel blending or combustion in a boiler or incinerator). The wastewaters were managed in aerated tanks, quiescent tanks, and through discharge to a Publicly Owned Treatment Works (POTWs).

Based on reported waste volumes and concentrations of 2-ethoxyethanol acetate in the waste, loadings of 2-ethoxyethanol acetate were calculated. Table 9 presents the total volumes of wastes and total solvent content for the different waste management practices.

EPA believes that the waste management practices reported in the questionnaires represent the plausible management scenarios for spent 2-ethoxyethanol acetate wastes. The use of 2-ethoxyethanol acetate has been decreasing dramatically in recent years, thus, other generators of this solvent waste are unlikely to exist. To assess the potential risks for management of 2-ethoxyethanol acetate wastes, EPA selected several management practices for modeling. To represent the thermal treatment process (incineration, industrial boilers, fuel blending), EPA chose an industrial boiler. To account for risks from the accumulation of residuals for thermal treatment, EPA modeled an uncovered storage tank. To assess risks arising from wastewater treatment, EPA modeled treatment in an aerated wastewater treatment tank.

None of the 38 wastestreams were reported to go to land disposal in landfills or impoundments. Solids (rags, containers, lab wastes) containing spent solvent were all incinerated, and wastewaters are all treated in tanks. In the face of the existing practices, EPA finds it implausible that high organic wastes or aqueous liquids currently sent to thermal treatment would be managed in a landfill. The large percentage of spent 2-ethoxyethanol acetate wastes that are already hazardous is precluded from land disposal in Subtitle D units, and no evidence exists to suggest that any wastes containing spent 2-ethoxyethanol acetate would be placed in a landfill. Any change from the current practice of treatment of wastewaters in tanks to treatment in impoundments also seems unlikely given the associated costs for such a

change. However, this solvent is removed from wastewaters by volatilization, therefore even if the

practice occurred, treatment in an aerated impoundment would be expected to rapidly remove the solvent

and make any releases to groundwater unlikely.

TABLE 9.—WASTE STATISTICS FOR 2-ETHOXYETHANOL ACETATE RESIDUALS

Management Practice	Number of facilities	Number of streams	Total volume (kg)	Total loading (kg)
Incineration	9	14	641,275	23,239
Energy Recovery (BIFs)	7	13	167,547	146,554
Fuel Blending	8	9	146,612	8,569
WWT—Tanks	2	2	3,161	3
POTW	1	1	243,500	4,871

3. Basis for Proposed No-List Determination

a. Risk Assessment. The Agency performed risk bounding and high end risk estimates using the approaches described earlier (see Section II.C) to obtain a hazard quotient (HQ) for each plausible mismanagement scenario. Where the HQ exceeds 1, exposure is expected to pose a risk to human health and the environment. The results of these analyses are shown in Table 10.

Using bounding assumptions, the Agency estimated that management of 2-ethoxyethanol acetate residuals in a boiler could result in an inhalation HQ of 2.2×10^{-8} and management in an aerated tank could result in an HQ of 0.006. Risk based on bounding assumptions for the other plausible mismanagement scenario (on site accumulation) exceeded an inhalation HQ of 1, and EPA then conducted high end and central tendency risk analyses for this scenario.

The estimated high-end risk assessment with plausible management of 2-ethoxyethanol acetate wastes in an uncovered onsite accumulation tank yielded an inhalation HQ of 0.7. This result indicates minimal risk through the inhalation pathway for this scenario.

TABLE 10.—RISK ASSESSMENT RESULTS FOR 2-ETHOXYETHANOL ACETATE

Plausible mismanagement practice	Hazard quotient (HQ)		
	Central tendency	Bounding	High end
Wastewaters:			
• Treatment in Aerated Tanks		0.006	
Nonwastewaters:			
• On Site Accumulation	0.003	9	0.7
• Incineration		2.2×10^{-8}	

All risks are direct inhalation. For a complete description of the risk assessment methodology and results, see the background document Assessment of Risks from the Management of Used Solvents.

b. Environmental Damage Incidents. 2-Ethoxyethanol acetate has been detected at one Superfund site. The ROD database indicates that 2-ethoxyethanol acetate has contaminated the soil, sediments, and ground water at the site, although no information on the concentration level is available. Wastes deposited at the landfill site include industrial and municipal waste, including what was termed spent organic solvents. However, no disposal occurred at the site after 1980, and the site would reflect management practices that may no longer be representative. Essentially all of the nonwastewater solvent wastes identified in the 3007 Survey were reported to be hazardous waste, and are subject to strict regulation. Furthermore, the ROD database does not specifically cite the uses of any of the wastes found at the site. Therefore, EPA did not factor this damage case into its listing determination.

c. Conclusion. EPA believes that 2-ethoxyethanol acetate does not satisfy the criteria for listing in 40 CFR 261.11(a)(3). Therefore, EPA is proposing that wastes from the use of 2-ethoxyethanol acetate as a solvent should not be listed as hazardous waste under 40 CFR 261.31. The use of 2-ethoxyethanol is declining rapidly in industry, and the Agency believes that this trend will continue. As discussed above, risk bounding estimates indicate that 2-ethoxyethanol acetate spent solvent residuals are not considered to pose a substantial risk or potential hazard to human health and the environment through the pathways and plausible mismanagement scenarios assessed. Furthermore, essentially all of the nonwastewaters are already incinerated as hazardous waste or sent to fuel blending. Risks from wastewater treatment were low and this practice bounded out. Thus, these residuals do not appear to be managed in a manner

that poses a threat to human health and the environment.

I. Furfural

1. Industry Identification

In 1993, U.S. production of furfural was estimated to be 39.5 million kilograms. An estimated 85 percent was consumed as an intermediate in the production of furfural alcohol and as an intermediate in the production of tetrahydrofuran. Other non-solvent uses of furfural may include the manufacture of cold-molded grinding wheels, where phenol and furfural react to form fusible, soluble resins that may be thermally set in the presence of hexamethylenetetramine. Less than 1 percent of furfural produced in 1993 was exported. The remaining 14 percent is used for other purposes, including 4 percent identified as solvent use by Questionnaire respondents.

2. Description of Solvent Usage and Resulting Wastes

a. Solvent Use and Questionnaire Responses. In response to the RCRA 3007 Prequestionnaire, 32 facilities indicated that 3.87 million kg of furfural were used as a solvent at their site in 1992. Eight facilities reported use of furfural as a solvent in response to the 3007 Questionnaire of Solvent Use, with a total 1993 use of 2.46 million kilograms. This apparent decrease was due to large volumes reported in the prequestionnaire that EPA determined from the full questionnaire were not used as a solvent.

Based on the responses to the Questionnaire, essentially all (>99.99%) of the use of furfural as a solvent is in the petroleum industry for lube oil extraction. The furfural refining process, developed by Texaco, Inc., involves extraction of raw lubricating stock with furfural at temperatures generally below 121°C to yield refined oil extract. The undesirable aromatic and olefinic components of the oil are selectively dissolved by furfural and separated from the desired paraffinic and naphthionic components. In practice, oil enters near the bottom of a countercurrent extraction column, and furfural is applied at the point near the top. The extract is removed from the bottom of the column with the bulk of the furfural. Furfural is separated from the extracted material and recovered for reuse by flash distillation followed by steam distillation. Furfural-water mixtures from the steam distillation are readily separated in a decanter by drawing off

the lower layer which consists of about 92 percent furfural and 8 percent water. This layer is subsequently dried for reuse. Furfural losses are generally 0.03 percent or less per cycle. EPA believes that the trend for furfural use is not favorable. The industry is moving toward the use of n-methyl pyrrolidone for lube oil extraction. The remaining solvent use reported was in specialty applications in laboratory analyses.

Literature searches indicated other potential uses for furfural, however Questionnaire responses did not indicate use of furfural for these purposes.

b. Physical/Chemical Properties and Toxicity. Furfural has a solubility in water of 83 grams per liter at 20°C, indicating that it is highly soluble in water. Furfural has a vapor pressure of 1 mm Hg at 20°C indicating that furfural is highly volatile. The Henry's Law Constant for furfural is 8.1×10^{-5} atm-m³/mole, indicating that furfural has a moderate evaporation rate from water. The Log K_{ow} is not available at this time, but the high water solubility suggests that furfural is not likely to sorb strongly to soils or bioaccumulate in organisms. However, the aldehyde functional group in furfural is fairly reactive and may lead to oxidation and degradation in the environment.

Furfural is not classified as a carcinogen. It has an RfC of 0.05 mg/m³ and an RfD of 0.003 mg/kg/day. These values correspond to HBLs of 0.05 mg/m³ for air, and 0.1 mg/L for water.

c. Waste Generation, Characterization, and Management. The seven responding facilities reported a combined volume of

just under 177.5 million kilograms of waste, containing less than 0.1 percent furfural, generated from processes using furfural as a solvent. Furfural wastes, as reported in the RCRA 3007

Questionnaire of Solvent Use, are predominantly (>99.9%) wastewaters that are managed in wastewater treatment systems. These high-volume wastes are not likely to be managed in another manner. One facility has a surface impoundment in their wastewater treatment system and two treat the wastewater in tanks. Much smaller quantities of nonwastewater furfural wastes were reported and these were incinerated as hazardous waste.

Based on reported waste volumes and concentration of furfural in the wastes, loadings of furfural to each waste management practice were calculated. Table 11 presents the total volumes of wastes and total solvent content for the waste management practices.

EPA believes that the waste management practices reported in the questionnaires represent the plausible management scenarios for spent furfural wastes. Nearly all of the solvent use of this chemical (>99.9%) was attributed to the petroleum industry, which EPA surveyed. Given that the major use of this solvent was very specialized (e.g., extraction of lube oil), the Agency is confident that no other significant waste management practices for the associated wastes are likely to exist.

To assess the potential risks for management of phenol wastes, EPA selected several management practices for modeling.

TABLE 11.—WASTE STATISTICS FOR FURFURAL RESIDUALS

Management practice	Number of facilities	Number of streams	Total volume (kg)	Total loading (kg)
Wastewater Treatment—Surface Impoundment	1	2	24,732,124	15,940
Wastewater Treatment—Tank	3	3	152,738,784	165,848
Incineration	1	2	6,220	0.07

To represent the thermal treatment process (incineration), EPA chose an industrial boiler. To account for risks from the accumulation of residuals for thermal treatment, EPA modeled an uncovered storage tank. To assess risks arising from wastewater treatment, EPA modeled treatment in an aerated wastewater treatment tanks and surface impoundments.

3. Basis for Proposed No-List Determination

a. Risk Assessment. The Agency performed risk bounding and high end risk estimates using the approaches

described earlier (see Section II.C) to obtain a hazard quotient (HQ) for each plausible mismanagement scenario. Where the HQ exceeds 1, exposure may pose a risk to human health and the environment. The results of these analyses are shown in Table 12.

Using bounding assumptions, the Agency estimated that management of furfural residuals in a boiler could result in an inhalation HQ of 2.4×10^{-14} and on site accumulation could result in an inhalation HQ of 1.2×10^{-5} . For management of furfural wastewater in a surface impoundment using bounding assumptions (e.g., no biodegradation),

the Agency estimated an inhalation HQ of 0.69, and an ingestion HQ of 0.8.¹ Risk based on bounding assumptions for the other plausible mismanagement scenario (an aerated wastewater treatment tank) exceeded an inhalation HQ of 1, and EPA then conducted high

¹ The bounding estimate for ingestion of contaminated groundwater from a surface impoundment assumed a leachate factor of 1, a dilution and attenuation factor of 10, and ingestion of 2 liters per day of water and a 70 kilogram body weight. After mixing with other wastewaters in the offsite treatment system, the initial concentration of furfural entering the impoundment was 0.80 mg/L.

end and central tendency risk analyses for these scenarios.

The estimated high end risk assessment with plausible

mismanagement of furfural wastes in an aerated wastewater treatment tank resulted in an inhalation HQ of 0.0008.

This result indicates minimal risk through the inhalation pathway for this scenario.

TABLE 12.—RISK ASSESSMENT RESULTS FOR FURFURAL

Plausible mismanagement practice	Hazard quotient (HQ)		
	Central tendency	Bounding	High end
Wastewaters:			
• Treatment in Aerated Tanks	2×10^{-4}	7.9	0.0008
• Treatment in Surface .....	.....	0.69 (inhalation).	
• Impoundment .....	.....	0.8 (ingestion).	
Nonwastewaters:			
• On Site Accumulation .....	.....	1.2×10^{-5} .	
• Incineration .....	.....	2.4×10^{-14} .	

All risks are direct inhalation, unless otherwise noted. For a complete description of the risk assessment methodology and results, see the background document Assessment of Risks from the Management of Used Solvents.

b. Environmental Damage Incidents. Furfural has been identified as a constituent of concern at one site investigated using the Hazard Ranking System (HRS). However, there are no sites with a Record of Decision (ROD) that identify furfural as a constituent. The reason for the absence of furfural may be due to its breakdown in the environment prior to the ROD investigation. In no instance has the use of furfural as a solvent been linked to environmental damage in either the ROD or HRS databases.

c. Conclusion. EPA believes that furfural does not satisfy the criteria for listing in 40 CFR 261.11(a)(3). Therefore, EPA is proposing that wastes from the use of furfural as a solvent should not be listed as hazardous waste under 40 CFR 261.31. Risk analyses indicate that furfural spent solvent residuals do not pose a substantial risk or potential hazard through the pathways assessed. Thus, these residuals do not appear to be managed in a manner that poses a threat to human health and the environment.

J. Cumene

1. Industry Identification

In 1993, U.S. production and imports of cumene totaled 2.24 billion kilograms, of which 1.5 percent is exported. The major non-solvent use of cumene is in the production of phenol and co-product acetone, which utilizes nearly 95 percent of the available cumene. Three percent is used either in the production of poly(alpha-methyl styrene) or for unknown purposes, which may include use as a component in aviation gasoline to improve the octane rating or use as a solvent.

2. Description of Solvent Usage and Resulting Waste

a. Solvent Use and Questionnaire Response. In the RCRA 3007 Prequestionnaire of Solvent Use, 67 facilities reported the use of 1.19 million kilograms of cumene in 1992. In response to the RCRA Questionnaire, nine facilities reported the use of a combined total of 0.60 million kilograms of cumene in 1993. Four other facilities were commercial treatment, storage, and disposal facilities that only received cumene wastes, and were eliminated from consideration. EPA also determined that a large amount of cumene reported as solvent use actually was cumene contained in purchased products.

The major solvent use of cumene is as a reaction medium for chemical production; this accounted for 82% of the total solvent use. The other major use of cumene was for de-inking or paint removal in the commercial printing, automotive, and aviation industries. Solvents used for de-inking and paint removal generally contain small amounts (1 to 3%) of cumene that are less than the 10 percent before use criterion in the existing spent solvents regulations (See 40 CFR 261.31(a)). Finally, cumene is used in small amounts as a reaction medium in laboratory experiments.

b. Physical/Chemical Properties and Toxicity. Cumene has a solubility in water of 50 mg/L at 20°C, indicating that it is only slightly soluble in water. It has a vapor pressure of 3.2 mm Hg at 20°C, indicating that it is highly volatile under ambient conditions and can become an air pollutant. The Log K_{ow} for cumene is 3.66, indicating that cumene has a moderate tendency to sorb to soils and some ability to bioaccumulate in organisms. Cumene is non-persistent in

water due to volatilization, with a half-life of less than two days.

Cumene is not classified as a carcinogen. It has a water HBL of 1 mg/L, based on a reference dose of 0.04 mg/kg/day. The HBL for air based on the RfC is 9×10^{-3} mg/m³.

Shortly before today's action was published, an industry group (The Cumene Panel of the Chemical Manufacturers Association) submitted a letter with information related to the toxicity of cumene. The letter cited the group's comments on another EPA proposal (Hazardous Waste Identification Rule; 60 FR 66344, December 21, 1995), which included extensive technical information concerning the toxicity of cumene. EPA will evaluate this information, along with information submitted by commenters, as it relates to this listing determination.

c. Waste Generation, Characterization, and Management. Nine facilities reported a combined generation of 224 thousand kilograms of residuals from the use of cumene as a solvent. The majority of these wastes (>70%; 160 thousand kg) are collected as vapors and sent directly to on-site combustion; this accounts for the vast majority (>95%) of the cumene loading in all of the wastes that are generated from use as a solvent. Other wastes include spent solvent and process solids that are sent for recovery, incinerated as hazardous, or stored for fuel blending. Small amounts of process wastewaters are sent to wastewater treatment systems, and the process sludges are sent to a landfill.

Based on reported waste volumes and concentration of cumene in the wastes, loadings of cumene were calculated. Table 13 presents the volumes and loadings reported for each management practice.

EPA believes that the waste management practices reported in the questionnaires represent the plausible management scenarios for spent cumene. The uses of cumene as a solvent are very limited and other significant generators of this solvent waste are unlikely to exist.

To assess the potential risks for management of cumene wastes, EPA selected several management practices for modeling. To represent the thermal treatment process (incineration, industrial boilers, fuel blending), EPA chose an industrial boiler. To account for risks from the accumulation of

residuals for thermal treatment, EPA modeled an uncovered storage tank. To assess risks arising from wastewater treatment, EPA modeled treatment in an aerated wastewater treatment tank.

Only one cumene waste was reported to go to a landfill, wastewater treatment sludges, and the cumene concentration was not reported. However, the cumene was used in small quantities in this case, so that the maximum amount of solvent that could be in the sludge would be <28 kg. The amount actually in the sludge is expected to be much less after wastewater treatment. Such a very small amount of cumene is highly

unlikely to present any risk in a landfill. Furthermore, cumene use in this case was at a level (1.7%), far below the 10% level used to define the currently listed solvents, suggesting that this particular waste is not derived from solvent use per se, but is essentially an impurity in the solvent mixture being used. Given the limited use of cumene as a solvent, and the minor volumes reported, EPA believes that the practice of landfilling will not increase. To the contrary, except for wastewaters, nearly all wastes generated are being treated as hazardous, suggesting that any change to Subtitle D landfills is implausible.

TABLE 13.—WASTE STATISTICS FOR CUMENE

Management practice	Number of facilities	Number of streams	Total volume (kg)	Total loading (kg)
Incineration	3	3	14,620	2,242
Boiler/Industrial Furnace	1	1	160,088	128,070
Wastewater Treatment-Tank	1	1	(¹)	<28
Wastewater Treatment-Surface Impoundment	1	1	4,738	<47
Landfill	1	1	1,631	<28
Storage Only	1	1	3,670	1,468
Recovery	3	2	39,117	1,379

¹ Not reported.

One waste containing spent cumene was reported to go to a surface impoundment as part of a wastewater treatment train. However, the annual loading was very small (<47 kg) and cumene levels would be negligible (i.e., orders of magnitude below the health-based level) after mixture with other wastewaters at the headworks prior to entering an impoundment. Furthermore, cumene volatilizes relatively quickly from water and is efficiently removed during wastewater treatment (>97%; see U.S. EPA RREL Treatability Database); thus any cumene reaching treatment impoundments would be further reduced. All wastewaters generated from use of cumene as a solvent appear to contain very low levels of cumene, therefore EPA believes treatment in a surface impoundment is unlikely to present a significant risk, even if the practice were to increase.

Finally, EPA also considered that spent cumene wastes have the potential to form non-aqueous phase liquids

(NAPLs) that might move as a separate phase above the ground water table. These NAPLs may present special problems, especially in assessing their transport and potential impact. Unlike all the other target solvents that are miscible or very soluble in water and are not likely to form NAPLs in groundwater, cumene's water solubility is relatively low, and cumene could theoretically form NAPLs. However, EPA believes that NAPL formation from cumene used as a solvent is highly unlikely because such uses are very limited, and the cumene loading to land-based disposal was minimal (<28 kg to landfills).

3. Basis for Proposed No-List Determination

a. Risk Assessment. The Agency performed risk bounding and high end risk estimates using the approaches described earlier (see Section II.C) to obtain a hazard quotient (HQ) for each plausible mismanagement scenario.

Where the HQ exceeds 1, exposure is expected to pose a risk to human health and the environment. The results of these analyses are shown in Table 14.

Using bounding assumptions, the Agency estimated that management of cumene residuals in a boiler could result in an inhalation HQ of 2.8×10^{-7} , management in an aerated tank could result in an inhalation HQ of 0.03. Risk based on bounding assumptions for the other plausible mismanagement scenario (on site accumulation) exceeded an inhalation HQ of 1, and EPA then conducted high end and central tendency risk analyses for these scenarios.

The estimated high end risk assessment with plausible mismanagement of cumene wastes by on site accumulation in an uncovered tank resulted is an inhalation HQ of 0.2. This result indicates minimal risk through the inhalation pathway for this scenario.

TABLE 14.—RISK ASSESSMENT RESULTS FOR CUMENE

Plausible mismanagement practice	Hazard quotient (HQ)		
	Central tendency	Bounding	High end
Wastewaters:			
• Treatment in Aerated Tanks .....	.....	0.03.	
Nonwastewaters:			
• On Site Accumulation	0.02	3	0.2

TABLE 14.—RISK ASSESSMENT RESULTS FOR CUMENE—Continued

Plausible mismanagement practice	Hazard quotient (HQ)		
	Central tendency	Bounding	High end
• Boiler	2.8×10^{-7} .....	.....

All risks are direct inhalation. For a complete description of the risk assessment methodology and results, see the background document Assessment of Risks from the Management of Used Solvents.

b. Environmental Damage Incidents. Of the three facilities identified with cumene contamination in the Record of Decision Database, only one was reported to be in operation after 1980. This facility was a landfill that operated from 1960 until 1984, when it was abandoned. The facility reportedly received a variety of wastes from 1972 to 1974, including waste paints, painting sludges, and spent solvents. Therefore, the disposal of the potential wastes of concern appears to have occurred well before 1980. The specific solvents disposed at the facility are not identified, making it difficult to link cumene contamination to spent solvents. However, eleven solvents currently listed as hazardous wastes were found as contaminants at the site and may account for the reporting of spent solvent wastes. Furthermore, cumene is a common additive to paint formulations and may be present at the site as a result of the waste paints and painting sludges. Given the limited uses of cumene as a solvent identified in the 3007 Survey, and the likelihood that cumene was present as an ingredient in paint wastes, EPA does not believe that the damage cases are relevant to its listing decision.

c. Conclusion. EPA believes that cumene does not satisfy the criteria for listing in 40 CFR 261.11(a)(3). Therefore, EPA is proposing that wastes from the use of cumene as a solvent should not be listed as hazardous waste under 40 CFR 261.31. Cumene has some limited use as a solvent, however, data indicate that the concentration of cumene before its use as a solvent is relatively low for the most prevalent use, deinking. As discussed above, risk bounding estimates indicate that cumene spent solvent residuals are not considered to pose a substantial risk or potential hazard to human health and the environment through the pathways assessed. Furthermore, essentially all of the cumene in the solvent wastes generated are thermally treated as hazardous or recovered. Thus, these residuals do not appear to be managed in a manner that poses a threat to human health and the environment.

K. Cyclohexanol

1. Industry Identification

The combined production and import data show 10.0 million kilograms of available cyclohexanol, based on 1990 production and 1993 import data. Non-solvent uses of cyclohexanol include cyclohexamine production (54 percent) and pesticide production (14 percent). An unknown amount is used in the oxidation of cyclohexanol to adipic acid (a key ingredient in nylon 66) and cyclohexanol can be used in the production of caprolactam. Some cyclohexanol was reported as solvent use by RCRA 3007 Questionnaire respondents within the petroleum industry. There is no evidence of significant use of cyclohexanol as a solvent outside the petroleum industry.

2. Description of Solvent Usage and Resulting Waste

a. Solvent Use and Questionnaire Responses. In the RCRA 3007 Prequestionnaire of Solvent Use, 37 facilities reported the use of cyclohexanol as a solvent, with a total 1992 use of greater than 100 thousand kg. In the RCRA 3007 Questionnaire, six facilities reported the use of cyclohexanol in 1993, with a total of greater than 1,000 kg and less than 20,000 kg (the exact volume used is confidential business information). The Agency removed a film manufacturer from further study because it was determined that the facility actually uses cyclohexanone, a portion was also found to be reported by a TSD, and other firms responding to the prequestionnaire in 1992 discontinued or reduced use in 1993.

According to data collected in the RCRA 3007 Questionnaire, the major solvent use of cyclohexanol is as an extraction solvent in the production of cyclohexane; however, the cyclohexanol used in this fashion was reported to be recycled in the process. Therefore, wastes generated arose primarily from smaller amounts of cyclohexanol used in specialized laboratory settings.

b. Physical/Chemical Properties and Toxicity. Cyclohexanol has a solubility in water of 56,700 mg/L at 15°C, indicating that it is highly soluble in

water. With a vapor pressure of 1 mm Hg at 20°C, cyclohexanol is moderately volatile. The Log K_{ow} for cyclohexanol is 1.23, indicating that cyclohexanol has a low potential for sorbing to soil. The Henry's Law Constant is 4.5×10^6 atm-m³/mole indicates that cyclohexanol has a low evaporation rate from water.

Data on the health effects of cyclohexanol are limited. Provisional values for the RfD and RfC have been calculated from one study. The provisional RfC is 6×10^{-5} mg/m³ and the RfD is 1.7×10^{-5} mg/kg/day. These correspond to HBLs of 6×10^{-5} mg/m³ for air and 0.0006 mg/L for water. These health-based numbers are provisional and have not undergone external peer review. The Agency plans to complete an external peer review of these health-based numbers prior to issuing a final determination. EPA requests comments on the appropriateness of the provisional numbers, and seeks any additional data on the toxicity of cyclohexanol.

c. Waste Generation, Characterization, and Management. Six facilities initially reported a combined generation of greater than 9 million kilograms of residuals from the use of cyclohexanol as a solvent. However, essentially all of this volume was treatment residuals reported by one facility. This facility reported details for the treatment train that led to a misleading volume as follows. Spent solvent (5,000 kg containing 11 kg of cyclohexanol) is sent to an onsite incinerator; the scrubber water from this hazardous waste incinerator (320 million kg containing no solvent) is then treated in a wastewater treatment system (as hazardous waste) to produce biotreatment sludge (9 million kg containing no solvent). After incineration all subsequent treatment residuals are expected to contain negligible amounts of cyclohexanol. Therefore, only the initial volume going to the incinerator contained cyclohexanol, and this was the only volume from this treatment process that was considered further. The corrected volume of waste generated that contained spent cyclohexanol is actually 44,110 kg, consisting of 43,360

kg of spent solvent (containing 16 kg of cyclohexanol), and 750 kg of filter media reported to contain a "negligible" concentration of cyclohexanol. Table 8 presents the waste volumes and loadings of cyclohexanol for the management practices reported.

In 1993, 98.3 percent of the wastes generated with spent cyclohexanol were treated as hazardous, and the remaining

750 kg of filter media as nonhazardous. Table 15 summarizes that volumes and loadings estimated for cyclohexanol.

Nearly all of the cyclohexanol wastes were reported to be incinerated in a hazardous waste BIF. One small wastestream (750 kg) of filter media was reported to go to a landfill, however the concentration was negligible and presumed zero. Given the specialized

and limited uses of cyclohexanol as a solvent, EPA does not believe that other wastes or management practices are likely to be significant. Therefore, to assess possible risks from management of cyclohexanol wastes from solvent use, EPA modeled combustion in a boiler to account for incineration, and storage in an open accumulation tank.

TABLE 15.—WASTE STATISTICS FOR CYCLOHEXANOL

Management practice	Number of facilities	Number of streams	Total volume (kg)	Total loading (kg)
Landfill	1	1	750	(¹)
Incineration	4	5	43,360	16

¹ Negligible.

3. Basis for Proposed No-List Determination

a. Risk Assessment. The Agency performed risk bounding and high end risk estimates using the approaches described earlier (see Section II.C) to obtain a hazard quotient (HQ) for each plausible mismanagement scenario. Where the HQ exceeds 1, exposure may pose a risk to human health and the

environment. The results of these analyses are shown in Table 16.

Using bounding assumptions, the Agency estimated that management of cyclohexanol residuals in a boiler could result in an inhalation HQ of 7.2×10^{-9} . Risk based on bounding assumptions for the other plausible mismanagement scenario (on site accumulation) exceeded an inhalation HQ of 1, and EPA then conducted high end and

central tendency risk analyses for these scenarios.

The estimated high end risk assessment with plausible mismanagement of cyclohexanol wastes by on site accumulation in an uncovered tank is an inhalation HQ of 0.3. This result indicates minimal risk through the inhalation pathway for this scenario.

TABLE 16.—RISK ASSESSMENT RESULTS FOR CYCLOHEXANOL

Plausible mismanagement practice	Hazard quotient (HQ)		
	Central tendency	Bounding	High end
Nonwastewaters:			
• On Site Accumulation	0.01	2	0.3
• Incineration .....	.....	7.2×10^{-9} .....	.....

All risks are direct inhalation. For a complete description of the risk assessment methodology and results, see the background document Assessment of Risks from the Management of Used Solvents.

b. Environmental Damage Incidents. Cyclohexanol has been detected at one Superfund site. The ROD database indicates that cyclohexanol has contaminated the soil and ground water at the site. The site was occupied by a waste oil company for ten years, and it was contaminated by a wide variety of chemicals. The ROD database does not specifically cite the uses of any of the cyclohexanol found at the site, and given the rare use of this chemical as a solvent, EPA did not consider this damage case to be relevant to its decision.

c. Conclusion. EPA believes that cyclohexanol does not satisfy the criteria for listing in 40 CFR 261.11(a)(3). Therefore, EPA is proposing that wastes from the use of cyclohexanol as a solvent should not be listed as hazardous waste under 40 CFR 261.31. It appears there is very limited

use of cyclohexanol as a solvent. The residuals generated from the use of cyclohexanol as a solvent contain negligible levels of cyclohexanol and are generally managed by thermal treatment as a hazardous waste. As discussed above, risk bounding estimates indicate that cyclohexanol solvent residuals are not considered to pose a substantial risk or potential hazard to human health and the environment during combustion or storage.

L. Isophorone

1. Industry Identification

Production information from 1995 shows 79.3 million kilograms were produced worldwide. However, only one domestic manufacturer exists. The non-solvent uses of isophorone include use as a raw material in the production of isophorone-derived aliphatic diisocyanates; as an intermediate in the

manufacture of 3,5-xylenol-3,3,5-trimethylcyclohexanol and 3,3,5-trimethyl-cyclohexamine; as a starting material and/or emulsifier for insecticides, xylenol-formaldehyde resins, disinfectants, and wood preservatives; and in the synthesis of vitamin E. Although isophorone may be used as a solvent for such purposes as commercial preparations of lacquers, inks, vinyl resins, copolymers, coatings and finishings, ink thinners, and pesticides, and formulators of these products would be considered solvent users for the purposes of this study, the use of these products generally is not. Users of these products may fall within the scope of the industry study only if they use isophorone for cleaning or other solvent purposes.

2. Description of Solvent Usage and Resulting Waste

a. Solvent Use and Questionnaire Responses. In the RCRA 3007 Prequestionnaire of Solvent Use, 30 facilities reported a combined use of greater than 0.3 million kilograms of isophorone. In the RCRA 3007 Questionnaire, six facilities reported a total use of 0.24 million kilograms of isophorone as a solvent in 1993. The largest user of isophorone used a solvent mixture containing significantly less than 10 percent isophorone before use.

Questionnaire respondents indicate that isophorone is used primarily as a diluent cleaning out tank bottoms, and in coating processes. At an aluminum manufacturing facility, isophorone-bearing paint and additional isophorone paint thinner enter the coil coating operation. The coil is coated and waste paint/thinner is drummed prior to fuel blending. At a printing facility, isophorone is mixed with ink and screened onto the material to be printed. The printed material is dried. Waste ink from the operation is drummed prior to off-site fuel blending. A pilot plant in the chemical industry uses isophorone in the coating process, where it is added in the coating steps. Isophorone is used in the manufacture of magnetic disks during the coating process, where isophorone and other raw materials are mixed and coated onto the disk substrate.

b. Physical/Chemical Properties and Toxicity. Isophorone has a solubility in

water of 12,000 mg/L at 25°C, indicating that it is highly soluble in water. With a vapor pressure of 0.38 mm Hg at 20°C, isophorone is volatile. The Henry's Law Constant of 6.2×10^{-6} atm-m³ mole indicates that isophorone has a low to moderate rate of evaporation from water. It has a Log K_{ow} of 1.70 and it is expected to have limited tendencies to sorb to soils and to bioaccumulate. Isophorone can biodegrade.

Isophorone is a suspected carcinogen by ingestion. Using an oral carcinogen slope factor (CSF) of 9.5×10^{-4} (mg/kg/day)⁻¹, EPA calculated that exposure to a water concentration of 0.04 mg/L for 70 years would correspond to a cancer risk of 1×10^{-6} . EPA also estimated a provisional air HBL of 4×10^{-3} mg/m³. These health-based numbers are provisional and have not undergone external peer review. The Agency plans to complete an external peer review of these health-based numbers prior to issuing a final determination. EPA requests comments on the appropriateness of the provisional numbers, and seeks any additional data on the toxicity of isophorone.

c. Waste Generation, Characterization, and Management. Six facilities reported the generation of 0.75 million kilograms of residuals from the use of isophorone as a solvent. The concentration of isophorone in all these residuals ranges from 0.1 percent to 8 percent, except one that was 45 percent. All wastes contained little or no water and were primarily organic liquids. Because of the

primary use of isophorone as a diluent for tank bottoms or coating processes, wastewaters were not generated. The solids generated were containers, rags and similar wastes contaminated with solvent. All isophorone residuals are managed by some type of thermal treatment, either fuel blending, energy recovery in a BIF, or incineration.

Based upon reported waste volumes and concentration of isophorone in the wastes, loadings of isophorone were calculated. Table 17 presents the volumes and loadings for each waste management practice.

All of the wastes identified in the questionnaire are managed as hazardous. Most are hazardous because of a characteristic (usually ignitability) or are listed based on other constituents (e.g., F003). One waste volume generated (705 thousand kg) was not hazardous, but was sent to a hazardous waste BIF; this waste resulted from the use of isophorone as a minor ingredient in a diluent to thin heavy end residuals from waste storage tanks to aid pumping the heavy ends to an on-site hazardous BIF. This stream also results from use of isophorone at a concentration of 8.8 percent, which is just below the 10 percent threshold EPA has used in the past to define solvent use in previous solvent listings (e.g., F001). However, EPA included this waste in its evaluation in order to more fully characterize potential risks from these wastes.

TABLE 17.—WASTE STATISTICS FOR ISOPHORONE

Management practice	Number of facilities	Number of streams	Total volume (kg)	Total loading (kg)
Incineration	3	4	12,186	2,248
Boiler/Industrial Furnace	1	2	*705,180	*9,873
Fuel Blending	1	4	36,329	1,816

* Based on two wastestreams in 3007 Questionnaire derived from isophorone at a before use concentration of <10%.

Because of the limited uses of isophorone as a solvent, EPA does not believe that other wastes or management practices are likely to be significant. Therefore, to assess possible risks from management of isophorone wastes from solvent use, EPA modeled combustion in a boiler to account for thermal treatment (incineration, BIFs, and fuel blending), and storage in an open accumulation tank.

3. Basis for Proposed No-List Determination

a. Risk Assessment. The Agency performed risk bounding and high end risk estimates using the approaches described earlier (see Section II.C) to

obtain a hazard quotient (HQ) for each plausible mismanagement scenario. Where the HQ exceeds 1, exposure is expected to pose a risk to human health and the environment. The results of these analyses are shown in Table 18.

Using bounding assumptions, the Agency estimated that management of isophorone residuals in a boiler could result in an inhalation HQ of 6.2×10^{-8} . Risk based on bounding assumptions for the other plausible mismanagement scenario (on site accumulation) exceeded an inhalation HQ of 1, and EPA then conducted high end and central tendency risk analyses for this scenario.

The estimated high end risk assessment with plausible mismanagement of isophorone wastes by on site accumulation in an uncovered tank resulted in an inhalation HQ of 0.6. This result indicates minimal risk through the inhalation pathway for this scenario. Furthermore, this risk resulted from one large wastestream that was used to mobilize tank heavy ends for pumping to an onsite hazardous waste BIF. The resulting waste mixture was not reported stored, and is likely pumped directly to the BIF for combustion, therefore the scenario appears to be unrealistic for this wastestream in any case.

TABLE 18.—RISK ASSESSMENT RESULTS FOR ISOPHORONE

Plausible mismanagement practice	Hazard quotient (HQ)		
	Central tendency	Bounding	High end
Nonwastewaters:			
• On Site Accumulation	0.01	14	0.6
• Incineration .....	.....	6.2×10^{-8}	.....

All risks are direct inhalation. For a complete description of the risk assessment methodology and results, see the background document Assessment of Risks from the Management of Used Solvents.

b. Environmental Damage Incidents. EPA investigated damage incidents at which isophorone was an identified contaminant at the site. Based on a review of identified damage instances, no single instance of damage was identified that could be tied to use of isophorone as a solvent. Isophorone was identified as a contaminant at 17 sites in the ROD database, however most of these sites arose from disposal practices that occurred many years ago, prior to promulgation of the RCRA regulations. Of the four facilities identified with isophorone contamination that have operated since 1980, two were landfills, one a chemical waste storage and processing facility, and one a pesticide manufacturing facility. All four of these facilities have also been in operation for many years before 1980, and all sites were contaminated with a myriad of chemicals. The maximum levels of isophorone found at the four sites were 0.014 ppm in groundwater, 59 ppm in soil, and 0.13 ppm in surface water. For the landfills and chemical treatment facility, the use of the isophorone prior to being found at the site is impossible to ascertain. However, in the case of the pesticide manufacturer, isophorone has been used as a starting ingredient in the production of pesticides and insecticides, and isophorone becomes part of the final product. This would not be considered a solvent use.

The solvent uses identified for isophorone are limited to only two industry sectors—agricultural chemicals and coating/printing operations, and none of these sectors were represented by facilities identified as having isophorone contamination onsite. Given that the current use of isophorone appears to be very limited, and considering that all of the isophorone wastes generated in 1993 were treated as hazardous, EPA does not believe that these damage cases are relevant to the listing determination.

c. Conclusion. EPA believes that isophorone does not satisfy the criteria for listing in 40 CFR 261.11(a)(3). Therefore, EPA is proposing that wastes from the use of isophorone as a solvent

should not be listed as hazardous waste under 40 CFR 261.31. As discussed above, risk bounding estimates indicate that isophorone solvent residuals are not considered to pose a substantial risk or potential hazard to human health and the environment through the inhalation pathway from burning. Furthermore, all reported residuals were treated as hazardous waste, and all were sent to thermal treatment. Thus, these residuals do not appear to be managed in a manner that poses a threat to human health and the environment.

M. 2-Methoxyethanol Acetate (2-MEA)

1. Industry Identification

In 1992, 2-methoxyethanol acetate (2-MEA) production was estimated to be approximately 500,000 kilograms based on 1988 data; however, the Chemical Manufacturers Association reported that production of this chemical ceased in 1992. It was manufactured only by Union Carbide, under the trade name Methyl Cellosolve Acetate. The use of 2-methoxyethanol acetate is reported to be 82,000 kilograms. The demand for 2-methoxyethanol acetate has declined and current U.S. use is limited to specialty solvents. Based on industry contacts, EPA believes that reported use reflects consumption of stockpiled chemicals.

2. Description of Solvent Usage and Resulting Waste

a. Solvent Use and Questionnaire Responses. In the RCRA 3007 Prequestionnaire of Solvent Use, 16 facilities reported the use of 2-methoxyethanol acetate, with use of greater than 4,000 kilograms in 1992. In the RCRA 3007 Questionnaire, three facilities reported the use of 1,672 kilograms of 2-methoxyethanol acetate in 1993.

Although limited in use, RCRA 3007 Questionnaire respondents indicated that 2-methoxyethanol acetate was used as a diluent in a coating formulation. It also was used as a reaction or synthesis medium and for dissolution.

Literature searches indicate other past uses for 2-methoxyethanol acetate,

however, these uses were not confirmed by the RCRA 3007 Questionnaire respondents.

b. Physical/Chemical Properties and Toxicity. 2-Methoxyethanol acetate is completely soluble in water. With a vapor pressure of 1.2 mm Hg at 20°C, 2-methoxyethanol acetate is moderately volatile. The Henry's Law Constant is 7.6×10^{-7} atm-m³/mole, indicating that 2-methoxyethanol acetate has a low rate of evaporation from water. The Log K_{ow} is -0.76, indicating that 2-methoxyethanol acetate has a low tendency to sorb to soil organic matter or to bioaccumulate.

2-Methoxyethanol acetate is not classified as a carcinogen. EPA estimated a provisional RfC of 0.02 mg/m³ and RfD of 5.7×10^{-3} mg/kg/day. These correspond to provisional HBLs of 2×10^{-2} mg/m³ for air, and 0.2 mg/L for water. These health-based numbers are provisional and have not undergone external peer review. The Agency plans to complete an external peer review of these health-based numbers prior to issuing a final determination. EPA requests comments on the appropriateness of the provisional numbers, and seeks any additional data on the toxicity of 2-methoxyethanol acetate.

c. Waste Generation, Characterization, and Management. Three facilities reported the generation of 16,329 kilograms of 2-methoxyethanol acetate solvent residuals. These residuals include 1,362 kg of debris (i.e., rags and containers), almost 15,000 kg of spent solvents, and negligible amounts (<1 kg) of process sludges. For the most part, these residuals had very low (<1 percent) concentrations of 2-methoxyethanol acetate in the residual. Only one residual from one facility had a higher concentration, in a range of 20–50 percent. Given the limited uses reported (diluent in coating and reaction media), wastewaters are not expected and were not reported. Waste management practices reported were hazardous waste incineration and energy recovery in a BIF.

Table 19 presents the waste volumes and loadings of 2-methoxyethanol

acetate for each waste management practice. All waste went to a hazardous waste incinerator or BIF. Given the limited and decreasing use of this chemical as a solvent, EPA believes that

these represent the only significant management practices likely to be found. Therefore, to assess possible risks from management of 2-methoxyethanol acetate wastes from

solvent use, EPA modeled combustion in a boiler to account for thermal treatment (incineration, BIFs), and storage in an open accumulation tank.

TABLE 19.—WASTE STATISTICS FOR 2-METHOXYETHANOL ACETATE

Management practice	Number of facilities	Number of streams	Total volume (kg)	Total loading (kg)
Incineration	1	3	16,322	963
Boiler/Industrial Furnace	1	3	7	0.07

3. Basis for Proposed No-List Determination

a. Risk Assessment. The Agency estimated risk using bounding assumptions as described earlier (see Section II.C) to obtain a risk for each plausible mismanagement scenario. Where the HQ exceeds 1, exposure may pose a risk to human health and the environment. The results of these analyses are shown in Table 20.

Using risk bounding assumptions, the Agency estimated that management of 2-methoxyethanol acetate residuals in a boiler could result in an inhalation HQ of 7.9×10^{-13} and by onsite accumulation could result in an inhalation HQ of 0.4. These results indicate minimal risk through the inhalation pathway for these scenarios.

TABLE 20.—RISK ASSESSMENT RESULTS FOR 2-METHOXYETHANOL ACETATE

Management practice	Hazard quotient (HQ)
	Bounding
Nonwastewaters:	
• On Site Accumulation	0.4
• Incineration	7.3×10^{-13}

All risks are direct inhalation. For a complete description of the risk assessment methodology and results, see the background document Assessment of Risks from the Management of Used Solvents.

b. Environmental Damage Incidents. 2-Methoxyethanol acetate has been detected at one Superfund site. The ROD database indicates that 2-methoxyethanol acetate has contaminated the soil, sediments, and ground water at the site, although no information on the concentration level is available. Wastes deposited at the municipal landfill site include drums of industrial waste that were buried either intact, punctured, or crushed. The ROD database does not specifically cite the uses of any of the wastes found at the site. Given the declining production and solvent use of 2-methoxyethanol acetate,

and the fact that the small amount of waste currently generated is treated as hazardous waste, EPA does not believe this damage case provides any relevant information on possible future management of the chemical. Therefore, EPA did not consider this damage case information in the listing determination.

c. Conclusion. EPA believes that 2-methoxyethanol acetate does not satisfy the criteria for listing in 40 CFR 261.11(a)(3). Therefore, EPA is proposing that wastes from the use of 2-methoxyethanol acetate as a solvent should not be listed as hazardous waste under 40 CFR 261.31. The use of 2-methoxyethanol acetate has been declining in recent years and does not appear to be manufactured domestically. Further, as discussed above, risk bounding estimates indicate that 2-methoxyethanol spent solvent residuals are not considered to pose a substantial risk or potential hazard to human health and the environment through the pathways assessed. Residuals from the use of 2-methoxyethanol acetate as a solvent generally are managed as hazardous waste, typically being co-managed with other wastes already listed under 40 CFR Part 261. Thus, these residuals do not appear to be managed in a manner that poses a threat to human health and the environment.

N. Chemicals With No Significant Use as Solvents

The following four chemicals were not reported to have any significant uses as solvents: p-dichlorobenzene, benzyl chloride, epichlorohydrin, and ethylene dibromide. On the 1993 Preliminary Questionnaire, the major recipients were hazardous waste incinerators, fuel blenders, or cement kilns who could not tell if the wastes containing these chemicals had, in fact, solvent use. Except in once case (for p-dichlorobenzene), all other use reported as a solvent at any facility was below 10 kg per year. In these cases, reports of "solvent use" often turned out to be quantities purchased for a facility's

research laboratory, without regard as to whether the chemical was actually used as a solvent. The Agency contacted facilities that reported apparent solvent use of larger quantities of these chemicals to confirm whether or not solvent use was actually taking place. In all cases, the facility indicated that solvent use was not occurring.

One of the chemicals, p-dichlorobenzene, is a solid at room temperature, which limits its utility as a solvent. The others are relatively reactive chemicals, which also makes them unsuitable for most solvent applications. All the chemicals may appear as an ingredient in product formulations, sometimes as a chemical impurity. The chemicals are most often used as chemical reactants, pesticides, sterilizing agents, or in other non-solvent uses. Information collected by EPA on each of the four chemicals is discussed below.

1. p-Dichlorobenzene

In 1993, U.S. production of p-dichlorobenzene was reported to be 35.9 million kilograms. Data from 1993 indicate that most of the uses that could be identified were nonsolvent uses, including the production of polyphenylene sulfide resin, in room deodorant blocks, and in moth control products. Industry studies indicate that p-dichlorobenzene is used in very limited amounts as a solvent, but is more typically found as a contaminant in o-dichlorobenzene, a listed solvent.

In response to the RCRA § 3007 Prequestionnaire of Solvent Use, the total volume used by 26 Prequestionnaire respondents for 1992 was greater than 25,000 kilograms. Much of that "use" was reported by facilities that treat waste by incineration or in a cement kiln; its use was also erroneously reported due to the presence of p-dichlorobenzene as an impurity in o-dichlorobenzene, a listed solvent. Six facilities reported the use of 6,288 kilograms of p-dichlorobenzene as a solvent in response to the RCRA § 3007 Questionnaire of Solvent Use.

The chemical was used in very small volumes (<2kg), except for one facility; this metal finishing facility reported using p-dichlorobenzene in a solvent mixture to remove coatings from metal parts in paint stripping tanks. However the facility reported very little solvent in the resulting wastestreams; furthermore, this facility indicated in its questionnaire response that it intended to cease using p-dichlorobenzene and switch to a less toxic solvent. In general, the data from most industries indicate that the chemical is primarily used in research and laboratory applications. p-Dichlorobenzene has a melting point of 54°C and is a solid at room temperature, limiting possible solvent uses.

Wastes from p-dichlorobenzene use were generated as spent lab solvents, laboratory wastewaters, spent solvents, and as part of process wastewaters. Five facilities reported that p-dichlorobenzene solvent waste was sent to hazardous waste incineration or a BIF; this includes the facility that used most of the p-dichlorobenzene. One facility reported discharging process wastewaters to a sanitary sewer (POTW). The total amount of p-dichlorobenzene reported in the wastestreams generated from solvent use in 1993 was <17 kg.

No instance of environmental damage relating to the use of p-dichlorobenzene as a solvent has been identified. This chemical is relatively common at CERCLA and other environmental damage sites, but always appears with other contaminants, most often solvents classified as F001–F005 wastes. p-Dichlorobenzene commonly occurs with high concentrations of o-dichlorobenzene, probably due to the presence of the p-isomer as an impurity. Other damage sites at which p-dichlorobenzene has been detected include former dye manufacturers; however, a nonsolvent use for p-dichlorobenzene is as an intermediate in a dye manufacturing process. Given the extremely low solvent use identified for p-dichlorobenzene, it is not likely that any of the damage incidents identified were the result of mismanagement of p-dichlorobenzene used as a solvent.

The Agency proposes that wastes from the use of p-dichlorobenzene as a solvent should not be listed as hazardous waste under 40 CFR 261.31. The use of p-dichlorobenzene as a solvent appears to be extremely limited, having specialty applications in laboratories and little or no industrial solvent use. p-Dichlorobenzene may be present in wastes generated from use of o-dichlorobenzene as a solvent, because the para-isomer is an impurity in the o-dichlorobenzene. However, o-

dichlorobenzene is already included in the F002 solvent listing, therefore, these wastes would already be regulated as hazardous. Residuals from the use of p-dichlorobenzene as a solvent generally are very small volumes and the total amount of p-dichlorobenzene in residuals was only 17 kg in 1993. Given that wastes generated were either incinerated or sent to a POTW where it would be further diluted by large volumes of other wastewater and treated, EPA believes that these wastes present no significant risks to human health and the environment.

2. Benzyl Chloride

Data from 1993 indicate that U.S. demand for benzyl chloride was 33.2 million kilograms. Nonsolvent applications account for nearly 100 percent of the reported uses of benzyl chloride. There were no industrial solvent uses of benzyl chloride identified during the industry study. Monsanto Corporation informed EPA in February 1993 that it is the only U.S. producer of benzyl chloride and that benzyl chloride has no current solvent uses.

Data from the RCRA 3007 Prequestionnaire reported the total volume used by the 12 Prequestionnaire respondents was 21,809 kg in 1992. Nearly all of that “use” was reported by TSD facilities that accepted the constituent for thermal treatment. Five facilities reported the 1993 use of 6.4 kg of benzyl chloride in response to the RCRA 3007 Questionnaire of Solvent Use; the 1992 solvent use was reported to be 5.9 kg. Data for 1993 indicated that the total amount of benzyl chloride solvent waste generated by five facilities in 1993 was 36,817 kg, and that these waste contained a total loading of 1.9 kg of benzyl chloride.

Benzyl chloride hydrolyzes in water and decomposes rapidly in the presence of most common metals (e.g., iron). The aqueous hydrolysis rate for benzyl chloride corresponds to a half-life of 14 hours; this means that the concentration of benzyl chloride in water would decrease by a factor of 1000 in less than 6 days. Due to its rapid transformation in environmental media, benzyl chloride is not expected to be persistent in moist soil or water. Given its high reactivity, it is highly unlikely that this chemical could find significant use as a solvent. Of the facilities providing information in the RCRA 3007 Questionnaire, each facility used 1 kg or less of benzyl chloride. The benzyl chloride solvent waste generated in 1993 were classified as spent solvents, and all were reported incinerated as hazardous. Given the extremely low use

rates, the concentration of benzyl chloride in the waste solvents is negligible (<2kg).

Benzyl chloride has been identified as a constituent of concern at one site investigated using CERCLA. However, there are no sites that have undergone a ROD that identifies benzyl chloride as a constituent. The reason for the absence of benzyl chloride may be due to its breakdown in the environment prior to the ROD investigation. In no instances has the use of benzyl chloride as a solvent been linked to environmental damage in either the ROD or HRS databases.

The Agency proposes that waste from the use of benzyl chloride as a solvent not be listed as hazardous waste under 40 CFR 261.31. The use of benzyl chloride as a solvent appears to be very limited, having specialty applications in laboratories and no known industrial solvent use. Residuals from the apparent use of benzyl chloride as a solvent generally are very small volumes and contain negligible concentrations of the solvent. The reactivity of the chemical severely limits any solvent use. The relatively rapid hydrolysis of benzyl chloride also indicates that the substance will not persist long enough to present significant risk even if released to the environment in such small quantities. Furthermore, all residuals are managed as hazardous waste. Thus, EPA believes that there are no residuals from solvent use that pose a threat to human health and the environment.

3. Epichlorohydrin

The estimated U.S. production and import of epichlorohydrin were 229.6 million kilograms, based on 1989 production data and 1993 import data. Nonsolvent use of epichlorohydrin includes use in the production of epoxy resins, glycerin, epichlorohydrin elastomers.

In response to the prequestionnaire, 14 facilities indicated that epichlorohydrin was used as a solvent at their site. These facilities reported a total use of more than 76,365 kilograms in 1992. Nearly all of these “uses” were either misreported as solvent use (when epichlorohydrin was, in fact, a chemical reactant) or the use was reported by a facility that accepted the constituent for thermal treatment or reclamation. Three facilities reported use 3.4 kilograms of epichlorohydrin as a solvent in response to the RCRA section 3007 Questionnaire of Solvent Use. The sharp decline reflects the elimination of a treatment facility from further study, since the use of the epichlorohydrin as a solvent prior to treatment could not be confirmed.

Literature searches indicate that epichlorohydrin has been used as an ingredient in natural and synthetic resins, gums, cellulose esters and ethers, paints, varnishes, nail enamels, lacquers, and cement for celluloid. Finally, epichlorohydrin has been used by the textiles industry to modify the carboxyl groups of wool, in the preparation of fibers, and in dyeing fibers.

Three facilities provided data in the section 3007 Questionnaire of Solvent Use. One facility used only .001 kg in 1993; the wastes generated (25 kg) were classified as lab wastes and sent off-site to a hazardous waste incinerator or to a nonhazardous energy recovery facility. The other two facilities, both pharmaceutical companies, used 1 kg and 2.36 kg of epichlorohydrin, respectively, in 1993. One of the two pharmaceutical facilities reported the generation of a total of 17,254 kg of spent solvent or lab waste, which was sent off-site for hazardous waste incineration. The other facility generated 5,000 kg of spent solvent or lab waste, which was incinerated on-site in a hazardous waste incinerator. These wastes contained epichlorohydrin in part per million concentrations.

Epichlorohydrin has not been identified as a constituent of concern at any sites investigated using the HRS. In addition, there are no sites that have undergone a ROD that identify epichlorohydrin as a constituent. The reason for the absence of epichlorohydrin may be due to its breakdown in the environment prior to the ROD or HRS investigation. Epichlorohydrin hydrolyzes relatively rapidly in water with a half-life of 8.2 days. In no instances has the use of epichlorohydrin as a solvent been linked to environmental damage in either the ROD or HRS databases.

The Agency proposes that waste from the use of epichlorohydrin as a solvent not be listed as hazardous waste under 40 CFR 261.31. The use of epichlorohydrin as a solvent, if it truly occurs, appears to be limited to specialty applications in laboratories and no known industrial solvent use. Residuals from the apparent use of epichlorohydrin as a solvent generally are very small volumes and contain negligible concentrations of the solvent. The reactivity of the chemical severely limits any solvent use. The relatively rapid hydrolysis of epichlorohydrin also indicates that the substance is unlikely to persist long enough to present significant risk even if released to the environment in such small quantities. Furthermore, all of the waste was

reported to be incinerated as hazardous waste. Thus, EPA believes that there are no residuals from solvent use that pose a threat to human health and the environment.

4. Ethylene Dibromide

The estimated U.S. capacity for ethylene dibromide production and import totals 61.6 million kilograms for 1993, based on 1981 production capacity and 1993 import data. However, production has been declining since 1974, and 1993 production was 11.3 million kg. The industry study confirms that ethylene dibromide has no significant use as a solvent. Nonsolvent uses included use as a lead scavenger in gasoline, as an insect and soil fumigant, and as an intermediate in the synthesis of dyes, pharmaceuticals, and vinyl bromide.

According to industry data obtained in the RCRA 3007 Preliminary Questionnaire, 11 facilities used a total of 127,760 kilograms of ethylene dibromide in 1992. Only two facilities used more than 1,000 kg per year. In response to the full RCRA 3007 Questionnaire, three facilities reported use of 14 kg of ethylene dibromide as a solvent in 1993. The apparent sharp decline reflects the elimination of a TSD from further study, since the use of ethylene dibromide as a solvent prior to treatment could not be confirmed by questionnaire responses. EPA did not find any evidence of significant solvent uses in industrial, rather than research settings. EPA believes that the facilities that reported using it as a solvent in the 3007 Survey probably used the chemical in an undefined manner in a laboratory, which may or may not include minor use as a solvent.

Of the three facilities providing data in the RCRA 3007 Questionnaire, a total of 34,197 kg of waste was generated, from a total use of 14 kg. All this waste was classified as spent laboratory waste. According to the Questionnaire data, all the wastes generated were sent to a hazardous waste incineration facility, either on-site or off-site. While no exact non-CBI waste concentrations were reported, given that only 14 kg of ethylene dibromide was reported used, the Agency believes that the wastes sent to incineration have very low (part per million range or lower) concentrations of ethylene dibromide.

Ethylene dibromide (EDB) has been detected at two sites undergoing a ROD evaluation. The ROD database indicates that EDB has contaminated soil, soil gas, and ground water at the two sites. Records indicate that the source of the contamination for the two sites can be

linked to the use of EDB as a grain fumigant/pesticide. At a pesticide manufacturing facility EDB has been detected in the soil in an area where pesticide production wastes had been dumped. EDB has also been detected at a site that includes a grain storage facility where EDB was used to fumigate grain. None of the information on these sites indicates that ethylene dibromide was used as a solvent in these situations. In water ethylene dibromide hydrolyzes relatively rapidly; the half-life of this reaction is 5–10 days.

The Agency proposes that waste from the use of ethylene dibromide as a solvent not be listed as hazardous waste under 40 CFR 261.31. The use of ethylene dibromide as a solvent, if it occurs, appears to be very limited, having specialty applications in laboratories and no known industrial solvent use. Residuals from the apparent use of ethylene dibromide as a solvent contain negligible concentrations of the solvent. Furthermore, all wastes were reported to be incinerated as hazardous waste. The reactivity of the chemical severely limits any solvent use. Thus, EPA believes that there are no residuals from solvent use that pose a threat to human health and the environment.

O. Relationship to RCRA Regulations and Other Regulatory Programs

There are several recent regulations and ongoing rulemaking efforts that may affect the usage, generation, and management of certain solvents being examined under the current judicially mandated listing determinations. Each of these rules is briefly described below.

Resource Conservation and Recovery Act Regulations

The Agency recently has published universal treatment standards for several of the chemicals addressed in today's proposal (59 FR 47980, September 19, 1994). These standards establish consistent concentration limits for constituents that previously may have been subject to inconsistent standards under various land disposal rulemakings. Under the final rule, universal standards are established for four of the 14 currently targeted solvents when found in nonwastewaters, and for four of the 14 solvents in wastewaters. Figure 2 presents the universal treatment standards proposed for solvents subject to the current listing determination.

FIGURE 2.—PROPOSED UNIVERSAL TREATMENT STANDARDS FOR TARGET SOLVENTS

Solvent	Proposed non-wastewater standard *	Proposed wastewater standard **
Acetonitrile .....	.....	0.17 mg/l *
p-dichlorobenzene (1,4-dichlorobenzene)	6.0 mg/kg	0.09 mg/l *
Ethylene Dibromide (1,2-Dibromoethane)	15.0 mg/kg	0.028 mg/l *
Methyl Chloride (Chloromethane)	30.0 mg/kg	0.19 mg/l *
Pheno	16.2 mg/kg	0.039 mg/l *

* Based on grab samples.

** based on composite samples.

Under 40 CFR 268.7(a), a waste generator must test the waste or an extract thereof (or apply knowledge of the waste) to determine whether the waste is hazardous and restricted from land disposal under the LDR program. If the waste is restricted from land disposal and does not meet the applicable treatment standards set forth in Part 268, the generator must notify any facility receiving the waste of the appropriate treatment standards. If a generator determines that a restricted waste meets all applicable treatment standards, he/she must submit a notice to facilities receiving the waste certifying that the waste meets applicable treatment standards.

Finally, regardless of the impact of the regulations discussed above, it is anticipated that a significant portion of the regulated community will opt for recycling as a management technique for any solvents that may be listed as a result of this investigation. Recycling exemptions in the hazardous waste regulations provide significant incentives for recycling wastes rather than managing them through traditional means (See 40 CFR 261.2, 261.4, 261.6, and Part 266).

Occupational Safety and Health Administration Regulations

One notable regulatory initiative is the Occupational Safety and Health Administration (OSHA) examination of the health impacts of glycol ethers. OSHA has recently proposed amendments to its existing regulation for occupational exposure to certain glycol ethers, specifically 2-methoxyethanol, 2-ethoxyethanol, and their acetates (2-methoxyethanol acetate, 2-ethoxyethanol acetate) (58 FR 15526; March 23, 1993). This proposed rule will reduce the existing 8-hour time-weighted average (TWA) permissible exposure limit, as well as establish guidelines to achieve generally lower exposure for employees to these chemicals. This proposal appears to have affected facility usage of these glycol ethers. In response to the Agency's RCRA § 3007 inquiries, a

number of facilities reported that use of these glycol ethers had been discontinued at their site due to health concerns. Others reported that the use of these glycol ethers will be phased out in the near future.

Clean Air Act Regulations

The Clean Air Act (CAA) Amendments of 1990 require EPA to expand the regulation of air toxics to 189 substances over a 10-year period (such substances are presumed to warrant regulation as air toxics—the list may be modified by the Administrator). This statutory list of air toxics includes all but two of the 14 solvents addressed in today's proposal. The two that are not listed as presumed air toxics are cyclohexanol and furfural. The CAA amendments do not require that the air toxics be regulated on a constituent-specific basis. Rather, EPA is required to identify categories of industrial facilities that emit substantial quantities of one or more air toxics. A list of the source categories, as well as a schedule for promulgation of hazardous air pollutant regulations, is published at 58 FR 63952 (December 3, 1993). The Agency has identified 174 source categories (including 8 area sources). The source categories include: pharmaceutical production processes; agricultural chemicals production; polymer and resins production; production of inorganic chemicals; production of organic chemicals; and numerous miscellaneous processes, including semiconductor manufacturing. Categories of area sources include, for example, halogenated solvent cleaners. Such increased regulation of many of the industries that use the 14 target solvents may prompt increased recapture and reuse of the constituent, or encourage the use of alternative compounds.

Emergency Planning and Community Right-to-Know Act Regulations (EPCRA)

Section 313 of EPCRA requires that any facility with 10 or more employees in SIC codes 20–39 that manufactures, processes, or otherwise uses specified

chemicals in amounts exceeding established thresholds must report, to EPA and designated state agencies, any releases of these chemicals to the environment. The reported data comprise the Toxics Release Inventory (TRI). The chemicals in the TRI are listed at 40 CFR 372.65, and include all but three (cyclohexanol, isophorone, and furfural) of the 14 solvents addressed in today's proposal. Under EPCRA, the quantity threshold for chemical use is 10,000 pounds per calendar year. The reporting quantity threshold for manufacturing, importing or processing is 25,000 pounds per year (1989 and thereafter). Although TRI release reporting does not have a direct impact on hazardous waste generation or management capacity, it is generally accepted that these reporting requirements create strong incentives for facilities to reduce releases and alter operating practices to reduce or eliminate the use of specified chemicals. Annual TRI reporting was initiated in 1988 (addressing releases during 1987) and is undergoing expansion. For example, a final rule published on November 30, 1994 (59 FR 61432) added 286 chemicals and chemical categories to the TRI reporting inventory. Among the chemicals added are cyclohexanol and isophorone.

Clean Water Act Regulations

The Agency currently is revising the effluent guidelines and standards for the pharmaceutical manufacturing category. This work, which is being conducted under a Consent Decree (*NRDC v. Browner*, (D.D.C. 89–2980; January 31, 1992)), involves the review and revision of the existing effluent guidelines and will consider inclusion of limitations on toxic and non-conventional volatile organic pollutants. A notice of proposed rulemaking was published on May 2, 1995. The Agency has also revised the effluent guidelines and standards applicable to the organic chemicals, plastics, and synthetic fibers industry (OCPSF) (58 FR 36872; July 9, 1993). These revisions add BAT and NSPS

standards for 19 additional constituents (including p-dichlorobenzene, methyl chloride, and phenol) and pretreatment standards for 11 of these 19 pollutants (including p-dichlorobenzene and methyl chloride).

The Agency also has developed effluent guidelines and standards for the pesticide chemicals category. This work (also being conducted under the NRDC Consent Decree) limits the discharge of pollutants into U.S. waters and POTWs from new and existing facilities that manufacture pesticide active ingredients. A final rule was published on September 28, 1993 (58 FR 50638), which included standards for p-dichlorobenzene and phenol, two constituents addressed by the solvents listing investigation. EPA is also completing effluent standards for facilities that formulate, package, and/or repackage pesticide active ingredients into final products. EPA expects to complete this rule by September 30, 1996.

As noted in the discussion of other rules above, these new and revised effluent standards may result in the generation of wastes already regulated under the CWA and/or may encourage the recycling or reduction of CWA-regulated constituents. It is noteworthy that, although not imposed as part of these rulemakings, the Agency routinely evaluates zero discharge effluent standards (usually based on recycling) as an option for new sources.

III. Waste Minimization

In the Pollution Prevention Act of 1990 (42 U.S.C. 13101 *et seq.*, P.L. 101-508, November 5, 1990), Congress declared pollution prevention to be a national policy of the United States. The act declares that pollution should be prevented or reduced at the source whenever feasible; pollution that cannot be prevented should be recycled or reused; pollution that cannot be prevented/reduced or recycled should be treated in an environmentally safe manner wherever feasible; and disposal or release into the environment should be chosen only as a last resort, and should be done in an environmentally safe manner. This section provides a general discussion of some generic pollution prevention and waste minimization techniques that facilities may wish to explore.

Waste minimization practices fall into three general groups: change in production practices, housekeeping practices, and practices that employ the use of equipment that by design promote waste minimization. Some of these practices/equipment listed below conserve water, others reduce the

amount of product in the wastestream, while others may prevent the creation of the waste altogether. EPA acknowledges that some of these practices/equipment may lead to media transfers or increased energy use. This information is presented for general information, and is not being proposed as a regulatory requirement. Production practices include:

- Triple-rinsing raw material shipping containers and returning the rinsate directly to the reactor;
- Scheduling production to minimize changeover cleanouts;
- Segregating equipment by individual product or product "families;"
- Packaging products directly out of reactors;
- Steam stripping wastewaters to recovery reactants or solvents for reuse;
- Using raw material drums for packaging final products; and
- Dedicating equipment for hard to clean products.

Housekeeping practices include:

- Performing preventive maintenance on all valves, fittings, and pumps;
- Promptly correcting any leaky valves and fittings;
- Placing drip pans under valves and fitting to contain leaks; and
- Cleaning up spills or leaks in bulk containment areas to prevent contamination of storm or wash waters.

Equipment promoting waste minimization by reducing or eliminating waste generation include:

- Low-volume/high-pressure hoses for cleaning;
- Drum triple-rinsing stations;
- Reactor scrubber systems designed to return captured reactants to the next batch rather than to disposal;
- Material storage tanks with inert liners to prevent contamination of water blankets with contaminants which would prohibit its use in the process; and
- Enclosed automated product handling equipment to eliminate manual product packaging.

Waste minimization measures can be tailored to the needs of individual industries, processes, and firms. This approach may make it possible to achieve greater pollution reduction with less cost and disruption to the firm.

Defined process control and good housekeeping practices often can result in significant waste volume or toxicity reduction. Evaluations of existing processes also may point out the need for more complex engineering approaches (e.g., waste reuse, secondary processing of distillation bottoms, and use of vacuum pumps instead of steam jets) to achieve waste minimization

objectives. Simple physical audits of current waste generation and in-plant management practices for the wastes also can yield positive results. These audits often turn up simple nonengineering practices that can be implemented successfully.

VI. State Authority

A. Applicability of Rule in Authorized States

Because this proposal would not change the Federal program, it would not affect authorized State programs. However, the relevant State authorization provisions are as follows.

Under section 3006 of RCRA, EPA may authorize qualified States to administer and enforce the RCRA program within the State. (See 40 CFR Part 271 for the standards and requirements for authorization.) Following authorization, EPA retains enforcement authority under sections 3007, 3008, 3013, and 7003 of RCRA, although authorized States have primary enforcement responsibility.

Before the Hazardous and Solid Waste Amendments of 1984 (HSWA) amended RCRA, a State with final authorization administered its hazardous waste program entirely in lieu of the Federal program in that State. The Federal requirements no longer applied in the authorized State, and EPA could not issue permits for any facilities located in the State with permitting authorization. When new, more stringent Federal requirements were promulgated or enacted, the State was obligated to enact equivalent authority within specified time-frames. New Federal requirements did not take effect in an authorized State until the State adopted the requirements as State law.

By contrast, under section 3006(g) of RCRA, 42 U.S.C. 6926(g), new requirements and prohibitions imposed by the HSWA (including the hazardous waste listings proposed in this notice) take effect in authorized States at the same time that they take effect in non-authorized States. EPA is directed to implement those requirements and prohibitions in authorized States, including the issuance of permits, until the State is granted authorization to do so. While States must still adopt HSWA-related provisions as State law to retain final authorization, the Federal HSWA requirements apply in authorized States in the interim.

B. Effect on State Authorizations

Because any regulations that EPA might propose (with the exception of the actions proposed under CERCLA authority) would be promulgated

pursuant to the HSWA, a State submitting a program modification is able to apply to receive either interim or final authorization under section 3006(g)(2) or 3006(b), respectively, on the basis of requirements that are substantially equivalent or equivalent to EPA's requirements. The procedures and schedule for State program modifications under 3006(b) are described in 40 CFR 271.21. It should be noted that all HSWA interim authorizations are currently scheduled to expire on January 1, 2003 (see 57 FR 60129, February 18, 1992).

Section 271.21(e)(2) of EPA's State authorization regulations (40 CFR Part 271) requires that states with final authorization modify their programs to reflect federal program changes and submit the modifications to EPA for approval. The deadline by which the States must modify their programs to adopt a final rule will be determined by the date of promulgation of a final rule in accordance with section 271.21(e)(2). If any HSWA regulations are adopted in the final rule, Table 1 at 40 CFR 271.1 would be amended accordingly. Once EPA approves the modification, the State requirements become RCRA Subtitle C requirements.

States with authorized RCRA programs already may have regulations similar to those EPA may issue. These State regulations have not been assessed against the Federal regulations being proposed to determine whether they meet the tests for authorization. Thus, a State would not be authorized to implement any such regulations as RCRA requirements until State program modifications are submitted to EPA and approved, pursuant to 40 CFR 271.21. Of course, States with existing regulations that are more stringent than or broader in scope than current Federal regulations may continue to administer and enforce their regulations as a matter of State law.

It should be noted that authorized States are required to modify their programs only when EPA promulgates Federal standards that are more stringent or broader in scope than existing Federal standards. Section 3009 of RCRA allows States to impose standards more stringent than those in the Federal program. For those Federal program changes that are less stringent or reduce the scope of the Federal program, States are not required to modify their programs. See 40 CFR 271.1(i).

V. CERCLA Designation and Reportable Quantities

All RCRA hazardous wastes listed in 40 CFR 261.31 through 261.33, as well

as any solid waste that exhibits one or more of the hazardous waste characteristics, are also hazardous substances under Section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended. Hazardous substances are listed in Table 302.4 at 40 CFR 302.4, along with their respective reportable quantities (RQs). Because EPA is not proposing to list any wastes, the Agency is not proposing changes to Table 302.4.

Under CERCLA 103(a), the person in charge of a vessel or facility from which a hazardous substance has been released in a quantity that equals or exceeds its RQ must immediately notify the National Response Center of the release as soon as that person has knowledge of the release. In addition to this reporting requirement under CERCLA, Section 304 of the Emergency Planning and Community Right-To-Know Act (EPCRA) requires owners or operators of certain facilities to report the release of a hazardous substance to State and local authorities. EPCRA Section 304 notification must be given to the community emergency coordinator of the local emergency planning committee (LEPC) for each area likely to be affected by the release, and to the State emergency response commission (SERC) of any State likely to be affected by the release.

Under Section 102(b) of CERCLA, all hazardous wastes are assigned a statutory RQ of one pound unless and until adjusted by regulation. The Agency's methodology for adjusting RQs of individual hazardous substances begins with an evaluation of the intrinsic physical, chemical, and toxicological properties of each hazardous substance. The intrinsic properties examined, called "primary criteria," are aquatic toxicity, mammalian toxicity (oral, dermal, and inhalation), ignitability, reactivity, chronic toxicity, and potential carcinogenicity. Generally, for each intrinsic property, the Agency ranks hazardous substances on a scale, associating a specific range of values on each scale with an RQ of 1, 10, 100, 1,000, or 5,000 pounds. The data for each hazardous substance are evaluated using various primary criteria; each hazardous substance may receive several tentative RQ values based on its particular intrinsic properties. The lowest of the tentative RQs becomes the "primary criteria RQ" for that substance.

After the primary criteria RQs are assigned, substances are further evaluated for their susceptibility to certain degradative processes, which are

used as secondary adjustment criteria. These natural degradative processes are biodegradation, hydrolysis, and photolysis (BHP). If a hazardous substance, when released into the environment, degrades relatively rapidly to a less hazardous form by one or more of the BHP processes, its RQ, as determined by the primary RQ adjustment criteria, is generally raised one level. This adjustment is made because the relative potential for harm to public health or welfare or the environment posed by the release of such a substance is reduced by these degradative processes. Conversely, if a hazardous substance degrades to a more hazardous form after its release, the original substance is assigned an RQ equal to the RQ for the reaction product. The downward adjustment is appropriate because the hazard posed by the release of the original substance is increased if it degrades to a more hazardous form.

The methodology summarized above is applied to adjust the RQs of individual hazardous substances. An additional process applies to RCRA waste streams that contain individual hazardous substances as constituents. In the August 14, 1989 Federal Register (54 FR 33440), the Agency stated that, in assigning an RQ to a waste stream, the Agency determines the RQ for each waste stream constituent and then assigns the lowest of these constituent RQs to the waste stream itself.

VI. Regulatory Impacts

A. Executive Order 12866

Under Executive Order 12866 (58 FR 51735; October 4, 1993), the Agency must determine whether a new regulation is a "significant regulatory action" and, therefore, subject to the requirements of the Executive Order and to review by the Office of Management and Budget. The E.O. defines "significant regulatory action" as one that is likely to result in a rule that may:

- (1) Have an annual effect on the economy of \$100 million or more or adversely affect, in a material way, the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;
- (2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
- (3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs, or the rights and obligations of recipients thereof; or
- (4) Raise novel legal or policy issues arising out of legal mandates, the

President's priorities, or the principles set forth in the Executive Order.

The Agency has analyzed the costs associated with this proposal, which are discussed in the following section, and has determined that this proposed rule is not a significant regulatory action. Because the Agency is not proposing to change any regulatory requirements for these chemicals, there are no costs to industry associated with this proposal, nor any economic impacts.

VII. Environmental Justice

Executive Order 12898 (59 FR 7629; February 16, 1994) requires Federal agencies to identify and address, as appropriate, disproportionately high and adverse human health and environmental effects of their programs, policies, rulemakings, and other activities, on minority populations and low-income populations. The Order directs each Federal agency to develop an agency-wide environmental justice strategy that will list agency programs, policies, public participation processes, enforcement activities, and rulemakings related to human health and environment that should be revised to, at a minimum: (1) promote enforcement of all human health and environmental statutes in areas with minority and low-income populations; (2) ensure greater public participation; (3) improve research and data collection relating to the health and environment of minority and low-income populations; and (4) identify differential patterns of natural resource consumption among minority and low-income populations.

Specifically, E.O. 12898 directs Federal agencies, in connection with the development and implementation of Agency strategies on environmental justice, to collect, maintain, and analyze information on the race, national origin, income level, and other appropriate information for areas surrounding facilities or sites expected to have a substantial environmental, human health, or economic impact on the surrounding populations, when such facilities or sites are the subject of a substantial Federal environmental administrative or judicial action.

Today's proposal not to list any of the target solvents as hazardous waste is expected to have no impact on any minority or low-income populations. EPA has evaluated risks to hypothetical receptors that might live close to facilities using these chemicals as solvents, and in all cases the Agency found no significant risks are likely to any nearby population. Therefore, EPA does not believe that any further analysis is required under Executive Order 12898.

VIII. Regulatory Flexibility Act

Pursuant to the Regulatory Flexibility Act of 1980, 5 U.S.C. 601 *et seq.*, whenever an agency publishes a notice of rulemaking, it must prepare and make available for public comment a Regulatory Flexibility Analysis (RFA) that describes the effect of the rule on small entities (*i.e.*, small businesses, small organizations, and small governmental jurisdictions). This analysis is unnecessary, however, if the rule is estimated not to have a significant economic impact on a substantial number of small entities.

According to EPA's guidelines for conducting an RFA, if over 20 percent of the population of small entities is likely to experience financial distress based on the costs of the rule, then the Agency considers that the rule will have a significant impact on a substantial number of small entities, and must perform an RFA. Because today's proposal would not change any regulatory requirements, the Agency estimates that this action will not significantly impact 20 percent of the population of small entities. Therefore, the Agency has not conducted an RFA for today's proposed rule.

IX. Paperwork Reduction Act

Today's proposed rule does not contain any new information collection requirements subject to OMB review under the Paperwork Reduction Act of 1980, 44 U.S.C. 3501 *et seq.* Because there are no new information collection requirements proposed in today's rule, an Information Collection Request has not been prepared.

X. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), P.L. 104-4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and tribal governments and the private sector. Under section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with "Federal mandates" that may result in expenditures to State, local, and tribal governments, in the aggregate, or to the private sector, of \$100 million or more in any one year. Before promulgating an EPA rule for which a written statement is needed, section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not

apply when they are inconsistent with applicable law. Moreover, section 205 allows EPA to adopt an alternative other than the least costly, most cost-effective or least burdensome alternative if the Administrator publishes with the final rule an explanation why that alternative was not adopted. Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant Federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements.

Today's rule contains no Federal mandates (under the regulatory provisions of Title II of the UMRA) for State, local, or tribal governments or the private sector.

XI. Compliance and Implementation

Because no regulatory action is being proposed today, the Agency expects no change in regulatory status for authorized and nonauthorized states.

List of Subjects

40 CFR Part 261

Environmental Protection, Hazardous Materials, Waste treatment and disposal, Recycling.

40 CFR Part 271

Environmental protection, Administrative practice and procedure, Confidential business information, Hazardous material transportation, Hazardous waste, Indians—lands, Intergovernmental relations, Penalties, Reporting and record keeping requirements, Water pollution control, Water supply.

40 CFR Part 302

Environmental protection, Air pollution control, Chemicals, Emergency Planning and Community Right-to-Know Act, Extremely hazardous substances, Hazardous chemicals, Hazardous materials transportation, Hazardous substances, Hazardous wastes, Intergovernmental relations, Natural resources, Pesticides and pests, Reporting and record keeping requirements, Superfund, Waste treatment and disposal, Water pollution control, Water supply.

Dated: August 2, 1996.

Carol M. Browner,

Administrator.

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