ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 148, 261, 268, 271, and 302

[FRL–5999–9]

RIN 2050–AD79

Organobromine Production Wastes; Identification and Listing of Hazardous Waste; Land Disposal Restrictions; Listing of CERCLA Hazardous Substances, Reportable Quantities

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: The EPA is adding two new hazardous waste codes to its current lists of hazardous waste found in 40 CFR part 261. One waste type to be added and designated by the hazardous waste code K140 is floor sweepings, off-specification product and spent filter media from the production of 2,4,6-tribromophenol. The second waste is 2,4,6-tribromophenol and is being added both to the list of commercial chemical products, designated by the hazardous waste code U408 and to the list of hazardous constituents in Appendix VIII of 40 CFR part 261. EPA is also modifying the land disposal treatment standards for hazardous waste in 40 CFR part 268 by adding these new wastes. The effect of listing this waste will be to subject it to stringent management and treatment standards under RCRA, as well as to emergency notification requirements for releases of hazardous substances to the environment. These notifications are required under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) and the Emergency Planning and Community Right to Know Act (EPCRA). EPA is also issuing Reportable Quantity (RQ) requirements for these notifications. EPA has made a final determination not to list as hazardous ten waste streams from the production of bromochloromethane, ethyl bromide, tetrabromobisphenol A, 2,4,6-tribromophenol wastewaters, octabromodiphenyl oxide, and decabromodiphenyl oxide.

DATES: Effective Date: November 4, 1998.

ADDRESSES: The official record of this action is identified by Docket number F–98–OBLF–FFFFF and is located at the following address: EPA Docket Clerk, U.S. EPA, Crystal Gateway #1, 1st Floor, 1235 Jefferson Davis Highway, Arlington, VA. The docket is open from 9 a.m. to 4 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 are $0.15 per page.

FOR FURTHER INFORMATION CONTACT: The RCRA/Superfund Hotline, at (800) 424–9346 (toll-free) or (703) 412–9810, in the Washington, DC metropolitan area. The TDD Hotline number is (800) 553–7672, or (703) 486–3323, locally. For technical information on the final listing determination, contact Anthony Carrell at (703) 308–0458, or carrell.anthony@epamail.epa.gov.

For technical information on the CERCLA aspects of this rule, contact: Elizabeth Zeller, Office of Emergency and Remedial Response (5204G), U.S. Environmental Protection Agency, 401 M Street, SW, Washington, DC 20460, (703) 603–8744.

SUPPLEMENTARY INFORMATION:

This rule is available on the Internet. Please follow these instructions to access the rule electronically: From the World Wide Web (WWW), type http://www.epa.gov/epaoswer, then select option for Rules and Regulations.

The official record for this action is kept in a paper format, and is maintained at the address in the **ADDRESSES** section at the beginning of this document.

I. Affected Entities

Entities potentially affected by this action are those which handle either the waste stream or the chemical being added to EPA's list of hazardous wastes under RCRA, and to the CERCLA list of hazardous substances, entities which need to respond to releases of hazardous substances, states that are required to adopt RCRA hazardous waste programs. Affected entities include:

Category	Affected entities
Industry	Generators of the listed waste solids and filter cartridges from the production of 2,4,6-tribromophenol; or the product 2,4,6-tribromophenol, or entities that treat, store, transport, or dispose of these wastes.
State, Local, Tribal Govt	State and Local Emergency Planning entities.
Federal Govt	National Response Center, and any Federal Agency that handles the listed waste or chemical.

This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be affected by this action. This table lists those entities that EPA now is aware potentially could be affected by this action. Other entities not listed in the table also could be affected. To determine whether your facility is regulated by this action, you should examine 40 CFR parts 260 and 261 carefully in concert with the amended

rules found at the end of this **Federal Register** document. If you have questions regarding the applicability of this action to a particular entity, consult the person listed in the preceding **FOR FURTHER INFORMATION CONTACT** section.

II. Legal Authority

These regulations are promulgated under the Solid Waste Disposal Act (SWDA), as amended by various other Acts over time. These statutes are commonly referred to as the Resource Conservation and Recovery Act (RCRA) and are codified at Volume 42 of the United States Code (U.S.C.), sections 6901 through 6992k (42 U.S.C. 6901–6992k).

Section 3001(a) of RCRA, 42 U.S.C. 6921(a), requires EPA to promulgate criteria for identifying characteristics of hazardous wastes and for listing hazardous wastes. Section 3001(b) of RCRA requires EPA to promulgate regulations, based on these criteria, identifying and listing hazardous wastes which shall be subject to the requirements of RCRA Subtitle C.

Hazardous waste is defined at section 1004(5) of RCRA, 42 U.S.C. 6903(5). There are two types of hazardous waste. First, hazardous wastes are those solid wastes which may cause or significantly contribute to an increase in mortality, serious irreversible illness, or incapacitating reversible illness. In addition, hazardous wastes are those solid wastes which may pose a substantial present or potential hazard to human health or the environment when improperly managed.

EPA's regulations establishing criteria for listing hazardous wastes are codified at volume 40 of the Code of Federal Regulations (CFR) at § 261.11 (40 CFR 261.11). Section 261.11 states three criteria for identifying characteristics and for listing wastes as hazardous.

First, wastes may be classified as ''characteristic'' wastes if they have the properties described at 40 CFR 261.20 which would cause them to be classified as having the characteristics of ignitability, corrosivity, reactivity and toxicity.

Second, wastes may be classified as acute hazardous wastes if they are fatal to humans at low doses, lethal in animal studies at particular doses designated in the regulation, or otherwise capable of causing or significantly contributing to an increase in serious illness.

Third, wastes may be listed as hazardous if they contain hazardous constituents identified in appendix VIII of 40 CFR part 261 and the Agency concludes, after considering eleven factors enumerated in § 261.11(a)(3), that the waste is capable of posing a substantial present or potential hazard to human health or the environment when improperly managed. Under § 261.11(a)(3), a substance is listed in appendix VIII if it has been ''shown in scientific studies'' to have toxic effects on life forms.

Wastes listed as hazardous are subject to federal requirements under RCRA for persons who generate, transport, treat, store or dispose of such waste. Facilities that must meet the hazard waste treatment, storage and disposal requirements, including the need to obtain permits to operate, are commonly referred to as RCRA Subtitle C or ''Subtitle C'' facilities. Subtitle C is Congress' original statutory designation for that part of RCRA that directs EPA to issue regulations for hazardous wastes as may be necessary to protect human health or the environment. Thus, facilities like incinerators or landfills that are required to comply with RCRA requirements for hazardous waste are referred to as Subtitle C incinerators or landfills.

Subtitle C is codified as Subchapter III of Chapter 82 (Solid Waste Disposal) of Volume 42 of the United States Code, 42 U.S.C. 6921 thru 6939e. EPA standards and procedural regulations implementing subtitle C are found generally at 40 CFR parts 260 through 272.

Section 3001(e)(2) of RCRA (42 U.S.C. 6921(e)(2)) requires EPA to determine whether to list, as hazardous, wastes generated by various chemical production processes, including the production of organobromines.

Solid wastes which are not hazardous wastes may be disposed of at facilities which are overseen by state and local governments. These are the so-called subtitle D facilities. Subtitle D is Congress' original statutory designation for that part of RCRA which deals with non-hazardous solid waste.

Subtitle D is codified as Subchapter IV of Chapter 82 (Solid Waste Disposal) of Volume 42 of the United States Code (42 U.S.C. 6941 thru 6949a). EPA regulations affecting subtitle D facilities are found generally at 40 CFR parts 240 thru 247, and 255 thru 258.

In response to the mandate on organobromine production wastes in RCRA section 3001(e)(2), the Agency undertook a two-year study of the industry and, eventually, listed several wastes from the production of ethylene dibromide (EDB) and methyl bromide.

The final rule listing wastes from the production of EDB was published in the **Federal Register** on February 13, 1986 (51 FR 5327). These wastes are listed in Title 40 of the Code of Federal Regulations § 261.32 (40 CFR 261.32) and are designated by EPA hazardous waste numbers K117, K118, and K136. The final rule listing wastes from methyl bromide production was published on October 6, 1989 (54 FR 41402). These wastes are listed at 40 CFR 261.32 and are designated by hazardous waste codes K131 and K132. Methyl bromide and ethylene dibromide are also on the Appendix VIII list of hazardous constituents.

In June of 1991, EPA entered into a proposed consent decree in a lawsuit filed by the Environmental Defense Fund, et al. (*EDF* v. *Reilly*, Civ. No. 89–0598 (D.D.C.)), in which the Agency agreed, among other things, to publish proposed and final determinations whether to list wastes from the production of the five other organobromine chemicals evaluated in this rulemaking.

Under a recently lodged proposed consent order in that case, the Agency is required to promulgate on or before April 15, 1998 a final decision on whether or not to list these wastes as hazardous. The Agency reserves the right to evaluate wastes from the production of other organobromine compounds in the future, if and when such an evaluation is deemed necessary.

III. Summary of the Proposed and Final Rules

A. Background Analysis

To provide a sound technical basis for this listing determination, EPA conducted a study of the organobromine chemicals industry in 1991 and 1992. Six firms were identified as currently manufacturing organobromine chemicals at eight facilities in the United States. The majority of organobromine chemicals are currently sold as flame retardants. Most are solid compounds that are incorporated into polymers, which are then used in a variety of products. Smaller volumes of organobromine chemicals are used as reagent chemicals and pharmaceutical intermediates. Under the authority of RCRA Section 3007, EPA sent questionnaires to these firms and four of them were selected for engineering site visits. These four facilities account for over 99 percent of total domestic production. Samples of process residuals were collected during the site visits to familiarize the Agency with the types of materials generated by the industry. Later in the study, record samples to be used as part of the technical basis to decide whether a listing rule is appropriate were collected at facilities of the two largest domestic producers. EPA published a proposed rule on the listing of organobromine

wastes in the **Federal Register** on May 11, 1994 (59 FR 24530). The Listing Background Document for this proposed listing determination contains a detailed description of the Agency's basis for proposing to list this waste stream, and for proposing not to list nine other waste streams; EPA proposed to defer action on one waste. The public version of this document, which does not contain confidential business information, can be copied at the RCRA public docket. See **ADDRESSES** section.

The third criterion described above for listing hazardous wastes in 40 CFR 261.11, is applicable to the listing of organobromine wastes. That is, wastes may be listed if they contain hazardous constituents identified in Appendix VIII of 40 CFR Part 261 and the Agency concludes the waste is capable of posing a substantial present or potential hazard to human health or the environment when improperly managed.

With respect to the other two criteria, the wastes under consideration here are not acutely hazardous. Further, ''characteristic'' wastes, in general, are not listed separately, since their classification depends upon whether, on a case-by-case basis, they qualify as wastes based on various tests described in the regulations. EPA notes that any of the organobromine wastes could be classified as ''characteristic'' wastes if they ''fail'' the applicable tests.

B. Summary of Proposed Rule

Consistent with its regulations, EPA, before proposing to list the organobromine production wastes determined whether there were present any Appendix VIII constituents and whether there was information on any other constituents of the waste that could lead to health or environmental concerns. The health effects data, along with other factors (generally related to exposure) required to be considered under 40 CFR 261.11(a)(3), were then evaluated to decide whether the wastes should be listed as hazardous wastes.

In this rulemaking EPA has considered all relevant factors for each waste stream. The critical factors, which vary depending on the individual waste stream, were identified in the rulemaking record for the proposal and are summarized at 59 FR 24536 to 24541. The record for this rule contains responses to all comments submitted on the relevant factors.

EPA proposed not to list as hazardous nine waste streams from the production of organobromine compounds. The Agency also proposed to defer action on the listing determination for one waste stream from the manufacture of tetrabromobisphenol A (TBBPA) because of inadequate information on the process. In the proposal the Agency stated, ''Based on comments received, including any data, EPA may choose, rather than deferring, to promulgate a final determination either to list or not to list tetrabromobisphenol A waste as a hazardous waste under RCRA'' (59 FR 24537).

EPA proposed to list as hazardous one waste stream from the production of 2,4,6-tribromophenol (2,4,6-TBP). The listing of this waste, as noted above, required consideration of whether an Appendix VIII constituent was present. While none of the constituents had been listed in Appendix VIII at the time of proposal, EPA did consider that the 2,4,6-tribromophenol present in the waste would likely qualify for Appendix VIII listing. Accordingly, along with the proposed hazardous waste listing, EPA proposed to include 2,4,6-tribromophenol in Appendix VIII.

The proposed addition to Appendix VIII is discussed at 59 FR 24531 and 24538. While EPA did not have a laboratory study directly showing that 2,4,6-tribromophenol has toxic effects on life forms, the Agency explored the use of structure-activity relationships to determine whether, nevertheless, there are other types of scientific studies that could indirectly show that this compound has toxic effects and, thereby, qualify for listing on Appendix VIII under 40 CFR 261.11(a)(3). Structure-activity relationships involve the use of health effects information for a compound with a chemical structure and properties very similar to those of the chemical of concern. The Agency determined that this technique could be used for 2,4,6-tribromophenol because the chemical behavior and mechanism of action for this compound is expected to be similar to its chlorinated analogue, 2,4,6-trichlorophenol.

After considering the data supporting the Appendix VIII listing determination and factors under 40 CFR 261.11(a)(3), EPA proposed to list as hazardous waste solids and filter cartridges from the production of 2,4,6-tribromophenol and designate it as K140. These waste solids consisted of floor sweepings and off-specification product from the production of 2,4,6-tribromophenol. EPA also proposed to add 2,4,6-tribromophenol to the list of commercial chemical products (as U408) that are hazardous wastes if discarded (40 CFR 261.33).

Under section 102(b) of CERCLA, all hazardous wastes newly listed under CERCLA have statutory reportable quantities (RQs) of one pound unless and until adjusted by regulation. Waste U408 is 2,4,6-tribromophenol, an individual hazardous substance. Based on its evaluation, the Agency proposed an adjusted RQ of 100 pounds for 2,4,6-tribromophenol.

The only hazardous constituent identified in the other waste proposed for listing, K140, is 2,4,6-tribromophenol. In accordance with the RQ adjustment methodology for hazardous waste streams, the RQ for K140 is being adjusted to 100 pounds based on the 100 pound RQ of its only hazardous constituent, 2,4,6-tribromophenol.

C. Additional Opportunities To Comment

In the original listing determination, EPA presumed that the plausible management scenario for the 2,4,6-tribromophenol waste solids was disposal in an unlined landfill. This was critical in the Agency's determining that the waste presented a substantial risk. However, comments on the rule by the only manufacturer of 2,4,6-tribromophenol showed that these wastes had been sent voluntarily, over a period of more than fifteen years, to a number of different Subtitle C landfills. Accordingly, EPA reevaluated the management scenario to comport with the actual Subtitle C disposal scenarios.

Since EPA's reexamination evaluated information not previously placed in the record, the Agency provided notice of this new information and its reevaluation in a letter dated September 3, 1997. This letter, sent to three commenters on the original proposal who were expected to have a direct interest in the listing of the particular waste, added additional information to the rulemaking record and explained the Agency's new rationale for listing the 2,4,6-tribromophenol waste solids.

EPA received comments from the three entities that received the notice letter. One commenter supported the decision to list 2,4,6-TBP production wastes, and two opposed the listing. The substance of the September 3 letter and EPA's response to the comments appears below in Unit IV.E. The Unit IV.E. deals with response to comments on the plausible mismanagement scenario for the 2,4,6-tribromophenol waste solids.

The commenter supporting the listing decision also argued that EPA underestimated the risks posed by disposal of the 2,4,6-TBP waste in a Subtitle C landfill, because EPA had ignored the presence of other toxic contaminants in the waste. The Agency reexamined the analytical data for the waste samples from the 2,4,6-tribromophenol production waste.

Based on that reexamination, EPA found that the waste contained another toxic constituent (ethylene dibromide) that appeared to further support the listing. EPA provided additional notice of this additional constituent to the interested party that is the sole generator of the waste in a letter dated January 14, 1998. The generator submitted comments on this second notice letter, and Unit IV.E also discusses the Agency's responses to these comments.

D. Final Rule

The final rule promulgated today is based on consideration of all comments submitted on the proposed rule, including those submitted in response to the reevaluation in the September 3 letter, and all relevant information available in the rulemaking record. Today's rule issues the final listing for 2,4,6-tribromophenol as a hazardous constituent in Appendix VIII of 40 CFR part 261, promulgates the listing of floor sweeping, off-specification product and spent filter media from the production of 2,4,6-tribromophenol as hazardous waste K140 (40 CFR 261.32) and lists the 2,4,6-tribromophenol commercial chemical product as a hazardous waste when discarded, with a waste code of U408 (40 CFR 261.33 (f)). These listings are based on the presence in the waste of 2,4,6-tribromophenol. EPA also has determined not to list any of the other wastes described in the proposed rule, including wastes from the production of tetrabromobisphenol A, on which the Agency had originally proposed to defer a final decision.

Also included in today's final rule, the Agency is adding 2,4,6-tribromophenol and K140 to the list of CERCLA hazardous substances in Table 302.4 of 40 CFR 302.4. CERCLA defines the term ''hazardous substance'' chiefly by reference to various Federal environmental statutes. For example, the term includes ''any hazardous waste having the characteristics identified under or listed pursuant to RCRA Section 3001.'' Thus, on the effective date of today's rulemaking, when 2,4,6-tribromophenol and K140 are added as RCRA hazardous wastes, these wastes automatically become CERCLA hazardous substances. In today's final rule, EPA also is adjusting the reportable quantities (RQs) for 2,4,6-tribromophenol (U408) and K140 to 100 pounds in Table 302.4 of 40 CFR part 302.

In the subsequent sections of today's notice, EPA responds to public comments received on the proposal and on the reevaluations and provides its reasons for changing the final rule from proposal or declining to make changes suggested by commenters. Table 1 summarizes the basis for the listing determinations.

TABLE 1.—BASIS FOR LISTING DETERMINATIONS

Product	Waste stream	Analysis	Decision
Dibromomethane	Filters	Very small volume (less than 1 kkg/yr) One producer.	No List.
	Wastewaters	Deep-well injected at site with approved no-migration petition (only one producer).	No List.
Ethyl Bromide	Filters	Very small volume stream (less than 1.5 kkg/yr)	No List.
	Wastewaters	Only constituent identified is ethanol at low concentration.	No List.
Tetrabromobisphenol A	Wastewaters	Stream is already listed as K131 for methyl bromide. Also contains 15,000 ppm tribromophenol.	Already listed waste.
Octabromodiphenyl oxide	Filter cake	Toluene and brominated dibenzofurans present at levels below concern. Assuming worst case for leachate, risk for the maximally exposed individual estimated to be below 10^{-6} for octabromodiphenyl oxide.	No list.
	Wastewaters	Major constituent of concern, brominated dibenzofurans, shows minimal risk; solubility of octabromodiphenyl oxide is very low; modeling of worst case for wastewaters showed risk below 10^{-6} for octabromodiphenyl oxide.	No list.
Decabromodiphenyl oxide.	Filter cake	The major constituent in waste (decabromodiphenyl oxide) could not be quantified. Assuming worst case for leachate, risk below 10^{-6} level because of very low solubility for this chemical.	No list.
	Wastewaters	The major constituent in waste (decabromodiphenyl oxide) could not be quantified. Assuming worst case for leachate, risk below 10^{-6} level because of very low solubility.	No list.
Tetrabromobisphenol A	Off-specification product	Tetrabromobisphenol A is of relatively low toxicity and has limited mobility. Levels of tribromophenol in leachate are below those for concern.	No list.
Tribromophenol	Wastewaters	Used structure activity relationship analysis for tribromophenol. Data collected indicate releases during deep-well injection are not likely to occur or would be of low risk. Tribromophenol not detected in groundwater at site.	No list.

TABLE 1.—BASIS FOR LISTING DETERMINATIONS—Continued

Product	Waste stream	Analysis	Decision
	Floor sweepings, off-specification product and spent filter media from the production of 2,4,6-tribromophenol; discarded commercial chemical product.	Used structure activity relationship analysis to show carcinogenicity of tribromophenol. High concentration of chemical in solids and TCLP leachate. Mobile in leachate and would present high risk if released from landfill, even a Subtitle C landfill.	List as hazardous waste (K140) and commercial chemical product (U408).

IV. Response to Comments

Seven parties submitted comments on the proposed rulemaking. Comments were received from two companies that manufacture bromine products, one trade association representing industrial chemical producers, two manufacturers of chemical products other than bromines, one company involved in the treatment and destruction of hazardous and toxic wastes, and one environmental interest group. The major issue addressed by commenters to the original proposal was the Agency's use of structure-activity relationship (SAR) analysis to support a listing determination. The major issue addressed with respect to the September 3 reevaluation was on EPA's use of Subtitle C landfills as a mismanagement scenario for modeling purposes and the assessment of risk relating to Subtitle C landfills. EPA also discusses the January 14, 1998 reevaluation of additional constituents found in the 2,4,6-TBP production wastes. More detailed summaries of the comments and complete Agency responses are provided in the Public Comment Summary & Response Document and the Supplementary Comment Summary & Response Document prepared for comments on the September 3, 1997, and January 14, 1998 letters. These documents are included as appendices to the Listing Background Document supporting today's rule (available in the public docket—see **ADDRESSES** section).

Before addressing the public comments in detail, some of the basic concepts related to the use of SAR analysis for this rulemaking are addressed here.

A. Development of Structure-Activity Relationship (SAR) Analyses

1. Principles Related to SAR Analyses

In the preamble to the proposed rule, EPA briefly discussed the basis for using SAR analyses for regulatory purposes. The scientific process used in SAR analysis also was presented in *Development of Provisional Human Health Reference Value for 2,4,6-Tribromophenol* and the Listing Background Document for the proposed listing (henceforth collectively termed ''the Listing Background Document.'') SAR analyses are based on the observation that structurally similar compounds have similar chemical properties. Thus, they may be absorbed, distributed, and metabolized in similar ways, and may have similar mechanisms of action and toxic properties. If two compounds or a group of compounds are chemically related, toxicologic data for one or more compounds in the group can be used to predict the toxicologic effects of other compounds in the group. The more closely related two compounds are, the more similar their toxic properties are likely to be.

The validity of SAR analysis is related to the degree of similarity of the candidate (the compound for which adequate toxicity information are lacking) and the surrogate (the chemical used as the basis for the analysis), and the amount of information available on how any differences between the two chemicals affects their activity. Because chemical similarity plays a critical role in SAR analysis, this discussion begins with a brief primer on chemical structure.

The periodic table of the elements arranges elements in order of increasing atomic number, in a manner that shows their chemical relatedness. Elements that are in the same column on the periodic table have the same number of electrons in their outer shell, and are chemically similar. Elements that lack one electron in their outer shell are in the same column, and are called halogens. This group includes fluorine, chlorine, bromine, and iodine, which react in chemically similar ways. Bromine and chlorine are the most similar halogens; fluorine binds to carbon much more strongly than do chlorine or bromine, while the reactivity of iodine is also influenced by its larger size. When chemical groups replace the hydrogen atoms in organic (carbon-containing) molecules, the molecules are called ''substituted.'' The chemical groups that do the substituting are called ''substituents,'' and play a large role in determining the chemical reactivity of the compound.

Figure 1 compares the structures of the two compounds studied in the SAR analysis, and shows the structure of the parent compound, phenol. 2,4,6-Trichlorophenol (TCP) is phenol with chlorine substitution at the 2-, 4-, and 6-positions. Similarly, 2,4,6-tribromophenol (TBP) is phenol with bromine substitution at the 2-, 4-, and 6-positions. Thus, the two compounds are phenols substituted with closely related halogens at the same positions. Note that both the position and number of substitutions are the same in the two compounds. If the two compounds were substituted by different numbers of halogen atoms, or at different positions from each other, they would be expected to be less similar chemically and physically. This is because both the type and location of the substitution contribute to the electronic, steric, and other attributes of the molecule.[1]

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[1] Waser J., N. Trueblood, and C. M. Knobler. 1976. Chem One. New York, NY: McGraw-Hill pp. 25–29.

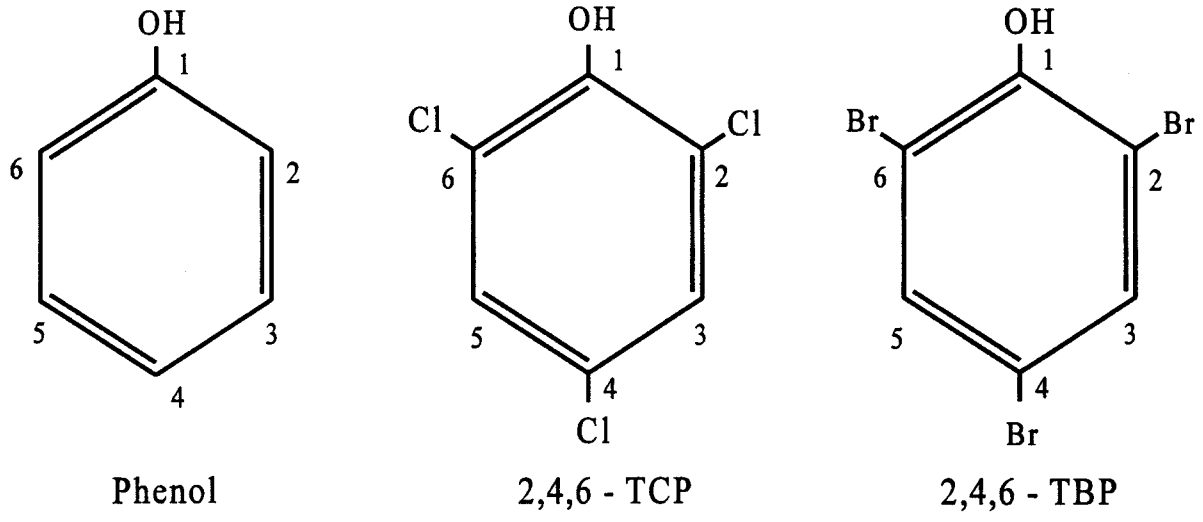

Figure 1 - Structures of 2,4,6 - TCP, 2,4,6 - TBP, and the parent compound, phenol.

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2. Structure-Activity Relationship Analysis

In the proposed rule, EPA developed a Quantitative SAR (QSAR) analysis for 2,4,6-TBP using 2,4,6-TCP as the surrogate, and attempting to adjust the cancer slope factor based on the closely-related electronic properties of bromine and chlorine. However, EPA received a number of comments stating that this analysis was too oversimplified to be reliable. In particular, commenters stated that additional parameters should be used in such an analysis. It was suggested that data on hydrophobicity (a description of the degree to which a compound repels water) and steric effects be incorporated into the analysis. Information on the hydrophobicity of a molecule is relevant to understanding how a molecule distributes in the body (e.g., fatty tissues versus blood), whether it accumulates in the fat, and the ease or difficulty with which the molecule may move across cell membranes to its site of action. This attribute of a molecule is often expressed as the octanol-water partition coefficient, which quantitatively indicates the degree to which the compound partitions to either water or lipid materials. The water solubility of a molecule, i.e., the amount that will dissolve in pure water, also influences the octanol-water partition coefficient. Steric (spatial) effects, which are caused by the different orientation of atoms in space relative to each other, are important because they provide information on whether the molecule's size and shape allow it to interact with receptors in biological systems, such as enzymes, hormones, and genetic material.

EPA has re-evaluated the SAR analysis in light of these comments, and agrees that additional parameters could have been considered; however, available data are insufficient to adequately account for these additional parameters. Despite the lack of adequate information to evaluate all parameters affecting the relative toxicity of 2,4,6-TCP and 2,4,6-TBP, the Agency believes that these compounds are so similar that it is appropriate to use the 2,4,6-TCP slope factor as an estimated slope factor for 2,4,6-TBP. Many of the toxicological similarities are discussed further in the following sections. In addition, the very factors suggested by comments for consideration, as noted above, provide a further basis for showing how these two chemicals are closely related. For example, when the Agency adjusted the slope factor for electronic effects, the change was less than 1%. Also, a key measure of hydrophobicity, the log of the octanol-water partition coefficients (log K_{ow}), is similar for these two chemicals; the values of log K_{ow} are 4.23 for 2,4,6-TBP and 3.69 for 2,4,6-TCP. All of these factors lead the Agency to conclude that 2,4,6–TCP can be used as a direct surrogate for 2,4,6-TBP.

3. 2,4,6-TBP Slope Factor and Risk Estimate

Although EPA is using the 2,4,6-TCP cancer slope factor as a default for 2,4,6-TBP, the Agency examined the impact of modifying the cancer slope factor in response to public and favorable peer reviewer comment, to account for the difference in molecular weight of 2,4,6-TCP and 2,4,6-TBP.

The molecular weight of a compound is the weight in grams of a specified number (a mole) of molecules of that compound, and is used to convert between the weight of a sample of a compound and a measure of the number of molecules in that sample.[2] Because a bromine atom is heavier than a chlorine atom, one gram of 2,4,6-TBP has fewer molecules in it than does a gram of 2,4,6-TCP, and therefore a gram of 2,4,6-TBP would be less potent than a gram of 2,4,6-TCP, all other things being equal. This is because chemically-induced cancer results from molecules binding to DNA or to another molecule in the body,[3] and, therefore, a compound's cancer potency is related most directly to the number of molecules administered (rather than the weight alone). As a result, the 2,4,6-TCP slope factor may be multiplied by the

[2] Waser, J., K.N. Trueblood, and C.M. Knobler. 1976. Chem One. New York, NY: McGraw-Hill pp. 25–29.

[3] William, G.M. and J.H. Weisburger. 1991. Chemical carcinogenesis. In: Amdur, M.O., J. Doull, and C.D. Klaassen. Casarett and Doull's Toxicology: The Basic Science of Poisons, 4th ed. New York, NY: Pergamon Press. pp. 127–200.

ratio of the 2,4,6-TCP molecular weight (197) to the 2,4,6-TBP molecular weight (331). Adjusting for molecular weight would result in a default value for the 2,4,6-TBP CSF of 6.5×10^{-3} (mg/kg/day)$^{-1}$, compared with 1.1×10^{-2} (mg/kg/day)$^{-1}$ for 2,4,6-TCP. If this slope factor were applied in a risk analysis in the preamble to the proposed rule, it would have little effect on results. Using the corrected cancer risk factor, the estimated individual risk from exposure to 2,4,6-TBP in groundwater would be 4.2×10^{-4} and 1.2×10^{-5} for the off-specification product and the filter cartridges, respectively, compared with risks of 7×10^{-4} and 2×10^{-5} calculated without the correction in the proposed rule. These changes are minor and would not change the Agency's decision, i.e., the risks posed by these wastes warrant control through listing.

4. Notice and Comment for the Use of an SAR

To check its analysis, EPA subjected it to both internal Agency review and external peer review. External peer review was solicited on a draft of the Public Comment Summary & Response Document. As background, the peer reviewers were provided the risk assessment section of the Listing Background Document for the proposal and the public comments on that part of the proposal. Three individuals with experience in SAR analyses were asked: (1) Is the SAR presented for 2,4,6-TBP sufficiently rigorous to be scientifically defensible and could the reviewers identify major areas of uncertainty with the analysis? (2) Is it appropriate for the Agency to conclude that 2,4,6-TCP and 2,4,6-TBP are similar and is 2,4,6-TCP an appropriate surrogate for 2,4,6-TBP? (3) Was all of the available information about the mechanism of toxicity for 2,4,6-TBP considered? (4) Is there any genetic toxicity data that could be included in the analysis? and (5) Could any additional information be provided to strengthen the Agency's conclusions?

All three peer reviewers agreed that a SAR analysis was appropriate for this rule. Additionally, the peer reviewers agreed that 2,4,6-TCP is the most appropriate surrogate for 2,4,6-TBP, and that it is appropriate to use the cancer potency factor for 2,4,6-TCP as a default value for 2,4,6-TBP. (One commenter also suggested that the potency factors be adjusted for the differences in molecular weight. This confirmed EPA's analysis. EPA has addressed the substantive technical issues raised by the commenters in a detailed memorandum to the file, which is in the docket.

B. Why the SAR Analysis of 2,4,6-TCP and 2,4,6-TBP Constitutes a Scientific Study That Shows Toxic Effects

1. Why This Is a Scientific Study

Although EPA usually uses controlled animal studies or epidemiological studies of human exposure as the basis for its regulations, 40 CFR 261.11(a)(3) does not preclude the use of other types of scientific studies. Moreover, EPA's interpretation of its own regulations to include SAR analysis as a scientific study is entitled to substantial deference.

SAR analysis is interpreted by EPA to be a scientific study. The scientific principles on which SAR analyses are based were developed from many years of chemical review and analysis and, more recently, toxicity studies on related compounds. For example, the SAR analysis for 2,4,6-BP rests not only on the chemical similarity of 2,4,6-TBP and 2,4,6-TCP, but also on toxicity studies showing structurally similar brominated and chlorinated compounds to be related in terms of whether they are carcinogens. These studies are discussed in more detail in Section III.C.3. of this preamble.

EPA has, in the past, relied on scientific studies in the form of sophisticated statistical analyses that are one step removed from a laboratory study much in the same way SAR analysis is. In addition, EPA has used meta-analyses, a statistical tool for combining the data from multiple studies, in several risk assessments, including the risk assessment for environmental tobacco smoke.[4]

Furthermore, the controlled animal studies performed on 2,4,6-TCP are indisputably scientific studies and these studies, with the aid of SAR analysis, show that 2,4,6-TBP is a potential carcinogen, as discussed below.

2. Does It ''Show'' Toxic Effects?

Section 40 CFR 260.11(a)(3) does not specify that EPA must conduct laboratory studies that directly implicate the precise chemical. In this case, the finding that 2,4,6-TCP is carcinogenic in animal studies, together with the SAR analysis demonstrating the close chemical similarity of 2,4,6-TCP and 2,4,6-TBP, shows that 2,4,6-TBP is expected to be carcinogenic because they provide a sound basis for EPA to infer the toxic effects of 2, 4, 6–TBP from the toxic effects demonstrated for 2,4,6-TCP, as noted below.

It also is important to recognize that all scientific studies that actually measure toxic effects in a laboratory have some level of uncertainty when used as the basis for regulatory action. Uncertainty is caused by:

a. Extrapolation from animal models to humans;

b. Variable responses among animals within a study;

c. Statistical variability of results between different studies (*i.e.*, if the experiment were to be repeated, one would not necessarily observe exactly the same tumor incidences);

d. Extrapolation from high laboratory doses to low actual human exposures; and

e. Extrapolation to humans from studies in animals that live for a fraction of the human life span.

Uncertainty in carcinogen assessment is discussed in detail in EPA's Proposed Guidelines for Carcinogen Risk Assessment, and articles cited therein.[5]

From a scientific perspective it is impossible to ''show'' anything without some uncertainty. Therefore, EPA interprets the language of the regulation as a requirement to ''show'' with a scientifically reasonable level of uncertainty. In this case, the level of uncertainty associated with this particular SAR is reasonable for the two chemicals being compared in this rulemaking because:

- 2,4,6-TBP and 2,4,6-TCP are both tri-halogenated phenols with substitutions at the same positions;
- The physical and chemical properties, such as the octanol-water partition coefficient and the water solubility, of the compounds are similar;
- Available genetic toxicity data show consistent results for 2,4,6-TCP and 2,4,6-TBP; and
- Examples in the literature and in Section C.3 of this preamble (e.g., 1,2-dibromoethane and 1,2-dichloroethane) support the idea that if a chlorinated compound is a carcinogen, the compound formed by substitution of a chlorine with bromine will still be a carcinogen.

Some commenters provided examples of chemical pairs where SAR analysis would be inappropriate, such as benzene/toluene and methanol/ethanol (see Figure 2 and the accompanying text for a further discussion of these chemicals). EPA agrees that for these pairs, a SAR analysis should not be used for regulatory purposes. However, the data support a conclusion that the structural and chemical similarities

[4] USEPA. 1992. Respiratory health effects of passive smoking: Lung cancer and other disorders. ORD, USEPA, Washington DC, 20460. EPA/600/6–90/006F.

[5] Proposed Guidelines for Carcinogen Risk Assessment. **Federal Register** 61(79): 17960–18011, Tuesday, April 23, 1996.

between 2,4,6-TBP and 2,4,6-TCP are much stronger than those in the pairs in Figure 2, and thus the uncertainty for the current rulemaking is much less than the uncertainty/error would be for a SAR analysis for any of the chemical pairs in the counter example. EPA has determined that these data support the regulation of 2,4,6-TBP under RCRA, because they reasonably support a conclusion that 2,4,6-TBP has a level of carcinogenicity comparable to that of 2,4,6-TCP, a known carcinogen.

C. Issues Regarding the Use of Structure-Activity Relationship (SAR) Analysis

1. Use of SARs to Support Listing Constituents in Appendix VIII

All seven commenters addressed the use of structure-activity relationships (QSARs) in this rulemaking. Two commenters stated that SAR analysis cannot be used to support listing a constituent in Appendix VIII, citing the language of 40 CFR 261.11(a)(3), which states that constituents may be listed in Appendix VIII ''only if they have been shown in scientific studies to have toxic, carcinogenic, mutagenic, or teratogenic effects on humans or other life forms.'' The commenters stated that SARs are not equivalent to empirical data, do not represent ''scientific studies'' and do not show that 2,4,6-tribromophenol has toxic effects on life forms. Therefore, the commenters stated that information on structure-activity relationships cannot be used to list constituents in Appendix VIII and, consequently, may not be used to list hazardous wastes under EPA's regulation.

EPA disagrees with the commenters. The commenters interpret ''shown in scientific studies'' to mean directly shown in laboratory studies that pertain to the constituent in question. EPA does not interpret the phrase so narrowly. SAR analysis represents a valid scientific approach for assessing toxicity. As noted above, EPA has concluded that there is sufficient similarity between 2,4,6-TBP and 2,4,6-TCP to justify using a SAR analysis for this rulemaking.

EPA's use of SAR analysis in regulatory programs is not unprecedented. EPA has used SAR analysis for assessing the hazards of chemicals to human health and the environment for 15 years in the New Chemicals Program under section 5 of TSCA. The process of using SAR takes into account the similarity of the surrogate chemicals with regard not only to chemical structure and functional reactive groups, but physical/chemical properties as well (*e.g.*, water solubility and octanol/water partition coefficients). Physical/chemical properties such as water solubility and octanol/water partition coefficients are important because they are related to how a compound is absorbed and distributed in the body. In particular, the octanol/water partition coefficient is a measure of a compound's relative solubility in octanol and water, and is related to how well a compound dissolves in fat versus the blood. The octanol/water partition coefficient describes a compound's hydrophobicity, which was mentioned in Section III.A.2. of this preamble. In cases where direct chemical-specific toxicity data are lacking and where appropriate analogue chemicals exist to allow valid comparisons to be drawn, SAR analysis represents a scientifically valid approach for assessing the potential toxicity of a chemical. As discussed in Section III.B. of this preamble, EPA regards SAR as ''scientific studies'' and believes that the SAR analysis conducted for this rulemaking does ''show'' toxic effects of 2,4,6-TBP sufficiently to support its listing in Appendix VIII.

2. Use of SARs Is a Departure From Agency Policy

Two commenters stated that the use of SAR analysis in this rulemaking represents a departure from Agency policy. The commenters added that the use of SARs in making hazardous waste determinations establishes a new criterion for identifying hazardous wastes and the public was not given sufficient opportunity to comment on this new criterion.

The Agency agrees that this listing represents a new element in the Agency's hazardous waste listing determination policy in that this is the first listing to use SAR as a basis for listing a waste stream as hazardous. However, the SAR analysis is consistent with 40 CFR 260.11(a)(3) of EPA's regulations, since EPA's decision to list a constituent in Appendix VIII makes use of a scientific study that shows the toxic effects of that constituent. There has been adequate opportunity to comment on this issue, since the Agency explained in the proposal that it was interpreting 40 CFR 260.11(a)(3) to allow use of structure-activity relationships. Indeed, the bulk of comments on the proposed rule dealt with the highly technical issue of whether SAR could be used to list hazardous wastes. This is a strong indication that commenters understood that they were being given the opportunity to express their views on this matter. EPA takes the position that, depending on the strength of the evidence, SAR-based listings are appropriate to use for the hazardous waste listings program. SAR is an available tool that can solve a problem the Agency faces in the case: Making risk-based regulatory decisions (such as listing determinations) in the absence of Agency-verified or provisional health benchmarks (*e.g.*, reference dose (RfD), reference concentration (RfC), or cancer slope factor (CSF).

As described in further detail in other places in this preamble, the evidence in this case rests on four points: 2,4,6-TCP is a close structural analogue to 2,4,6-TBP; the physical and chemical properties of the compounds are similar; the available genetic toxicity data also show consistent results for 2,4,6-TCP and 2,4,6-TBP; and examples in the literature support the idea that if a chlorinated compound is a carcinogen, the compound formed by substitution of a chlorine with bromine will still be a carcinogen.

SAR is one approach that was designed specifically to address this problem. The use of SAR is particularly compelling in the organobromines listing determination. The constituent 2,4,6-TBP has an extremely close structural analogue (2,4,6-TCP) for which direct toxicity data are available. Because of this, the Agency specifically solicited comment on the policy implications of the use of QSAR/SAR in the organobromines proposal.

The Agency has concluded that SAR currently is a viable approach for making a human health impact determination for the waste stream of concern. The strong technical argument involved, that the principal toxicant of concern, 2,4,6-TBP, is a highly similar analogue of 2,4,6-TCP, makes this listing the appropriate place to use SAR. It is important to note, however, that the determination to list 2,4,6-TBP-containing residuals as hazardous wastes is *not* based solely on the SAR analysis for 2,4,6-TBP. Other factors were included in the risk assessment, including the concentrations of 2,4,6-TBP in the waste, the volumes of waste generated, the mobility of the 2,4,6-TBP in leachate tests of the waste, plausible mismanagement scenarios, and potential receptors.

3. Validity of SAR Analysis in Supporting the Hazardous Waste Listing Determination for 2,4,6-TBP Production Wastes

All seven commenters addressed the general validity of the SAR analysis employed in this rulemaking. One commenter supported the Agency's use

of SARs and the inference that 2,4,6-TBP and 2,4,6-TCP are similar, but the other six commenters raised scientific and procedural concerns related to the use of SAR analysis to support a listing determination. Some of the comments were specific to the SAR analysis in the proposed rule. Specifically, two commenters objected to the analysis being based on electronic effects alone, instead of also considering hydrophobic and steric effects. Other comments addressed the general aspects of the analysis, *i.e.*, the appropriateness of 2,4,6-TCP as a surrogate for 2,4,6-TBP. In light of the quantitative uncertainties raised and other issues, the Agency believes that a SAR analysis does show that 2,4,6-TCP is an appropriate surrogate for 2,4,6-TBP, based on their high degree of structural similarity, *i.e.*, both are tri-substituted phenols with the closely-related halogens chlorine (2,4,6-TCP) or bromine (2,4,6-TBP) located at the 2-, 4-, 6-positions (see Section A1. for a more detailed discussion of the structural similarity between 2,4,6-TBP and 2,4,6-TCP).

As mentioned in Section III.A.3., the Agency is adopting one quantitative manipulation suggested by both a commenter and a peer reviewer. They noted that the differing molecular weights of the two compounds should be taken into account in the slope factor projection; this change has been adopted. When making this adjustment, however, the Agency found that the change would not exert a significant change in the risk results (*i.e.*, a 40% decrease in risk). Even if EPA made the change, the risk would still warrant listing.

As part of the support for SAR analysis, this discussion summarizes the available data related to the carcinogenic activity of 2,4,6-TCP and the genetic toxicity of 2,4,6-TCP and 2,4,6-TBP. 2,4,6-TCP carcinogenicity was tested in mice and rats. Based on the results of this study, 2,4,6-TCP is classified as a probable human carcinogen (B2), and the CSF for 2,4,6-TCP was calculated based on leukemia in male rats. No long-term animal studies that could detect cancer have been conducted with 2,4,6-TBP.

Results from short-term genetic toxicity studies, such as those described in the following paragraphs, provide information on whether the compound of interest interacts with DNA and causes mutations or other DNA damage, such as chromosome aberrations. These data are used to predict whether a compound is likely to be carcinogenic, and to help interpret results of cancer assays in animals. A variety of different genetic toxicity tests commonly are used. Because no single test can detect all types of damage, a battery of tests is necessary to assess completely a compound's potential to cause DNA damage. Findings in mammalian cells generally are considered more relevant than findings in bacterial cells. For 2,4,6-TCP, genetic toxicity studies appear to indicate that 2,4,6-TCP is positive in mammalian cell gene mutation assays, and negative in a bacterial (*Salmonella typhimurium*) mutation assay and in a mammalian cell chromosome aberration assay. Genetic toxicity data for 2,4,6-TBP are limited to a negative result in a *S. typhimurium* gene mutation assay.[6] Although this single negative result might appear to predict that 2,4,6-TBP is not carcinogenic, 2,4,6-TCP also produced negative results in this bacterial assay,[7] but is carcinogenic in rats. Therefore, the *S. typhimurium* gene mutation assay does not appear to accurately predict whether this class of compounds is carcinogenic.

One commenter believed that the analysis should have compared 2,4,6-TBP to an entire class of compounds rather than to a single chemical compound. The Agency believes that comparison with a single compound is acceptable for SAR analysis in cases such as this, when the structural similarities between the two compounds are so strong. Comparisons across multiple chemicals are needed for larger structural differences. This commenter also stated that the QSAR/SAR analysis disregarded documented differences between the carcinogenicity of chlorinated and brominated analogues. For example, the commenter noted differences in the species and tissue (*e.g.*, kidney or liver) in which tumors develop following administration of trihalomethanes ranging from chloroform ($CHCl_3$) to bromoform ($CHBr_3$). The compounds in the series represent a series of replacements of chlorine atoms by bromine atoms (i.e., 3 chlorines; 2 chlorines and 1 bromine; etc.).

Because the trihalomethanes are such small molecules, the three halogen atoms constitute a relatively large percentage of the total volume of the molecule. Thus, substituting bromine for chlorine would be expected to have a larger effect than the same substitution in the large 2,4,6-TCP/2,4,6-TBP molecules. This difference in size may explain the observed differences in target organs among the trihalomethanes. An important point to note is that all four trihalomethanes are carcinogens, regardless of the target tissue.

Regarding the issue of the appropriateness of SAR analyses based on analogues in which a chlorine is substituted by a bromine, the Agency notes that there are additional well-studied examples in which substitution of a chlorine by a bromine has resulted in retention of carcinogenic activity. For example, both 1,2-dichloroethane (ethylene dichloride)[8] and 1,2-dibromoethane (ethylene dibromide)[9] are multi-target carcinogens, causing tumors in the lung, the forestomach, the circulatory system, and the mammary gland. The Agency recognizes that examples of bromine/chlorine substitutions in which both the chlorinated analogue and the brominated analogue are carcinogens are not sufficient to show that such substitutions in general will not change a carcinogen into a noncarcinogen. However, based on these examples and in light of the carcinogenicity of 2,4,6-TCP in animal testing, it is plausible to conclude that 2,4,6-TBP is a potential carcinogen. (For a more detailed discussion of many of the scientific bases underlying SAR and the rationale behind the selection of cancer as the endpoint for human exposure, see the Response to Public Comment Document for this rulemaking, in the public docket.)

One commenter expressed concerns that the use of SAR analyses to make predictions of the expected types of toxicity produced by a compound can result in erroneous predictions. The commenter illustrated the point by providing several cases (e.g., benzene/toluene, methanol/ethanol, methyl n-butyl ketone/methyl isobutyl ketone (MnBK/MIBK)) in which predictive errors would occur based on SAR analysis performed with structurally similar chemicals. The Agency recognizes the limitations to SAR

[6] Zieger, E., B. Anderson, S. Halworth, T. Lawlor, K. Mortelmans, and W. Speck. 1987. Salmonella mutagenicity tests. III. Results from the testing of 225 chemicals. Environ Mutagen 9 (Suppl. 9) 1–109. As cited in Docket #F–94–OBLP–S0013.

[7] Haworth, S., T. Lawlor, K. Mortelmans, W. Speck, and E. Zeiger. 1983. Salmonella mutagenicity test result for 250 chemicals. Environ Mutagen Suppl 1:3–142.

Rasanen, L., M. L. Hattula, and A. U. Arstila. 1977. The mutagenicity of MCPA and its soil metabolities, chlorinated phenols, catechols and some widley used slimicides in Finland. Bull Environ Contam Toxicol 18:565–571.

[8] NCI. 1978. Bioassay of 1,2-dichloroethane for possible carcinogenicity. National Cancer Institute, Bethesda Maryland. NCI–CG–TR No. 66; DHEW/PUB/NIH–78–1361.

[9] NTP. 1982. Carcinogenesis bioassay of 1,2-dibromoethane for possible carcinogenicity F344 rats and $B6C3F_1$ mice. U.S. National Toxicology Program, Research Triangle Park, North Carolina. NTP–TR No. 210; NIH/PUB 87–1766.

analysis and agrees that the choice of surrogate needs to carefully take into account the degree of similarity between the chemical of interest (the ''candidate'') and the surrogate (from which predictions are made). The structural and chemical similarities between 2,4,6-TCP and 2,4,6-TBP are greater than those in the pairs cited by the commenter. Both 2,4,6-TBP and 2,4,6-TCP consist of a phenol molecule with halogen substitutions at the 2-, 4-, and 6-positions, and differ only in the identity of the halogen. As shown in Figure 2, the differences in the pairs listed by the commenter are much larger. The pairs cited by the commenter differ in having/not having a substituent group (benzene/toluene), or are positional isomers (1-/2-naphthylamine), homologues (methanol/ethanol, n-hexane/n-heptane), or structural isomers (MnBK/MIBK). These differences in the cited pairs have greater potential to change the chemical properties of the molecule. For example, the addition of the methyl group in the benzene/toluene pair changes the way that the molecule is converted to other molecules and removed from the body. Toluene is converted (metabolized) to compounds with low toxicity (*e.g.*, benzoic acid) that are dissolved easily in water and removed from the body. Benzene's structure does not allow the use of this pathway for removing the chemical. Instead, benzene is converted and removed via a pathway that creates cancer-producing compounds.[10]

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[10] Andrews, L.S. and R. Snyder. 1991. Toxic effects of solvents and vapors. In: Amdur, M.O., J. Doull, and C.D. Klaassen. Casarett and Doull's Toxicology: The Basic Science of Poisons, 4th ed. New York, NY: Pergamon Press. pp. 681–722.

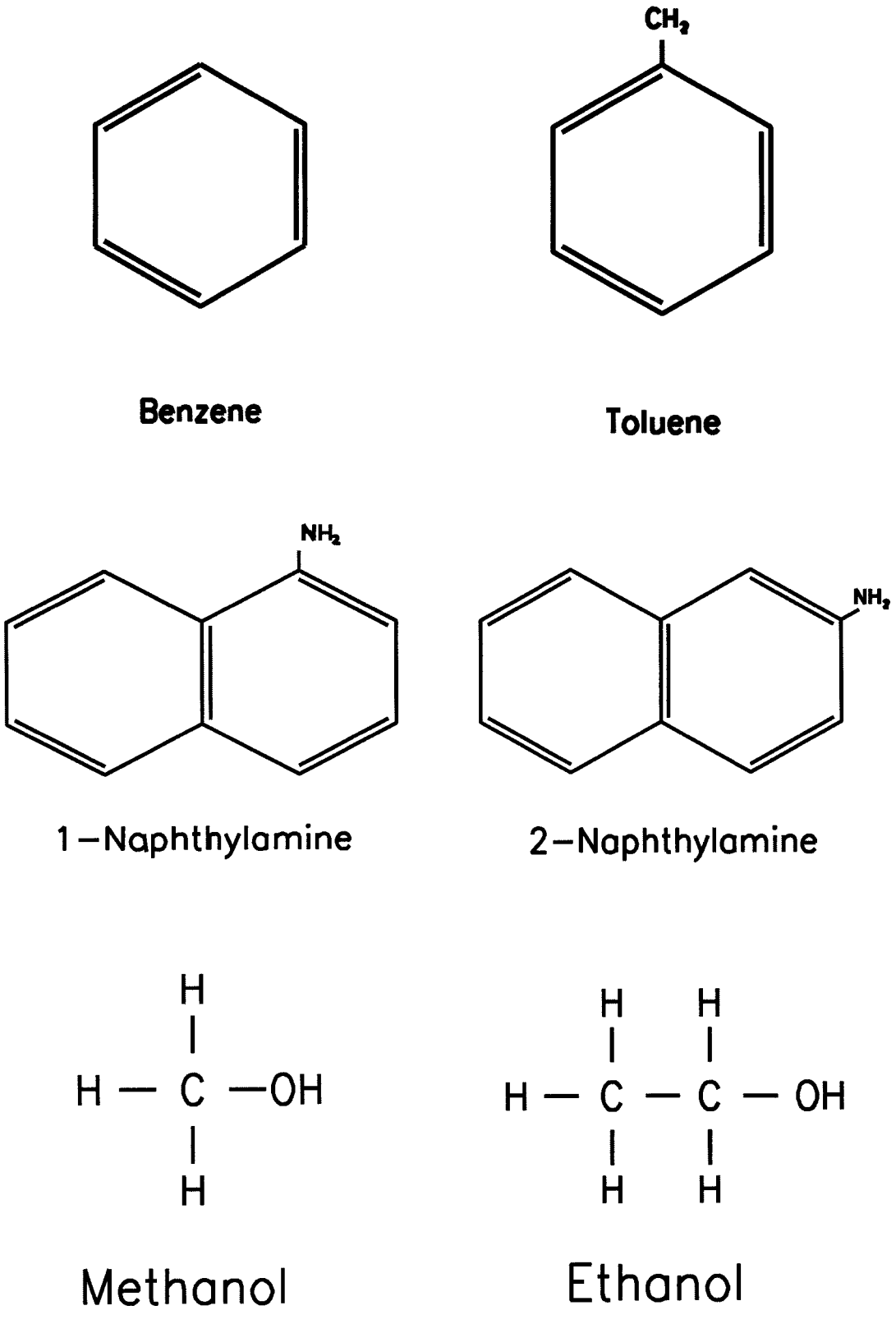

Figure 2. SAR pairs discussed by commenter

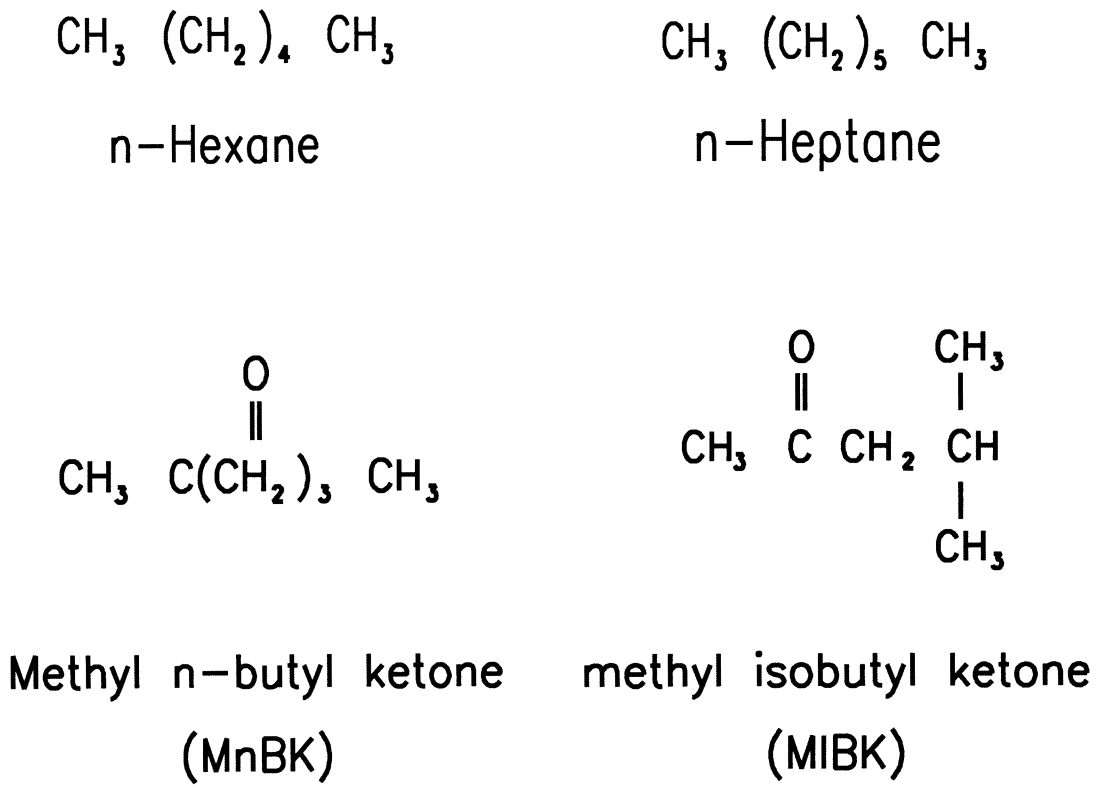

Figure 2 (con't). SAR pairs discussed by commenter

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Thus, the structural similarities between 2,4,6-TCP and 2,4,6-TBP are greater than those between pairs of chemicals cited by a commenter in a counter-example. As described in the Listing Background Document and the Response to Public Comment Document, the physical properties of the compounds are also similar, with similar octanol/water partition coefficients and solubility in the same solvents. The available genetic toxicity data show consistent results for 2,4,6-TCP and 2,4,6-TBP, although data for the latter compound are quite limited. Finally, examples in the literature support the idea that if a chlorinated compound is a carcinogen, the compound formed by substitution of a chlorine with bromine still will be a carcinogen. Based on this line of reasoning, the Agency believes that a SAR is appropriate in this case, and the very strong chemical similarities between 2,4,6-TCP and 2,4,6-TBP justify the use of the cancer slope factor for 2,4,6-TCP as a default value for 2,4,6-TBP.

Two commenters expressed reservations regarding the use of QSAR/SAR analysis to support listing determinations, but outlined conditions under which the use of SARs may be acceptable. Both of these commenters recommended that the Agency require some level of peer review of SAR results as a standard procedure, including both internal reviews by Agency senior scientists and external peer reviews. EPA is cognizant of the novelty of the use of SAR analysis for this hazardous waste determination and, therefore, has subjected its analysis to both internal Agency review and external peer review, as described in Section III.A.4.

4. Types of Data Appropriate to Support or Refute SAR Predictions

Five commenters responded to the Agency's request for information on the types of data appropriate in supporting or refuting SAR results. Three commenters stated that actual data should be used to confirm or refute SAR predictions and that empirical evidence should take precedence over modeling predictions. One commenter added that the Agency should simplify delisting procedures for sole-constituent wastes that were listed based on SAR analysis such that if actual data become available that refute the SAR conclusions, the Agency could delist the waste. EPA appreciates the commenters' response to its request for information on the types of data appropriate for supporting or refuting SAR analyses. If toxicity data for 2,4,6-TBP become available at some point in the future and these data refute the results of the Agency's SAR analysis for this rulemaking, EPA could take appropriate action at that time to revisit the listing investigation for 2,4,6-TBP production wastes.

D. Addition of Constituent to Appendix VIII

Two commenters stated that EPA cannot simultaneously propose to list a constituent in Appendix VIII and propose to list a waste as hazardous because it contains that constituent. The commenters contended that this approach is illegal and violates the procedures established in 40 CFR 261.11(a)(3), which require the Agency to list a constituent in Appendix VIII based on the results of ''scientific studies'' demonstrating that the substance has toxic or other adverse effects. Following the listing of a constituent in Appendix VIII, the Agency may use that constituent to justify a hazardous waste listing. Therefore, they reasoned that EPA may not proceed with listing the 2,4,6-tribromophenol production wastes because the hazardous constituent (2,4,6-tribromophenol) was proposed for inclusion in Appendix VIII simultaneously with the proposed hazardous waste listing.

EPA disagrees and finds no basis in the regulation to support this contention. Furthermore, this practice is long-standing. Other simultaneous listings are found at 59 FR 24530 (May 11, 1994), 59 FR 458 (Jan. 4, 1994), 54 FR 50968 (Dec. 11, 1989), and 51 FR 6537 (Feb. 25, 1986).

The plain language of 40 CFR 261.11(a)(3) provides that a waste shall be listed if it contains an Appendix VIII constituent *and* the Administrator concludes it poses a hazard after considering the eleven factors cited in the regulation. Neither the August 1986 preamble text to which the commenter makes reference nor the regulatory language of 40 CFR 261.11(a)(3) suggest that a sequential determination is required. In the August 1986 rule, the Agency stated that the significance of placing a constituent in Appendix VIII includes the fact that the constituent then can be cited as a basis for listing toxic wastes (51 FR 28296, August 6, 1986). Nothing in this statement suggests that an Appendix VIII listing must be proposed for public comment and finalized separately from an associated hazardous waste listing. The public was given ample opportunity to comment on all relevant issues concerning both the hazardous waste listing and the Appendix VIII listing on which it is based.

Not only is there nothing in the regulation that precludes EPA from considering Appendix VIII and hazardous waste listings in the same proposal but, in many instances, to do otherwise could lead to absurd and futile results. In general, because listing a substance in Appendix VIII and listing a substance or a waste stream as a hazardous waste under 40 CFR 261.11(a)(3) involve consideration of a common factor, toxicity, simultaneous listing is appropriate.

E. Plausible Mismanagement Scenario and Other Issues in the Listing Determination for Waste Solids From the Production of 2,4,6-Tribromophenol.

1. Comments on the Proposed Rule

In comments on the proposed rule published May 11, 1994 (59 FR 24530), one commenter disputed the plausible mismanagement scenario used by the Agency to support the proposed listing of 2,4,6-TBP production wastes (disposal in unlined Subtitle D landfills), and noted that the proposed rule contained errors in the description of 2,4,6-TBP waste quantities and management practices. The commenter stated that it was the sole generator of TBP wastes covered by the proposed listing and that all of its solid streams containing TBP are shipped to a Subtitle C disposal facility. The generator subsequently submitted information showing that it disposed of these wastes in Subtitle C facilities for many years. (See letter to Anthony Carrell, EPA, from Stephen M. Wallace, Great Lakes Chemical Corporation, dated April 23, 1997). The generator reported sending the waste to various Subtitle C landfills since 1981 (1981–1990, Chemical Waste Management, Emelle, AL; 1991–1994, Chemical Waste Management, Carliss, LA; 1995–1996, American Ecology, Winona, TX; 1997, Philips Environmental, Avalon, TX). The commenter noted that the only waste from 2,4,6-TBP production disposed in a Subtitle D landfill consists of 10 tons of empty soda ash bags that do not contain any TBP. The commenter stated that the other combined waste solids from TBP production (floor sweepings, off-specification product and spent carbon from filters) total approximately 34 tons annually. The commenter argued that EPA's selection of an unlined Subtitle D landfill as a plausible mismanagement scenario is erroneous and, therefore, EPA's risk analysis significantly overstates the risk.

After considering these comments, EPA issued the September 3, 1997, letter, noted above, which evaluated additional information to support the

Agency's listing decision. The following paragraphs in this section describe the substance of the September 3 letter, including the new risk analysis and the new plausible mismanagement scenario of voluntary disposal in a Subtitle C landfill for this waste stream. Responses to the additional comments received on the September 3 letter are discussed in the remaining sections of this Unit.

In the September 3 letter, EPA stated that based on the information provided by the commenter, the Agency agrees that the quantity of waste solids from 2,4,6-TBP production that contain 2,4,6-TBP levels of concern should be approximately 34 tons, and should not include the 10 tons of empty bags. The Agency also acknowledges that the generator apparently has a long record of disposing the wastes with high 2,4,6-TBP content in a lined Subtitle C hazardous waste landfill. However, EPA continues to believe that the waste solids from production of 2,4,6-TBP should be listed as hazardous, even if the waste continues to be sent to Subtitle C landfills. EPA considered several critical factors in deciding to list this waste stream.

First, Congress clearly expressed its intent that the Agency is not to place excessive reliance on confidence in landfill design and liners for problematic wastes. In the Hazardous and Solid Waste Amendments (HSWA) of 1984, Congress explicitly added as one of the ''findings'' to RCRA that ''land disposal facilities are not capable of assuring long-term containment of certain hazardous wastes'' and that ''reliance on land disposal should be minimized or eliminated.'' RCRA section 1002(b)(7), 42 U.S.C. 6902(b)(7). As a result of this finding, and others, Congress added the land disposal restriction (LDR) program to RCRA, which significantly restricts land disposal of hazardous wastes. Further, it was made very clear in the Conference Report for HSWA that the new findings in RCRA were intended to House Report No. 98–1133, 98th Cong., 2d Sess. at 80–81 (Oct. 3, 1984). EPA views the statute and legislative history as sufficient justification to evaluate in a listing determination all risks of land disposal, including in appropriate cases risks from voluntary disposal in permitted Subtitle C facilities. This is particularly true where risks presented by a waste might be high if releases occur, and treatment of the waste under Subtitle C would significantly reduce these risks.

Accordingly, EPA added to the rulemaking record additional data on the effects of disposal in Subtitle C landfills and reevaluated its analysis of the factors contained in 40 CFR 261.11(a)(3) that are relevant to listing the 2,4,6-tribromophenol waste solids. The following analysis describes the September 3 letter's evaluation of, in particular, the inherent toxicity of the hazard constituent in the waste (§ 261.11(a)(3)(i)), concentration of the hazardous constituent in the waste (§ 261.11(a)(3)(ii)), the potential of the hazardous constituent to migrate into the environment (§ 261.11(a)(iii)), the relevance of the quantities of the waste generated (§ 261.11(a)(3)(viii)) when compared with these other factors, and how these factors are weighed when considered with the plausible management scenario of voluntary disposal of the waste in a Subtitle C landfill (§ 261.11(a)(3)(vii)). EPA concluded, after balancing these factors in accordance with the Agency's listing determination policy described in its December 22, 1994, proposed rule listing certain wastes generated during the production of dyes and pigments (59 FR 66073–78) that the 2,4,6-tribromophenol waste solids are capable of posing a substantial present or potential hazard to human health or the environment.

Review of the scientific data, particularly sample analysis and Structure Activity Relationships (SAR), shows that evaluation of disposal in subtitle C facilities is especially appropriate for untreated 2,4,6-tribromophenol waste solids. The waste contains a highly toxic chemical, 2,4,6-TBP, which may present significant carcinogenic risk even at low concentrations. This chemical was also found to be present in the wastes of concern at extremely high concentrations. EPA's analytical data show levels up to 40% (equivalent to 400,000 ppm) in the waste solids. Thus, while the volume of wastes generated (approximately 34 tons annually) is not very large, the extremely high levels of 2,4,6-TBP render this waste highly toxic. As a general matter, when settings its own priorities, EPA would not ordinarily consider it a priority to make a listing determination on a small-volume waste from a single generator. However, EPA has a set of statutory obligations to make a prescribed set of listing determinations and a determination on this particular waste stream is an obligation under the consent decree governing EPA's completion of those obligations.

Furthermore, EPA's data show that 2,4,6-TBP is relatively mobile and will leach out of the waste at high concentrations. In the proposal, EPA used the TCLP method to estimate the potential concentration of waste constituents that could be in leachate generated from disposal of the waste in a landfill, and found up to 760 mg/L of 2,4,6-TBP in the TCLP leachate. This level is 76,000 times the health-based criteria of 0.01 mg/L that corresponds to the 10^{-6} cancer risk level for ingestion. The proposed rule estimated risks of 7×10^{-4} from migration to groundwater, if this waste were placed in an unlined landfill (see the proposed rule, 59 FR 24538). Although the generator has sent this waste to a lined Subtitle C facility in the past, EPA believes that the risks estimated from migration from an unlined landfill provide an indication of the potential risks that could occur if 2,4,6-TBP is released from the lined landfill due to failure of the unit to contain the waste leachate. The Agency agrees that the liner/leachate collection system in a Subtitle C unit would serve to contain the waste, and would substantially lessen the risk even in the case of liner failure. However, EPA believes that the purpose of the RCRA hazardous waste treatment requirements (as expressed by Congress) is to reduce the uncertainty inherent in engineered containment approaches.

In past rulemakings EPA has assumed that waste containment systems will tend to degrade with time. In the proposal for the Land Disposal Restrictions (January 14, 1986, 51 FR 1641) EPA noted that in the long-term (beyond the post-closure period) the efficiency of cover and liner systems will degrade. Eventually synthetic liners will degrade and leachate collection systems will cease operation. In the proposed Liner and Leak Detection Rule (May 29, 1987; 52 FR 20218) EPA also stated that no liner can be expected to remain impervious forever. As a result of interactions with waste, environmental effects, installation problems, and operating practices, liners eventually may degrade, tear, or crack and allow liquids to migrate out of the unit. In evaluating the benefits of this rule (see 52 FR 20270), EPA noted that a properly installed double liner and leachate collection system, together with a final cover placed at closure, substantially reduces release during the operating life and post-closure care period. However, these technologies may not effectively reduce the longer-term risk for landfills, especially for persistent and mobile compounds, because the containment system may only delay leachate release from the landfill until after the post-closure period, when the cap and leachate collection system begin to fail.

EPA has attempted to account for the effect of Subtitle C containment (covers and liners) in the Regulatory Impact Analyses (RIA) completed for other

recent rulemakings. (See the RIA for the Land Disposal Restrictions—Phase II rule, pages 5–10, in the docket for the final Phase II rule, published September 19, 1994, 59 FR 47980; and the RIA for the final rule on Corrective Action Management Units, Appendix C, in the docket for the rule published February 16, 1993, 58 FR 8658.) These documents are incorporated by reference into the docket for this rule. As EPA noted in the source document used in these RIAs (Technical Guidance Document, ''Indexing of Long-Term Effectiveness of Waste Containment Systems for a Regulatory Impact Analysis,'' Office of Solid Waste, November 1992; this document has been placed in the public docket for today's rule), the structural integrity of waste containment systems degrades over time due to stresses on system components. EPA noted that failures of multi-component liner systems have been reported in the literature, and that some liners fail unpredictably with time. While acknowledging the uncertainties in predicting long-term effectiveness, EPA estimated that the effectiveness of Subtitle C composite liner systems may decrease significantly with time.

Although it is difficult to quantify the impact of the long-term degradation of liner systems, the high level of risk estimated from disposal of this waste in an unlined landfill (7×10^{-4}) means that even a modest reduction in long-term liner effectiveness would present risks of concern. For example, if the long-term effectiveness of the landfill liner and containment system were on the order of 95%, which would reduce the potential risks from releases to groundwater by 20-fold, the residual risk would exceed 3×10^{-5}. In fact, the containment systems would have to be in excess of 98% effective for the estimated risk to drop below $1 \times 10-5$. The risks for this particular untreated waste, therefore, would remain above EPA's presumptive level of concern for listing ($>10-5$), whether they were sent to an unlined landfill or a Subtitle C landfill (for a discussion in risk levels used in listing determination see December 22, 1994, 59 FR 66075).

The Agency recognizes that a recent court decision (*Dithiocarbamate Task Force* v. *EPA*, 98 F.3d 1394 (D.C. Cir. 1996), raised questions as to what constitutes ''plausible'' mismanagement under the listing regulations (§ 261.11(a)(3)). However, EPA has not yet fully evaluated the recent court decision to determine how to weigh possible future changes in management practices and is not relying on projecting new management practices in this listing decision. For the purposes of the analysis in the September 3 letter, EPA assumed that the current waste management practices continue (i.e., disposal of the untreated waste in Subtitle C landfills).

To respond to the commenter's concern related to waste solids that do not contain 2,4,6-TBP, EPA is revising the regulatory language to clarify that the wastes covered in the listing are those of concern, i.e., those containing high levels of 2,4,6-TBP. This avoids capturing the empty soda ash bags, and possibly other waste solids downstream from the production unit that EPA did not intend to cover in the listing. Therefore, the final listing reads as follows:

K140—Floor sweepings, off-specification product, and spent filter media from the production of 2,4,6-tribromophenol.

Another commenter stated that the high concentrations of TBP in the floor sweepings sampled by EPA provide singular justification for the listing of these wastes. EPA agrees with the commenter that the high concentration of the toxic chemical, 2,4,6-TBP, is a major concern. However, EPA did not consider this factor in isolation, but also considered the mobility of the waste and its inherent toxicity as equally important factors, and balanced all of these factors in the risk assessment. As noted above, the risk assessment predicts TBP leaching from unlined and lined landfills to receptor drinking-water wells at concentrations well above health-based levels of concern.

2. Comments on the September 3, 1997, Notice Letter

As noted previously in today's rule, EPA provided an opportunity for further comment on the Agency's reevaluation, described above, of the rationale for the listing determination for the waste solids from the production of 2,4,6-TBP. EPA sent letters of notice to three parties who commented on the proposed rule and could be expected to have an interest in the final decision and the revised rationale for listing. EPA received the comments noted below from the three entities that received the notice letter; one supported the decision to list 2,4,6-TBP production wastes, and two opposed the listing. EPA's response to these new comments are summarized below and are described in more detail in the docket. (See ''Supplementary Response To Public Comment'', April 1998)

a. Procedural Comments. One commenter challenged EPA's approach of sending notice letters to only three commenters on procedural grounds, and claimed that EPA was soliciting comments through a ''selective notice procedure'' that fails to give the general public opportunity to be heard on several issues. The commenter argued that others should have a chance to comment on the idea that placement of waste in a Subtitle C landfill that is in compliance with appropriate regulations may be ''mismanagement,''because this may have significant ramifications for individuals who did not previously comment and has ''far-reaching effects for those operating and using'' hazardous waste facilities.

Another commenter argued that EPA cannot list wastes based on the theory that Subtitle C disposal constitutes ''mismanagement'' without amending its listing criteria, stating that EPA must first propose and seek comment on the new theory of mismanagement before it can redefine its basic approach to the listing process.

EPA does not agree that notice was inadequate, nor does the Agency agree the listing criteria must be amended. Due to the limited time EPA has for completing this action, the Agency decided that letters providing actual notice to the parties who commented on the proposed rule and could be expected to have a direct interest in the final rule decision was appropriate. Those receiving the letter included the only current generator of the waste, and the industry group and environmental group that commented on the proposed rule. These are the parties EPA decided were arguably affected by the recharacterization of the rationale for listing. EPA is not aware of any other generators of this waste or any other persons who would have a direct interest in this decision. The actual notice given in this case is sufficient.

No reasons offered by the commenters indicate any need to go beyond the actual notice EPA provided. The decision in this case does not have ''palpable effects upon a regulated industry or the public in general.'' Instead, it affects this wastestream, alone, and those that can argue they have an interest in the wastestream. To the extent a similar analysis may be used for other wastestreams EPA may consider listing in the future, the affected parties will have adequate opportunity to comment then. Moreover, today's action does not compromise their legal rights to challenge such EPA listing decisions in the future.

Also, there are no ramifications for individuals who did not previously comment. The fact of the matter is that the revised rationale described in the letter will not have ''far-reaching

effects'' for those operating and using hazardous waste landfills. Rather, this decision is being made on the basis of risk for one specific waste with certain properties and does not reflect any new policy direction towards any other operators or users of hazardous waste landfills. No persons are expected to change their habits, for example, in changing the operations of their landfills, as a result of this decision. No persons who operate their landfills in accordance with Agency regulations will be affected by this decision. In any future circumstances in which EPA chooses to evaluate, as part of a listing decision, the risk basis of voluntarily putting a waste in a Subtitle C landfill ample opportunity for comment will be provided.

Further, the commenter's concern that disposal of untreated waste in a Subtitle C landfill that complies with regulations may be mismanagement is misleading. Disposal of untreated waste in any type of landfill could be considered mismanagement, despite compliance with all applicable landfill design and operation regulations. No one would want highly dangerous materials voluntarily placed in a Subtitle C landfill. Clearly, some untreated wastes could pose a potential hazard of such magnitude that merely voluntarily placing them in a lined landfill would not be sufficient. In this instance, applying the factors in § 261.11(a)(3), EPA has concluded that the disposal of this highly toxic, untreated waste in a Subtitle C landfill is improper management within the meaning of that subsection of the regulations. EPA is not suggesting that the landfills in question have been mismanaged. On the contrary, the voluntary use of Subtitle C landfills by the generator has been laudable. However, for purposes of a listing determination, the overall practice is improper management in that is does not adequately control risks to human health and the environment.

EPA also does not agree that the listing criteria have to be modified in any way to allow the Agency to make the listing determination for the organobromine waste at issue. The regulations (see § 261.11(a)(3)) clearly permit EPA to render a listing decision based on a variety of factors. These factors were weighed when considered with the plausible management scenario of voluntary disposal of the waste in a Subtitle C landfill without previous treatment. After balancing these factors EPA concluded that the 2,4,6-tribromophenol waste solids are capable of posing a substantial present or potential hazard to human health or the environment. It is consistent with the regulations to reason that, if voluntary Subtitle C landfilling (absent treatment) presents a substantial present or potential hazard, the practice constitutes improper management under § 261.11(a)(3)(vii). Therefore, a regulatory change is definitely not needed prior to making this listing determination.

b. Risks Related To Plausible Mismanagement Scenario. One commenter stated that EPA's proposed listing is based on a management scenario that is unsupported and implausible, and further noted that the evaluation of future failure rates of Subtitle C landfill containment systems is not supported by evidence in the docket. The commenter states that the one study relied upon by EPA fails to account for the multi-component nature of liner systems and does not specify how it accounts for these factors, making it impossible to determine the validity of the assigned failure rates. The commenter claimed EPA's sole reliance on this study is arbitrary and capricious. The commenter also stated that EPA did not consider site-specific factors (e.g, liner type, soil type, annual precipitation) to determine if leachate will reach groundwater. The commenter claimed, therefore, that EPA has not made a reasoned determination that the long-term effectiveness evaluation is valid at these specific facilities.

The commenter is wrong for a number of reasons. The effectiveness-time relationships given in the reference used by EPA (*Indexing of Long-Term Effectiveness of Waste Containment Systems for a Regulatory Impact Analysis,* USEPA, November 1992) was based on an examination of the technical literature on the subject, and an evaluation of many technical factors. The document evaluated the effectiveness of various components of the containment system, and identified the likely degradation mechanisms. For example, landfill containment systems may leak due to improper installation, and may be degrade by subsidence, drying/cracking, freeze-thaw cycles, burrowing of animals, leachate incompatibility, and vehicle loads. This analysis considered the composite clay/geomembrane liners and caps required under RCRA Subtitle C regulations. The document also provided data and cited references showing that even configurations like RCRA Subtitle C liners do, in some cases, leak over time. Concerning the leachate collection system, EPA notes that the regulations require operation and maintenance of these collection and leak detection systems for 30 years after closure of the landfill (see 40 CFR 264.117). Over the long-term, therefore, EPA cannot rely on leachate collection systems to prevent the eventual release of leachate of untreated waste from the landfill if the liner system fails.

EPA agrees that the degradation of a containment system depends to some extent on the systems design and other site-specific factors. However, the commenter provided no specific data indicating what site-specific factors would prevent release of constituents from the wastes disposed, or what the long-term containment efficiencies might exist for the landfills at the sites in question. Therefore, EPA has no reason to alter its analysis on this basis. Furthermore, EPA does not believe that such a site-specific analysis is appropriate in this case, because the generator may use many different landfills for disposal. In fact, the history of the generator's disposal practices (See letter from Great Lakes Chemical Corporation to EPA dated April 23, 1997) shows that the generator changed disposal sites quite often (e.g., the generator sent the waste to three different landfills between 1994 and 1997).

One commenter stated that EPA has turned this inquiry from determining whether dangerous ''mismanagement'' is plausible into an inquiry into whether it can be ruled out completely, and cites EPA's admission that there is at least a 95% chance that C landfills will not leak. The commenter claims EPA argues that ''nothing lasts forever,'' and therefore Subtitle C disposal can be mismanagement. The commenter argues that this type of logic was unacceptable in the *Dithiocarbamate* case. The commenter states that EPA effectively writes the requirement of a ''plausible mismanagement scenario'' out of the listing rule, and that recent court decisions do not allow EPA to evaluate such a factor so as to drain it of all content.

As a preliminary matter, EPA points out that this listing is wholly consistent with the *Dithiocarbamate Task Force* case. The Agency has found that the common practice of the only generator of the waste over more than 15 years is the plausible management scenario. The assessment of all relevant factors under § 261.11(a)(3) led the Agency to conclude that voluntary Subtitle C landfill disposal is improper management.

Furthermore, the Agency has not turned this into an inquiry about whether ''mismanagement'' can be ruled out completely. Rather, the Agency has evaluated this particular waste under the conditions of plausible management and reached a conclusion that there is

a substantial present or potential risk. The commenter is attempting to turn the Agency's risk analysis into a narrow inquiry into plausible mismanagement. This is simply incorrect.

With respect to the EPA's analysis of risk, the Agency did not state that there is a 95% chance that C landfills will not leak. Rather, EPA was indicating that even if the containment system was 95% effective, the potential risks from the waste in question are so high that it would still present a risk at levels of concern. Even if a Subtitle C landfill was 98% effective in reducing risk relative to risk in an unlined landfill (*e.g.*, the Subtitle C landfill's effectiveness decreased 2% from a combination of cap failure and abandonment of active landfill management), the estimated risk would still exceed $1 \times 10-5$. The actual long-term efficiency is extremely difficult to estimate, given the highly uncertain long-term integrity of liners/leachate collection systems and landfill caps. The document cited by EPA that attempts to evaluate the effectiveness of liner systems estimated it would degrade to an efficiency well below 95% over the long term (*e.g.*, one hundred years). EPA is not attempting to absolutely rule out certain management scenarios, but rather to account for the likely degradation of a Subtitle C containment system over the long-term. Certainly the available data (cited in the document used by EPA) clearly show that the materials that make up liners and caps are expected to degrade over time. Therefore, given this fact, in conjunction with the available estimates of long-term effectiveness, EPA believes that the highly toxic waste in question may present a significant risk when placed in any landfill, even a Subtitle C unit.

One commenter stated that EPA's legislative references do not support the idea that disposal in Subtitle C landfills constitutes mismanagement, but rather relate to historic problems caused by unregulated disposal, and expressed support for minimizing the quantities and toxicity of wastes that must be disposed. The commenter states Congress did not require all wastes to be treated before land disposal, but only wastes that are hazardous, and notes that the fact that treatment might reduce the hazardousness of a waste is not a relevant factor in EPA's listing criteria.

EPA disagrees with the claim that Congress was concerned only with unregulated land disposal. The statute itself clearly states Congressional intent: ''certain classes of land disposal facilities are not capable of assuring long-term containment of certain hazardous wastes * * * and land disposal, particularly landfill and surface impoundment, should be the least favored method for managing hazardous wastes.'' (See RCRA, section 1002(b)(7)). EPA agrees that Congress did not require all wastes to be treated prior to land disposal. However, in this case EPA believes the waste in question presents a substantial hazard when land filled, even in a Subtitle C landfill, in the form in which it is generated (i.e., untreated). Therefore, EPA believes the waste is, in fact, hazardous and should be subject to full regulation under Subtitle C, including the land disposal restrictions.

One commenter stated that, while EPA is not relying on projecting new management practices in this listing decision, the *Dithiocarbamates* decision is still controlling. The commenter noted that when the court struck down the K160 listing, it did not remand it to allow EPA to reevaluate whether disposal in a Subtitle C landfill constitutes ''plausible mismanagement,'' as EPA is attempting to do here. The commenter went on to say that, in striking down 24 other waste listing (U-listings) in the *Dithiocarbamate* decision, the court refused to accept as examples of mismanagement various past or future accidents, and stated that EPA assertions that ''accidents will happen'' does not constitute ''plausible mismanagement.'' The commenter claimed this analysis is equally applicable to EPA's assumption that all landfills will leak eventually, and the fact that some unquantified uncertainty exists regarding long-term risks from Subtitle C disposal does not mean that such disposal is mismanagement. The commenter argued that the only change listing the waste would cause would be to require compliance with land disposal treatment standards and it is difficult to see how a listing would substantially reduce risks. The commenter stated that EPA did not address the question of how much risk reduction would result from treatment. The commenter also noted that the fact that treatment might reduce the hazardousness of a waste is not a relevant factor under § 261.11(a)(3) in deciding whether to list a waste as hazardous.

The commenter's reference to ''the *Dithiocarbamate* case'' is not relevant in this context. In the *Dithiocarbamate* case, the court did not address the issue of Subtitle C management in any substantive way. The court stated that it was vacating the listing of K160 ''[b]ecause EPA failed to identify a plausible mismanagement scenario * * *'' (98 F.3d at 1404) and did not reach the issue of whether voluntary disposal in a Subtitle C landfill (absent treatment) would present a substantial risk. The decision in no way limits the Agency from considering potential risks from Subtitle C management. EPA had not raised the issue in rulemaking because the Agency had determined that the plausible management scenario was an unlined landfill. The Agency did not conduct a risk assessment on the Subtitle C landfill because it did not believe it had to.

The reference to consideration of the U wastes in the *Dithiocarbamate* case is also irrelevant in this context. The commenter is confusing EPA's acknowledgment of the uncertainty in quantitatively estimating the long-term efficiency of Subtitle C containment systems as being equivalent to assertions that ''accidents happen,'' referenced by the *Dithiocarbamate* case. As noted in response to other comments in this proceeding, EPA's evaluation attempted to account for the likely degradation of a Subtitle C containment system over the long-term. Therefore, EPA continues to believe that it is logical and appropriate to assume that the containment efficiency of landfills will degrade sufficiently so that, for this highly toxic waste, disposal of the untreated material in a Subtitle C landfill may present a substantial present and potential hazard.

As noted in the commenter's own statements, unlike in the *Dithiocarbamate* case, in which the court did not see how U-listings would avert accidents, a listing of the 2,4,6-TBP waste solids would, in fact, prevent the placement of untreated wastes in the landfill. Further, the treatment standards for this newly listed waste (see the land disposal restrictions section of today's rule) require levels of 2,4,6-TBP for nonwastewaters to be no greater than 7.4 mg/kg. This level equates to a reduction of up to a 50,000-fold reduction in the level of 2,4,6-TBP in the waste. Such a reduction in 2,4,6-TBP levels will likely result in significant risk reduction—a clear benefit of the listing. Furthermore, the § 261.11(a)(3) criteria, as noted by the commenter, does not require the Agency to consider risk reduction. Section 261.11 is promulgated under the authority of section 3001 of RCRA, which requires EPA to identify criteria for listing. Once listed, the wastes would become subject to the management requirements of Subtitle C. The regulations for management requirements are promulgated under other sections of RCRA, like sections 3002 (generator standards), 3003 (transportation standards), 3004

(standards for treatment, storage and disposal facilities), and 3005 (permits for treatment, storage or disposal). These are the sections under which EPA would consider risk reduction measures that would be protective of human health or the environment.

While one commenter supported EPA's decision to list the 2,4,6-TBP solids and filter cartridges, the commenter stated that EPA assumes in its reevaluation that the wastes at issue will always be landfilled in a Subtitle C facility, even though the regulated community is under no legal or technical mandate to do so in the absence of a hazardous waste listing. The commenter claimed that EPA's proposed listing rationale based on Subtitle C landfilling substantially understates the risks, and argues that EPA should not assume past disposal practices represent the only plausible mismanagement practice for at least four reasons: (1) There is no technical or other bar to additional companies producing 2,4,6-TBP and generating the wastes at issue, either at existing organobromine chemical production facilities or at new locations. Therefore identification of plausible mismanagement scenarios should involve more than an analysis of one company's historic disposal practices; (2) the wastes at issue (floor sweepings and filter cartridges) are frequently observed in the organobromine chemical industry, and in many cases are landfilled onsite in nonhazardous units. Thus, EPA should consider how similar wastes from other organobromine production processes are managed when identifying plausible mismanagement scenarios; (3) the company currently generating these wastes has used three different landfills since 1994, suggesting that cost is the overriding factor in the company's disposal decision. It is not unreasonable for EPA to assume the cost differential between Subtitle C and D landfills may cause the company to use a nonhazardous waste landfill; and (4) the production facility's 1995 TRI report reveals that half of the TRI chemicals sent offsite for disposal were sent to a nonhazardous landfill. Thus, even at this one facility Subtitle C landfilling is not uniformly practiced.

As a general response to these comments, the Agency notes that these arguments have no practical effect and would not change EPA's decision to list the waste. In the original proposal to list the 2,4,6-TBP production solids, EPA estimated the risks from disposal in an unlined landfill would warrant listing the waste (see proposed rule, 59 FR 24530, May 11, 1994). As noted in the September 3, 1997 notice letter, the risks from such disposal would be mitigated in a Subtitle C landfill, but would still be at levels of concern. Therefore, EPA does not need to rely on projecting new management practices in this listing decision. EPA intends to address the more general issue of how to weigh potential changes in management practice in the future.

Two commenters argued that EPA did not fully consider the impact of the existing RCRA Subtitle C regulations in its analysis of potential risks from disposal in such a regulated landfill. One argued that the proposed mismanagement scenario presumes that all landfill operators are in violation of RCRA regulations, and noted that the regulations require that liner/leachate collection systems prevent migration out of landfills during the active life (including the closure period) of the landfill. The commenter argues that the resources spent on landfill design and construction have resulted in more than a 20-fold decrease in risk posed by the waste disposed. The commenter stated that if EPA is concerned with releases from landfills, the proper place to address this is through the regulations governing land disposal units, and not the listing process.

The other commenter stated that comprehensive landfill regulations prevent the release of hazardous constituents from the waste into the environment by: Double liners and leachate collection systems, groundwater monitoring, and corrective action requirements in case of a release. The commenter also noted that the performance of Subtitle C landfills is guaranteed by operating, closure, and post-closure permits, but stated that none of these safeguards were addressed in EPA's reevaluation.

EPA agrees that the regulations governing Subtitle C landfills are stringent and are designed to prevent releases from the unit, to detect if such leaks occur, and to take corrective action if necessary. However, EPA is not assuming that all landfill operators will be in violation of RCRA. EPA is simply recognizing that such standards are not protective in perpetuity nor for every possible waste. EPA is not saying that voluntary Subtitle C landfilling is always ''improper'', just that there are wastes that should not go into them if they are not treated. EPA agrees that properly installed liner systems and final covers substantially reduce the potential for releases during the operating life and post-closure period (see 52 FR 20270, May 29, 1987). EPA also agrees that permits for landfills help to ensure the implementation of stringent requirements for groundwater monitoring and corrective action. The RCRA regulations require a 30 year post-closure period, during which the unit is maintained and monitored (see 40 CFR 264.117), but after the post-closure monitoring ends releases may not be detected or corrected. While extending the post-closure period might be one way to decrease potential risks from Subtitle C landfills, EPA notes that treatment under the land disposal restrictions program is another way (and perhaps a more direct way) of ensuring long-term risks are minimized. Listing the waste solids from the production of 2,4,6-TBP ensures that this highly toxic waste will be treated prior to landfill disposal.

c. Demonstration of a Substantial Hazard. One commenter claimed that EPA's approach does not demonstrate that the TBP wastes managed in Subtitle C landfills pose a substantial hazard as required by the statute and EPA's rules (§ 261.11(a)(3)). The commenter argued that no human health or environmental damage has ever occurred as a result of improper management of TBP wastes, and the quantity of the TBP waste (35 tons per year) is ''inconsequential.'' The commenter also stated that the court in the *Dithiocarbamate* case indicated that EPA must balance the toxicity of the chemicals with other factors specified in EPA's listing criteria. Finally, the commenter noted that EPA's estimate of risks above 10^{-5} from TBP wastes in Subtitle C landfills is ''based on improper extrapolation from Subtitle D risk modeling.''

EPA disagrees with the commenter's assessment of the hazard posed by the TBP wastes. First, the regulatory criteria for listing wastes as hazardous is that the wastes *may* * * * pose a substantial present or *potential* hazard.'' These wastes certainly meet that criteria. While EPA has not found damage cases that document health or environmental damage from disposal of this waste, this is only one of the factors EPA considers in its listing decisions. While EPA has not identified any cases of actual damages from this waste, EPA has explained how it considered the other factors under § 262.11(a)(3). The risk assessment, after consideration of all of these factors shows individual risk numbers to be above EPA's level of concern. Furthermore, by listing a waste as hazardous, EPA hopes to prevent such damage from occurring, and the Agency has often listed wastes in the absence of definitive damage cases. Contrary to the comment, EPA does not concede that the volume of waste at issue (34 tons annually) is necessarily ''inconsequential.'' The volume of waste

must be examined in conjunction with the concentration and properties of toxic constituents present. In this case, the relatively small quantity of waste contains very high concentrations of a highly toxic constituent, 2,4,6-TBP.

As noted elsewhere in today's rule, EPA continues to believe that the SAR results demonstrate that 2,4,6-TBP is highly toxic. Furthermore, EPA has shown how this toxic chemical, in a highly concentrated waste, may potentially cause a substantial risk even if managed in a Subtitle C landfill. The waste in question is so toxic and concentrated that release may occur at levels of concern, even if the containment system of a Subtitle C landfill were very high (e.g., 95%). Given this result, EPA believes that listing is warranted.

d. Other Risk Issues. Two commenters argued that the Agency's toxicity assumptions for 2,4,6-TBP are invalid. One stated that EPA failed to address comments on the use of Quantitative Structure Activity Relationships (QSAR) in its risk analysis, and incorporated its previous comments by reference. The commenter also noted that a proposal by EPA to gather the data necessary to evaluate 2,4,6-TBP was rejected by the Interagency Testing Committee (ITC). The commenter stated that, while the ITC originally proposed to include 2,4,6-TBP on the priority testing list under Section 4(e) of the Toxic Substances Control Act (TSCA), following receipt of exposure information from an industry group and the producer of 2,4,6-TBP, the ITC revised its position and removed 2,4,6-TBP from the priority list. The commenter stated that the rationale for removal of 2,4,6-TBP was based on the ITC's determination that ''environmental and workplace monitoring indicate that 2,4,6-tribromophenol is not likely to result in substantial environmental releases or significant exposures to workers, consumers or the general population.''

EPA has not ignored the comments received on the Agency's use of Structure Activity Relationships for estimating the toxicity of 2,4,6-TBP. EPA responds fully to all comments related to this issue in a separate section of today's preamble. As the commenter noted, the ITC's 40th Report revised the TSCA section 4(e) Priority Testing List by removing 2,4,6,-TBP, which had previously been recommended for testing in its 39th report (62 FR 8578, February 25, 1997). The ITC stated that it removed 2,4,6-TBP after reviewing data that demonstrated that: (1) It is used as a chemical intermediate to produce flame retardants; (2) greater than 99% of 2,4,6-TBP used as an end-product is shipped overseas to be used as an intermediate in the production of brominated flame retardants; and (3) environmental and workplace monitoring indicate that 2,4,6-TBP is not likely to result in substantial environmental releases or significant exposures to workers, consumers, or the general public. Exposure and release information provided by industry and the CMA include an industrial hygiene survey from 1979, a historical prospective mortality study of workers, a pollution evaluation, and a determination of brominated organic compounds in environmental matrices (secondary effluents). The available exposure information pertains to workers and the potential for general population exposure from manufacturing sites. In deciding to list waste solids from the production of 2,4,6-TBP, however, EPA considered in detail the potential exposure and risks due to the disposal of wastes generated, not product use. EPA notes that none of the exposure studies used in the ITC decision deal with RCRA issues, for example, the presence of TBP in waste streams, its subsequent disposal in a landfill, and the potential hazards associated with leakage from such a landfill or with any mismanagement scenario.

EPA further examined the rationale for the removal of 2,4,6-TBP from the Priority Testing List and does not agree that this action in any way undermines EPA's use of SAR to estimate the chemical's toxicity. 2,4,6-TBP was not removed from the ITC Priority Testing List because the ITC had found that TBP was not toxic. Indeed, the chemical was originally included on the List because the NIEHS needed chronic toxicity and 2-year carcinogenesis study data. The availability of these data would obviate the need for the use of a qualitative or quantitative SAR by EPA, which would prefer to use actual data on the constituent in question whenever possible. Among the studies cited by CMA and GLCC as available for EPA review are acute toxicity (oral, inhalation, and dermal), dermal sensitization, skin and eye irritation, 21-day inhalation toxicity, 28-day subacute dermal toxicity, clearance, teratogenicity, genotoxicity, and pharmacokinetics. None of these studies are sufficient to judge the carcinogenic potential of TBP, which is the primary endpoint of concern for this chemical. Therefore, EPA does not believe that the ITC decision to remove TBP from the Priority Testing List addresses EPA's determination that 2,4,6-TBP is highly toxic as indicated by SAR and that disposal of wastes containing high levels of this toxic chemical in a landfill (even a Subtitle C landfill) poses a substantial hazard that requires listing the waste as hazardous.

One commenter supported the proposed decision to list waste solids from the production of 2,4,6-tribromophenol, but argued that EPA underestimated the risks posed by disposal of the waste in a Subtitle C landfill for at least three reasons. The reasons noted by the commenter were: (1) The TCLP understates the leaching potential of the waste in a Subtitle C landfill by at least an order of magnitude, because the waste may be exposed to solvents and other chemicals that encourage contaminant leaching, and because the TCLP appears ''uniquely ineffective'' in leaching contaminants from the waste; (2) EPA's risk estimates are based on the presence of 2,4,6-TBP only and ignore the presence of arsenic and other toxic contaminants in the waste and TCLP leachate; (3) EPA's assumption of 95% containment efficiency for a Subtitle C landfill is unreasonable given that owner/operator's post-closure responsibilities typically end after 30 years; containment efficiency would drop to 60% at 100 years, and beyond 100 years additional declines can be expected.

As a general response to the argument that EPA underestimated the risks posed by Subtitle C disposal for the wastes in question, the Agency notes that these arguments have no practical effect and would not change EPA's decision to list the waste. However, EPA does not agree with some of the arguments put forth by the commenter, and is responding to them for this reason. EPA does not agree that the TCLP underestimates the leaching potential of the waste in question for reasons discussed below. Absent any firm data to conclude otherwise, EPA finds no reason to conclude that the TCLP underestimates the leaching potential of the 2,4,6-TBP production wastes. As a preliminary matter, EPA notes that the commenter cites no basis for its quantified estimate that the leaching is underestimated by one order of magnitude. Moreover, there is no indication that the TCLP is ''uniquely ineffective'' in leaching contaminants from this waste, as the commenter claims. The properties of 2,4,6-TBP indicate that the relatively low leaching efficiency is not unexpected. This chemical is not highly soluble in water (70 ppm; see The Merck Index, Ninth Edition, 1976) and would not be expected to leach from the organic waste matrix at very high levels.

The octanol-water partition coefficient (Kow) for this substance is on the order of 17,000 (or in log form, 4.23); this coefficient is a measure of the tendency of the chemical to partition into organic phases compared to water, and this value indicates the chemical is expected to be at 17,000-fold higher concentration in the organic phase compared to water. It, therefore, would be expected to remain bound in the organic phase and would tend to be less mobile. Furthermore, the lower leaching from the spent filter material is also logical, because the filter material is activated carbon. Activated carbon is used expressly to remove organic material from a process stream, and the 2,4,6-TBP is expected to be relatively tightly adsorbed to this matrix. Therefore, EPA has no reason to believe, despite the commenters assertions, that the TCLP results are not valid for this waste.

EPA's decision to list this waste focused on 2,4,6-TBP because this chemical was found at levels that greatly exceeded the other constituents detected. While other constituents were detected in the waste, many were also found in blank laboratory QC samples (e.g., methylene chloride) indicating that the detection of these volatile constituents in waste samples may have been due to some sample contamination, perhaps in the laboratory. Concerning arsenic, the analytical results are suspect due to known problems with measuring some metals in these type of waste matrices. (See Method 6020, Test Methods for Evaluating Solid Waste, Physical/ Chemical Methods, third edition, 1994; OSW/USEPA). One of the waste samples (spent carbon filter material, number GL–08) showed the presence of other brominated phenols, notably 2,4-dibromophenol; however, EPA does not have any health-based levels to rigorously evaluate them.

Analysis of the other sample (floor sweepings and off-specification product, GL–09) showed the presence of several volatile constituents that were found in the blank samples. However, this sample also contained significant levels of 1,2-dibromoethane (also known as ethylene dibromide, or EDB). As evidenced by the very low drinking water standard established for this chemical (the maximum contaminant level, or MCL, is 0.00005 mg/L; see 40 CFR 141.61), this substance is highly toxic, and the level reported in the TCLP analysis (36 mg/L) is 720,000 times the existing MCL. The Agency believes that the relatively high levels of this chemical in the waste (and the corresponding TCLP sample) further confirms that these production solids contain high levels of highly toxic chemicals and present a substantial hazard, even if managed in a Subtitle C landfill. There is further discussion of the presence of EDB in the following Unit IV.E.3.

In its reevaluation, EPA did not conclude that the containment efficiency for a Subtitle c landfill was necessarily 95%. The Agency's point was, even if the efficiency was as high as 95%, the potential release from 2,4,6-TBP production solids in a landfill may present risks at levels of concern. While estimating the long-term efficiency of containment is highly uncertain, EPA agrees that it may be less than 95%, thereby making the potential risk higher.

e. Other Comments. The commenter that supports EPA's decision to list the waste at issue noted that the disposal of wastes with high concentrations of organic contaminants is what Congress sought to restrict through the Land Disposal Restrictions program. The commenter argued that a hazardous waste listing for these wastes is appropriate to ensure Congressional objectives of the LDR program are achieved. The commenter claims EPA must consider these expressions of ''proper'' management when applying its criteria for listing hazardous waste.

EPA agrees that in establishing the Land Disposal Restrictions program, Congress found land disposal to be incapable of ensuring long-term containment of hazardous waste. However, EPA does not agree that the high content of organic contaminants is, by itself, sufficient to require listing. The listing decision is based on the highly toxic nature of the constituent in question (2,4,6,-TBP), in conjunction with potential risks associated with its release, even if placed in a Subtitle C landfill. Therefore, EPA agrees that listing, and the associated treatment required under the land disposal restrictions program, are appropriate because of the chemicals high toxicity and potential mobility in groundwater. EPA does not agree that listing is appropriate merely to comply with Congressional intent for treatment of hazardous waste, because a waste must first be determined to be hazardous before the LDR program applies.

One commenter argued that EPA's reevaluation could be read as an indictment of the Agency's comprehensive Subtitle C program for managing hazardous wastes in landfills, and indicated that if Subtitle C disposal is not protective and constitutes mismanagement, then EPA's landfill standards are inadequate. The commenter does not believe this is the case and claims the criticism of the long-term integrity of landfills is an effort to avoid the implications of the *Dithiocarbamate* decision. The commenter stated that, even is some uncertain degree of risk is posed in the long term by such disposal, this uncertainty is not a sufficient basis for listing these wastes.

As noted elsewhere in response to other related comments, EPA believes the extensive regulatory controls provide management that reduces the potential for releases to the environments. EPA's decision to list the solids from the production of 2,4,6-TBP is in not an indictment of the Agency's Subtitle C program, but is based on the specific characteristics of this waste (i.e., toxicity, mobility) and the potential risks that would occur if these wastes were disposed without prior treatment, and the long-term containment systems in a Subtitle C landfill degrade over time, as expected.

3. Comments on the January 14, 1998 Notice Letter

As noted in the above section, a reexamination of the analytical data of the samples from the 2,4,6-TBP production waste showed that 1,2-dibromoethane (EDB) was found in both the total and TCLP analyses of the sample of floor sweepings and off-specification product. The EPA sent a letter of notice to the interested parties (i.e.,the sole generator of this waste and the commenter that originated the comment about additional constituents being present in the waste). The letter explains the new piece of information and notes that the presence of this highly toxic chemical appears to further support the Agency's contention that the waste warrants listing. EPA received comments from the generator, and the Agency's responses are summarized below. The comments and responses are described in more detail in the docket. (See ''Supplementary Response To Public Comment,'' April 1998).

The commenter challenged the validity of the analytical results showing the presence of EDB in the waste, because of technical flaws in the analytical procedure. The commenter collected more samples of the floor sweepings and product, and submitted chemical analyses that did not show the presence of EDB. The commenter went on to note that EDB is not used as a raw material, nor is it produced as a by-product in the 2,4,6-TBP process. The commenter argued that even if the EDB was found in the floor sweepings, the presence of EDB could not justify the scope of the Agency's proposed listing. The commenter stated that, since EDB is

not present in the 2,4,6-TBP process, its presence would have to be the result of a mixture of 2,4,6-TBP and EDB.

EPA disagrees with the contention that the Agency's analysis was flawed. EPA reexamined the raw analytical data for this sample and the data clearly indicate that EDB was detected and quantified as reported. EPA has provided a full response in the docket to these and other comments related to the analysis of the wastes under study (see the Supplementary Comment Summary & Response Document in the docket). EPA agrees that EDB does not appear to be used in the 2,4,6-TBP process, and that it is unlikely to form as a by-product. However, EDB is used as a raw material elsewhere in the facility, and the raw analytical data clearly support the finding of EDB in the waste. Therefore its presence may be due to the cross contamination of waste streams, as the commenter suggested. The lack of EDB in the recent samples obtained by the commenter suggest that EDB may not be present in all samples of waste. Given the limited data, EPA agrees that EDB is not the primary basis of listing this waste, but that the presence of the 2,4,6-TBP itself is the major concern.

The commenter stated the Agency did not provide public notice of its intent to list 2,4,6-TBP production wastes based on the presence of EDB, and that this is in violation of the Administrative Procedures Act. Furthermore, the commenter contends that the EPA's ''new rationale'' to list TBP as hazardous would fail to take into account the marked shift in emphasis between the proposed and final rules.

As EPA noted in its response to similar comments on the first notice letter (see subsection 2.a above), due to the limited time EPA has for completing this action, the Agency decided that a letter of actual notice to the aforementioned interested parties was appropriate. The generator of the 2,4,6-tribromophenol production waste is the only party EPA believes would be affected by the recharacterization of the rationale for listing and that would have a direct interest in the final listing decision. The Agency is not aware of any other generators of this waste, or any other persons who would have a direct interest in this decision, thus the actual notice given in this case is sufficient.

Finally, the commenter stated that it had not received any response to its previous comments challenging the use of QSAR as a basis for alleging that 2,4,6-TBP itself is toxic. The commenter also stated that EPA does not have any data indicating that 2,4,6-TBP is toxic, and is instead relying on predictive models that were never intended to be used for this purpose. The commenter submitted further comments on this issue.

EPA was not seeking further comments on the use of QSAR in this listing determination. The Agency's responds to all comments concerning QSAR submitted on the proposed rule in Units IV.A, IV.B, and IV.C of today's final rule. These responses are also given in the Public Comment Summary and Response Document found in the docket as an appendix to the background document.

F. Listing Determination for Wastes From the Production of Tetrabromobisphenol-A

1. Solids

In the proposed rule, EPA deferred a hazardous waste listing decision on waste solids from the production of tetrabromobisphenol-A (TBBPA), based on a lack of information on waste characterization and toxicity. In the absence of data on the amount of brominated phenols in TBBPA product, the leachability of brominated phenols from the product matrix and toxicological data on TBBPA solids, the EPA was unable to analyze the potential risks associated with TBBPA migrating to ground water if managed in unlined landfills. The Agency, accordingly, requested this information in the proposal and also noted that if sufficient information to support a listing determination was received during the public comment period, the Agency may choose to promulgate a determination rather than defer action in the final rule.

One commenter provided toxicological data on TBBPA that support an assessment of the potential for environmental risk from release of TBBPA. (The toxicological data were previously submitted to EPA under Section 8(d) of the Toxic Substances Control Act (TSCA) and as the result of a TSCA Section 4 Test Rule.) The test data on the toxicology of TBBPA indicate that TBBPA product ''does not pose a health hazard to mammals.'' One reason appears to be that TBBPA is poorly absorbed when ingested. In 1985, the Interagency Testing Committee reviewed TBBPA and found no need to conduct further health effects testing. In addition, the results of ecological testing submitted to the Agency by the Brominated Flame Retardant Industry Panel do not indicate an unacceptable level of hazard for aquatic organisms.

Ecological effects data submitted by the commenter (and previously collected by EPA under TSCA as noted above) indicate that TBBPA is not particularly toxic to aquatic test species (e.g., fathead minnow, bluegill, daphia); no long-term aquatic effects are observed with tetrabromobisphenol-A in water at levels below 0.22 mg/L. Using the data on fish and assuming that the waste was placed in an unlined landfill close to a stream into which ground water discharged, the Agency made a worst-case assumption that leachate from the landfill would be saturated with tetrabromobisphenol-A at the chemicals solubility level (4.16 mg/L). This leachate would be diluted before reaching any nearby stream (in the proposed rule, EPA estimated a dilution fraction on the order of 100 for leachate exiting a landfill), and then diluted further after discharge to such a stream. Therefore, the diluted concentration in the stream after such a scenario would be well below the above-stated long-term aquatic effect level of 0.22 mg/L.

In determining potential risk from the TBBPA waste, EPA also considered the possible risk due to the presence of traces of 2,4,6-TBP in the TBBPA waste. The commenter provided the Agency with data on concentrations of 2,4,6-tribromophenol in the TBBPA product. In considering whether to list spilled product and floor sweepings from the packaging of TBBPA due to the possible presence of 2,4,6-TBP, EPA assumed that the 2,4,6-TBP concentration in the spilled product would be no greater than the 2,4,6-TBP concentration in the TBBPA product itself. (Note that this appears to be a worst case assumption because 2,4,6-TBP is not handled in the packaging area, thus the spilled product should not be contaminated with any further 2,4,6-TBP; the commenter confirmed that waste solids from production of TBBPA are floor sweepings generated from spills in the packaging area, and not the production area). The commenter reported that commercial TBBPA has less than 1% impurities, and the primary impurities are isomers of tribromobisphenol A, not 2,4,6-TBP. The concentration of 2,4,6-TBP in the TBBPA product reported by the commenter is more than 100 times less than the concentration of 2,4,6-TBP EPA found in the off-specification 2,4,6-TBP product.

The TCLP leaching data presented in the proposed rule show a maximum concentration of 760 mg/l of 2,4,6-TBP in leachate extracts from the off-specification 2,4,6-TBP product. In the absence of TCLP leaching data for the TBBPA solids, EPA assumed the TCLP leaching efficiency of 2,4,6-TBP from the spilled TBBPA product and floor sweepings would be comparable to the

leaching efficiency of 2,4,6-TBP measured for the off-specification TBP product. Thus, the TCLP level for 2,4,6-TBP from the TBBPA solids was assumed to be more than 100-fold less than the TCLP level found in the TBP off-specification product. As described in the proposed rule, the level of estimated individual risk from exposure to 2,4,6-TBP in groundwater for disposal of the off-specification 2,4,6-TBP product in an unlined Subtitle D landfill was 7×10^{-4} (with the SAR-based health number is corrected for molecular weight differences of 2,4,6-TCP and 2,4,6-TBP as noted in today's notice, the risk would be 4.2×10^{-4}). Using this analysis, any risk posed by TBBPA solids under the same disposal scenario would be more than a 100-fold less, or less than 10–$^{-6}$. Therefore, this waste is not a candidate for listing as hazardous based on the presence of 2,4,6-TBP.

In addition, EPA has monitoring data that also indicate TBBPA wastes do not present a significant risk. As stated in the proposed rule, record sampling of an on-site landfill at one plant where TBBPA solids formerly were disposed for a number of years showed the absence of TBBPA and any brominated compounds in the landfill leachate. Therefore, based on the data submitted by the commenter, the available data on the limited toxicity of TBBPA noted above, and the monitoring data, the Agency has decided not to list waste solids from the production of TBBPA.

2. Wastewaters

As discussed in the proposed rule (59 FR 24537), wastewaters from the manufacture of tetrabromobisphenol-A already are listed and carry the hazardous waste code of K131. Methyl bromide and TBBPA are produced in the same process. One commenter objected to the language used in the proposed rule to describe the process step that generates wastewaters. The proposal states ''process wastewater originates from the distillation step where methyl bromide is recovered.'' The commenter contended that the wastewater originated from a distillation step where methanol is recovered. The commenter believed the language in the proposed rule was inconsistent with the existing listing description for K131 and was concerned that EPA was attempting to amend the K131 listing as part of this rulemaking.

The Agency concedes that the language used in the proposed rule was misleading. Indeed, the distillation step is where methanol, or both methanol and methyl bromide, can be recovered, as described in the Listing Background Document. The Agency was not referring to a specific process at any one facility. It was simply attempting to make the point that TBBPA and methyl bromide are produced in the same process and the wastewaters arising from that process meet the existing listing description for K131. As a result, there is no need for further action on a hazardous waste listing for wastewaters from TBBPA production.

In response to a petition filed by the Ethyl Corporation for judicial review of the K131 listing, the Agency stayed the K131 listing as it applies to the ''liquid material exiting the reactor producing methyl bromide located at Ethyl Corporation's production facility.'' This facility currently recycles the wastewaters, after solids removal, to the bromine plant for recovery of bromine values. As directed by the terms of the stay, the Agency is in the process of ''determining whether the wastewater stream generated at this facility contains a solid waste and, if so, whether it is eligible for an exemption or variance.'' EPA clarifies that today's rulemaking does not affect the Agency's ongoing effort to respond to this petition. EPA is not attempting to reach a decision on the applicability of the K131 listing to Ethyl's wastewater stream as part of the listing determination for wastes from organobromines production.

G. Other Issues

One commenter felt that the model used by the Agency for assessing migration of 2,4,6-tribromophenol wastewaters from the deep formations into which they were injected was very conservative and over-estimated potential risks. The commenter felt that many of the assumptions of the model describe physical conditions that are known not to exist.

In response, the Agency notes that the model was intended to represent a conservative scenario in order to identify any potential risk if leakage were to occur. The Agency reexamined the record and agrees that the existing data collected for the site suggest that the release scenario modeled is not likely to exist. The information available indicates that the only abandoned wells found in the area of the injection wells that are deep enough to penetrate the injection zone are in fact known to be plugged and should not serve as potential conduits for release of waste constituents from the injection zone to the upper drinking water aquifer. Furthermore, as noted in the proposed rule, sampling of drinking water wells on the plant site and in the vicinity of the plant did not find any trace of tribromophenol in the groundwater, even though disposal has been occurring for nearly twenty years. In any case, the comment is moot, since EPA has decided not to list wastewaters from the production of 2,4,6-TBP.

One commenter requested that the Agency provide a detailed definition of the term ''production'' as used in the proposed listing description for K140. The commenter suggested that production be defined to limit the reach of the listing to wastes resulting from the actual synthesis of 2,4,6-TBP (*i.e.,* the listing should not encompass wastes from processes that isolate an intermediate or a product other than 2,4,6-TBP).

The Agency does not believe it is necessary for this final rule to define ''production'' because the majority of wastes listed in 40 CFR 261.37 include the unambiguous term ''production.'' The fact that intermediates or co-products may arise from the same process that produces 2,4,6-TBP is irrelevant to the basis for listing the process wastes from the production of 2,4,6-TBP. If listings were constructed so narrowly as to capture wastes from the production of a given product only when the process produced that product alone, vast amounts of process waste containing similarly hazardous constituents would remain unregulated. In this case, by manipulating the process, a producer of tribromophenol may co-produce di-, tetra-, or penta-brominated phenols along with tribromophenol from the same process. If the listing were crafted the way the commenter suggests, the operator of such a process would escape the intent of this regulation, while still producing 2,4,6-TBP.

One commenter expressed concern that the proposed rule may have the unintended effect of increasing the land disposal of wastes containing 2,4,6-TBP by preventing their use as feedstocks to bromine recovery units (BRUs). EPA does not agree with this statement. The listing of TBP production wastes should not affect the current management of these materials in BRUs. EPA clarifies that BRUs are halogen acid furnaces, which meet the definition of industrial furnace in 40 CFR 260.10. As stated in the proposed rule, the combustion of hazardous waste in industrial furnaces is regulated under 40 CFR part 266, subpart H. The commenter noted that EPA issued a correction notice on August 27, 1991 that excluded from regulation certain brominated materials combusted in halogen acid furnaces (56 FR 42504). The Agency agrees that the provision added by the correction notice effectively excludes brominated materials meeting the criteria in 40 CFR 261.2(d)(2)(i)–(iii) from designation as

''inherently waste-like'' materials. Accordingly, these materials are not hazardous wastes; thus, furnaces processing them are not processing hazardous wastes and are not subject to the BIF regulations. Listed and characteristic brominated streams that do not meet the criteria of 40 CFR 261.2(d)(2), *i.e.*, that contain >1% of Appendix VIII materials, are considered inherently waste-like and should not be burned in non-RCRA facilities. Today's listing of TBP wastes does not alter the criteria of this exclusion nor subject the commenter's BRUs to any additional requirements. If the commenter's brominated waste streams meet the criteria for the exclusion, the BRUs to which these streams are fed are not subject to regulation under part 266, subpart H.

Finally, the Agency notes that the sole generator of the 2,4,6-tribromophenol production solids did not attempt to use this material as feedstock for the BRU, even in the absence of a hazardous waste listing.

One commenter questioned the accuracy of early sampling and analysis results obtained at one facility. This commenter submitted a letter to the Agency in 1993 detailing concerns over the quality and accuracy of some of the analytical results. The commenter concluded in the 1993 letter, ''There are a great many non-credible and questionable analyses in this study. We believe that the analytical work will simply not stand up to close scrutiny. The analytical results are not of a quality that lend themselves to making a valid risk assessment or developing regulations for the organo-bromine industry. The validity and accuracy simply aren't there.'' EPA prepared a complete response to the issues enumerated in that letter and has placed it in the public docket for today's rulemaking. EPA notes that none of the questioned data were used as a basis for the decision to list wastes from the production of 2,4,6-tribromophenol.

V. Conclusions

The Agency is listing, as EPA Hazardous Waste No. K140, floor sweepings, off-specification product, and spent filter media from the production of 2,4,6-tribromophenol. EPA is also listing discarded 2,4,6-TBP product as EPA Hazardous Waste No. U408. EPA received no comments objecting to the listing of U408, except to the extent that issues relating to SAR may be considered relevant to the U408 listing. (EPA notes, however, that the analysis completed for the listing of K140 also included an evaluation of the risks posed by off-specification 2,4,6-tribromophenol product. Such off-specification product should be very similar to discarded material that might carry the U408 listing and, as such, the discarded U-waste may present comparable risks and is even more likely to be disposed of in an unlined landfill). EPA responded above, and in the separate Response to Public Comment Document, to all comments on the SAR analysis. These listing determinations are based on the projected toxicity of 2,4,6-TBP from structural activity studies, and the assessment of risk from potential exposure to this chemical. EPA's decision to list these wastes as hazardous represents a determination by the Agency that the wastes identified in this action meet the criteria for listing hazardous wastes presented in 40 CFR 261.11. Specifically, based on available evidence, the Agency concludes that 2,4,6-tribromophenol is similar in toxicity to its chlorinated analogue (2,4,6-trichlorophenol) and, therefore, may pose a risk to human health and the environment if improperly land-disposed.

Based on the data collected by the Agency during the recent organobromines industry study and the unique conditions of the industry regarding limitations to future expansion, EPA believes there is ample justification for a no-list determination for wastes generated from production of the other organobromine chemicals identified in the proposed consent decree (*i.e.*, tetrabromobisphenol A, bromochloromethane, ethyl bromide, octabromodiphenyl oxide, and decabromodiphenyl oxide) and for wastewaters from 2,4,6-tribromophenol production. After considering the collected information and data from toxicological, chemical, hydrogeological, and engineering viewpoints, EPA has concluded that the disposal of any wastes from these processes that are not currently listed in 40 CFR part 261, subpart D does not pose a substantial present or future risk to human health or the environment. Therefore, EPA is not listing any additional hazardous wastes generated from the production of these chemicals. The Agency received no comments objecting to its decision not to list these wastes.

VI. Land Disposal Restrictions

A. Treatment Standards for Organobromine Wastes

In the land disposal restrictions Phase III proposed rule (60 FR 11722, March 2, 1995), EPA proposed that the newly identified K140 and U408 wastes comply with numerical treatment standards for 2,4,6-tribromophenol to be promulgated in 40 CFR 268.40, and that 2,4,6-tribromophenol be added as a underlying hazardous constituent subject to the universal treatment standards of 40 CFR 268.48.

Since treatment data currently are not available for 2,4,6-TBP, the Agency proposed to set the UTS for 2,4,6-TBP based on analytical detection limit data transferred from 2,4,6-trichlorophenol. The structures of 2,4,6-tribromophenol and 2,4,6-trichlorophenol are sufficiently similar to be considered halogenated congeners of phenol. Both halogenated phenols contain three symmetrically placed bromine or chlorine substituents that are difficult to remove by chemical substitution. The chemical behavior and mechanisms of action for 2,4,6-tribromophenol are expected to be similar to its chlorinated analogue, 2,4,6-trichlorophenol. Thus, the Agency proposed the treatment standards for 2,4,6-tribromophenol at 7.4 mg/kg for nonwastewaters and 0.035 mg/L for wastewaters for 2,4,6-tribromophenol.

The Agency solicited comment regarding the achievability of this standard by demonstrated available technologies and regarding the analytical detection limit of 2,4,6-TBP in treatment residual matrices. The Agency also solicited any available data on the concentrations 2,4,6-TBP in treatment residuals from the recovery or destruction of wastes containing 2,4,6-TBP. The analytical method for 2,4,6-TBP is SW–846 method 8270 (GC/MS for semivolatiles, capillary column).

In response to the Agency's request for comment, Chemical Waste Management, Inc. supported the Agency's proposed treatment standards associated with organobromine wastes; the Environmental Technology Council, while objecting to setting treatment standards on the sole basis of analytical detection limits, noted that EPA can use technology transfer to develop standards from similar chlorinated organics. Therefore, EPA is promulgating the proposed UTS for 2,4,6-TBP at 7.4 mg/kg for nonwastewaters and 0.035 mg/L for wastewaters.

B. Applicable Technology

The single facility that produces 2,4,6-TBP wastes uses a bromine recovery unit (BRU) to recover bromine values from organic liquid and vapor waste streams. In this unit, the organics are burned and the combustion products are removed by a wet scrubber. The BRU is a halogen acid furnace which meets the regulatory definition of industrial furnace in 40 CFR 260.10. The

combustion of hazardous waste in industrial furnaces is regulated under 40 CFR part 266, subpart H, which regulates air emissions from these units and requires monitoring and analyses.

Treatment of 2,4,6-TBP wastes in the BRU should be effective in destroying the phenolic component of 2,4,6-tribromophenol and providing for recovery of bromine. Based on available information, EPA proposed that the best demonstrated available technology (BDAT) for 2,4,6-tribromophenol wastes is treatment by BRU. EPA solicited comment on this assertion and on the potential applicability of other technologies which destroy 2,4,6-tribromophenol and provide recovery of bromine.

Great Lakes Chemical Corporation (GLCC) commented that EPA's assumption that TBP waste generated by GLCC currently is managed in a bromine recovery unit (BRU) is incorrect. GLCC maintains that treatment of TBP in the existing BRU would be very difficult, if not impossible (both technically and legally). Accordingly, GLCC concluded that the proposed TBP treatment standard is flawed. The Agency disagrees. Because tribromophenol is not refractory, EPA believes the BRU technology clearly is applicable to waste treatment of the K140 and U408 wastes and, therefore, may form the basis of a standard. There are various combustion technologies capable of meeting the numerical treatment standards, one of which is BRU. The Agency stated in error in the proposal that the existing BRU already is subject to the performance standards of part 266, subpart H. However, in order to treat the listed organobromine wastes, the subject BRU would be subject to the part 266, subpart H performance standards. EPA has assessed the costs associated with incineration of the newly identified organobromine wastes as part of its regulatory impact analysis. See the regulatory impact analysis discussion in Section X of this preamble. Because the Agency has promulgated the universal treatment standards for the organobromine wastes, treaters are free to use any technology capable of achieving the numerical standard promulgated today (so long as the standard is not achieved by means of impermissible dilution).

C. Capacity Analysis Results Summary

1. Introduction

This section summarizes the results of the capacity analysis for the wastes covered by today's rule. For a detailed discussion of capacity analysis-related data sources, methodology, and detailed response to comments for each group of wastes covered in this rule, see the following document: ''Background Document for Capacity Analysis for Land Disposal Restrictions: Surfaced-disposed Organobromine Production Wastes (Final Rule)'' (i.e., the Capacity Background Document).

When EPA establishes land disposal restrictions (LDR) determinations, LDR treatment standards become effective when promulgated unless the Agency grants a national capacity variance delaying the effective date. RCRA section 3004(h)(2), 42 U.S.C. 6924(h)(2) authorizes EPA to grant a national capacity variance for the waste and to establish a different date (not to exceed two years beyond the statutory deadline) based on ''* * * the earliest date on which adequate alternative treatment, recovery, or disposal capacity which protects human health and the environment will be available'' if there is inadequate alternative treatment/recovery capacity.

In general, EPA's capacity analysis focuses on the amount of waste to be restricted from land disposal that is currently managed in land-based units and will therefore require alternative treatment as a result of the LDRs. The quantity of wastes that are not managed in land-based units (e.g., wastewater managed only in RCRA exempt tanks, with discharge to a Publicly Owned Treatment Works (POTW)) is not included in the quantities requiring alternative treatment as a result of the LDRs. Also, wastes that do not require alternative treatment (e.g., those that are currently treated using an appropriate treatment technology) are not included in these quantity estimates. Land-disposed wastes requiring alternative treatment or recovery capacity that is available on-site or within the same company as the generator are also omitted from the required commercial capacity estimates.

EPA's decisions on whether to grant a national capacity variance are based on the availability of alternative treatment or recovery technologies. Consequently, the methodology focuses on deriving estimates of the quantities of waste that will require either commercial treatment or the construction of new on-site treatment or recovery unit as a result of the LDRs. The resulting estimates of required commercial capacity are then compared to estimates of available commercial capacity. If adequate commercial capacity exists, the waste is restricted from further land disposal before meeting the LDR treatment standards. If adequate capacity does not exist, RCRA section 3004(h) authorizes EPA to grant a national capacity variance for the waste for up to two years or until adequate alternative treatment or recovery capacity becomes available.

2. Capacity Analysis Results Summary

A brief summary of the capacity analysis performed to support this rule is presented below. For additional detailed information, please refer to the ''Background Document for Capacity Analysis for Land Disposal Restrictions: Surfaced-disposed Organobromine Production Wastes (Final Rule)''.

For this capacity analysis, EPA examined data on waste characteristics and management practices that have been gathered for the organobromine production industry study in the 1992 RCRA Section 3007 survey. The Agency analyzed the capacity-related information from the survey responses, reviewed the public comments received in response to the proposed rule, and identified the following annualized quantities of newly listed hazardous wastes requiring commercial treatment: Less than 100 tons of organobromine nonwastewater wastes (K140, U408) are expected to require alternative treatment capacity. The available data sources indicate that there are no quantities of K140 and U408 wastewaters that will require alternative commercial treatment, and therefore this volume is assumed to be zero.

EPA is finalizing the rule to apply UTS to these wastes. The treatment standards for organobromine production wastes are concentrations which in turn are based on bromine recovery unit as the BDAT. Additionally, EPA believes that incineration and thermal destruction technologies are applicable technologies to meet these treatment standards. The Agency estimated that the commercially available sludge and solid combustion capacity is approximately 430,000 MT per year and sufficient to treat these wastes when the listing determinations for these wastes become effective. Since EPA is finalizing numerical standards for these wastes, the Agency does not exclude the use of other technologies capable of meeting the final LDR treatment standards. Sufficient commercial capacity exists to treat theses wastes to meet the LDR standards. Therefore, EPA is not granting a national capacity variance under LDR for these wastes. The LDR standards for these wastes will become effective when the listings become effective.

For soil and debris contaminated with the newly listed wastes, EPA proposed to not grant a national capacity variance. EPA received no comments regarding

this issue. EPA believes that the contaminated soil and debris can be managed on-site or if necessary, off-site commercial treatment capacity is available. Therefore, EPA is not granting a national capacity variance to hazardous soil and debris contaminated with the newly listed wastes covered under this rule. Based on the questionnaire, there were no data showing the mixed radioactive wastes with the newly listed wastes. There were also no comments concerning the radioactive wastes mixed with the newly identified wastes. EPA is not granting a national capacity variance for mixed radioactive wastes or soil and debris contaminated with these mixed radioactive wastes.

VII. Waste Minimization Opportunities in the Industry

During the industry study, the Agency identified two potential opportunities for waste minimization. The first involves the recovery of tribromophenol in the tetrabromobisphenol-A and tribromophenol process. Commercial tetrabromobisphenol-A is made by condensation of phenol and acetone and, hence, the feedstock contains some unreacted phenol. Record sampling of one wastewater stream, which leaves the process hot, revealed that it contained tribromophenol. The Agency appreciates the effort that the commenter has made to recover TBP and understands the difficulty of recovering pure product. The Agency received some information from the two manufacturers of TBBPA. One firm claimed the idea was impractical. The second has installed a process to recover a low-grade material which is a mixture containing underbrominated bisphenol-A compounds. It is yet unknown if this material can be marketed successfully as a low-grade flame retardant formulation. The facility has informed the Agency that if the material cannot be marketed it will be sent to Subtitle C facilities for disposal. This plant also is recycling the wastewater, after solids removal, to the bromine plant for recovery of bromine from the sodium bromide present. Removal of the solids is necessary to prevent problems in the bromine recovery operation.

The second area where savings could be achieved is in product packaging. Materials spilled in the packaging areas are drummed and shipped to Subtitle C facilities. Presently, the two major manufacturers of organobromine chemicals generate over 300 tons per year of various spilled solid products. Improved housekeeping in the packaging areas will reduce the volumes of these wastes.

VIII. State Program Implementation

A. Applicability of Rules in States

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

Prior to the Hazardous and Solid Waste Amendments of 1984 (HSWA), a State with final RCRA authorization administered its authorized hazardous waste program entirely in lieu of EPA. The Federal requirements no longer applied in the authorized State, and EPA could not issue permits for any facilities in the State which the State was authorized to permit. When new, more stringent Federal requirements were promulgated or enacted, the State was obliged 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.

In contrast, under section 3006(g) of RCRA (42 U.S.C. 6926(g)), new requirements and prohibitions imposed by the HSWA take effect in authorized States at the same time that they take effect in unauthorized States. EPA is directed to implement these requirements and prohibitions in authorized States, including the issuance of permits, until the State modifies its program to reflect the Federal standards, and applies for and is granted authorization. While EPA initially implements HSWA-related provisions in authorized States, States still must adopt these provisions as State law to retain final authorization.

Today's rule for listing EPA Hazardous Waste Nos. K140 and U408 is being promulgated pursuant to section 3001(e)(2) of RCRA, a provision added by the HSWA. With these rules being promulgated today, EPA considers its HSWA obligation to make a determination regarding listing organobromine wastes to be fulfilled. Therefore, the Agency is adding these requirements to Table 1 in 40 CFR 271.1(j), which identifies the Federal program requirements that are promulgated pursuant to the HSWA and that take effect in all States, regardless of their authorization status. The land disposal restrictions and treatment standards in today's rule are being promulgated pursuant to section 3004(g) and (m) of RCRA, provisions also added by HSWA. Table 2 in 40 CFR 271.1(j) is modified to indicate that these requirements are self-implementing. States may apply for final authorization for the HSWA provisions identified in 40 CFR 271.1(j), as discussed in the following section of the preamble.

B. Effect on State Authorizations

As noted previously, today's rule is being promulgated pursuant to provisions added by HSWA. The additions of K140 to the list of hazardous wastes from specific sources and of U408 to the list of commercial chemical products that are hazardous when discarded are promulgated pursuant to Section 3001(e)(2) of RCRA, a provision added by the HSWA.

The land disposal restrictions and treatment standards are promulgated pursuant to Sections 3004 (g) and (m), also HSWA provisions.

As noted above, EPA will implement the HSWA portions of today's rule in authorized States until they modify their programs to adopt these rules and such modifications are approved by EPA. Because this rule will be promulgated pursuant to HSWA, a State submitting a program modification may apply to receive either interim authorization under RCRA section 3006(g), if the State regulations are substantially equivalent to EPA's regulations, or final authorization under RCRA sections 3006(b), if the State regulations are fully equivalent to EPA's regulations. The procedures and schedule for State programs modifications for either interim or final authorization are described in 40 CFR 271.21. It should be noted that all HSWA interim authorizations will expire on January 1, 2003 (see 40 CFR 271.24(c), 52 FR 60129, December 18, 1992).

It should be noted that 40 CFR 271.21(e) requires that States having final RCRA authorization must modify their programs to reflect Federal program changes and subsequently must submit the modifications to EPA for approval. The deadline by which States must modify their programs to adopt today's rule will be determined by the date of promulgation of the final rule in accordance with 40 CFR 271.21(e)(2). 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 in today's rule. Such State regulations have not been assessed against the Federal regulations being promulgated today to determine whether they meet the tests for authorization. Thus, these State regulations will not be deemed as RCRA

requirements until the State program modification is submitted to EPA and approved. Of course, States with existing regulations may continue to administer and enforce those regulations as a matter of State law. In addition, in implementing the Federal program, EPA will work with the States under cooperative agreements to minimize duplication of efforts; in many cases, EPA will be able to defer to the States in their efforts to implement their programs, rather than take separate actions under Federal authority.

States that submit their official applications for final authorization less than 12 months after the effective date of EPA's regulations are not required to include regulations equivalent to the EPA regulations in their application. However, States must modify their programs by the deadlines set forth in 40 CFR 271.21(e). States that submit official applications for final authorization 12 months after the effective date of these standards must include standards equivalent to these standards in their application. The requirements States must meet when submitting final authorization applications are set forth in 40 CFR 271.3.

IX. Compliance and Implementation

A. Section 3010 Notification

Generally, when new hazardous wastes are listed, all persons who generate, transport, treat, store, or dispose of the newly listed wastes are required to notify either EPA, or a State authorized by EPA to operate the hazardous waste program, of their activities pursuant to section 3010 of RCRA. However, under the Solid Waste Disposal Amendments of 1980 (Pub. L. 96–482), EPA was given the option of waiving the notification requirement for persons who handle wastes that are covered by today's listing and already have notified EPA that they manage other hazardous wastes and have received an EPA identification number. This waiver is being promulgated because of the likelihood that persons managing today's promulgated wastes already are managing one or more hazardous wastes that generally are associated with the generation of EPA Hazardous Waste Nos. K140 and U408 and, therefore, have previously notified EPA and received an EPA identification number. In the event that any person who generates, transports, treats, stores, or disposes these wastes and has not previously notified and received an identification number, that person must obtain an identification number pursuant to 40 CFR 262.12 before that person can generate, transport, treat, store, or dispose of these wastes.

B. Compliance Dates for Facilities

The effective date of today's rule is November 4, 1998. Today's listings will be promulgated pursuant to HSWA. HSWA requirements are applicable in authorized States at the same time as in unauthorized States. Therefore, EPA will regulate the wastes being promulgated today until States are authorized to regulate these wastes. Once these regulations are promulgated in a final rule by EPA, the Agency will apply these Federal regulations to these wastes and to their management in both authorized and unauthorized States.

1. Facilities Newly Subject to RCRA Permit Requirements

Facilities that treat, store, or dispose of wastes that are subject to RCRA regulation for the first time by this rule (that is, facilities that have not previously received a permit pursuant to section 3005 of RCRA and are not currently operating pursuant to interim status), might be eligible for interim status (see section 3005(e)(1)(A)(ii) of RCRA). In order to obtain interim status based on treatment, storage or disposal of such newly identified wastes, eligible facilities are required to comply with 40 CFR 270.70(a) and 270.10(e) by providing notice under section 3010 and submitting a Part A permit application no later than November 4, 1998. Such facilities are subject to regulation under 40 CFR part 265 until a permit is issued.

In addition, under section 3005(e)(3)and 40 CFR 270.73(d), not later than November 4, 1998, land disposal facilities newly qualifying for interim status under section 3005(e)(1)(A)(ii) also must submit a Part B permit application and certify that the facility is in compliance with all applicable groundwater monitoring and financial responsibility requirements. If the facility fails to submit these certifications and a permit application, interim status will terminate on that date.

2. Existing Interim Status Facilities

Pursuant to 40 CFR 270.72(a)(1), all existing hazardous waste management facilities (as defined in 40 CFR 270.2) that treat, store, or dispose of the newly identified hazardous wastes and are currently operating pursuant to interim status under section 3005(e) of RCRA must file an amended Part A permit application with EPA no later than the effective date of today's rule, (i.e., November 4, 1998. By doing this, the facility may continue managing the newly listed wastes. If the facility fails to file an amended Part A application by that date, the facility will not receive interim status for management of the newly listed hazardous wastes, and may not manage those wastes until the facility receives either a permit or a change in interim status allowing such activity (40 CFR 270.10(g)).

3. Permitted Facilities

Facilities that already have RCRA permits must request permit modifications if they want to continue managing newly listed wastes. See 40 CFR 270.42(g). This provision states that a permittee may continue managing the newly listed wastes by following certain requirements, including submitting a Class 1 permit modification request by the date on which the waste or unit becomes subject to the new regulatory requirements (i.e., the effective date of today's rule), complying with the applicable standards of 40 CFR parts 265 and 266, and submitting a Class 2 or 3 permit modification request within 180 days of the effective date.

Generally, a Class 2 modification is appropriate if the newly listed wastes will be managed in existing permitted units or in newly regulated tank or container units and will not require additional or different management practices than those authorized in the permit. A Class 2 modification requires the facility owner to provide public notice of the modification request, a 60-day public comment period, and an informal meeting between the owner and the public within the 60-day period. The Class 2 process includes a ''default provision,'' which provides that if the Agency does not reach a decision within 120 days, the modification is automatically authorized for 180 days. If the Agency does not reach a decision by the end of that period, the modification is permanently authorized. See 40 CFR 270.42(b).

A Class 3 modification is generally appropriate if management of the newly listed wastes requires additional or different management practices than those authorized in the permit or if newly regulated land-based units are involved. The initial public notification and public meeting requirements are the same as for Class 2 modifications. However, after the end of the 60-day public comment period, the Agency will grant or deny the permit modification request according to the more extensive procedures of 40 CFR part 124. There is no default provision for Class 3 modifications. See 40 CFR 270.42(c).

Under 40 CFR 270.42(g)(1)(v), for newly regulated land disposal units, permitted facilities must certify that the facility is in compliance with all

applicable 40 CFR part 265 ground-water monitoring and financial responsibility requirements no later than November 4, 1998. If the facility fails to submit these certifications, authority to manage the newly listed wastes under 40 CFR 270.42(g) will terminate on that date.

X. Listing as CERCLA Hazardous Substances and RQ Adjustment

All hazardous wastes listed in 40 CFR 261.31 through 261.33, as well as any solid waste that meets one or more of the characteristics of a RCRA hazardous waste (as defined at 40 CFR 261.21 through 261.24), are hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), pursuant to CERCLA section 101(14)(C), 42 U.S.C. 9601(14). CERCLA hazardous substances and their reportable quantities (RQs) are listed in Table 302.4 at 40 CFR 302.4. Therefore, in addition to the K140 listing being promulgated today for 40 CFR 261.32 and the U408 listing being promulgated for 40 CFR 261.33, the Agency also is adding K140 and 2,4,6-tribromophenol to the list of CERCLA hazardous substances at Table 302.4 of 40 CFR 302.4.

Reporting Requirements. Under CERCLA section 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.[11] In addition to this reporting requirement under CERCLA, section 304 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA), 42 U.S.C. 11004, requires owners or operators of certain facilities to report the release of a CERCLA hazardous substance in a quantity that equals or exceeds its RQ 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.

Adjustment of RQs. Under section 102(b) of CERCLA, all hazardous substances under CERCLA have 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.[12] The intrinsic properties examined—called ''primary criteria''—are aquatic toxicity, acute 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, 1000, or 5000 pounds. Each hazardous substance may receive several tentative RQ values based on the primary criteria. The lowest of the tentative RQs becomes the ''primary criteria RQ'' for that substance.

After the primary criteria RQs are assigned, substances are evaluated further for their susceptibility to certain degradative processes, which are used as secondary RQ 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) generally is raised one level.[13] 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 product after its release, the original substance is assigned an RQ equal to the RQ for the more hazardous substance, which may be one or more levels lower than the RQ (as determined by the primary RQ adjustment criteria) for the original substance. The downward adjustment is appropriate because the potential for harm posed by the release of the original substance is increased as a result of degradative processes.

The methodology summarized above is applied to adjust the RQs of individual hazardous substances. An additional process applies to RCRA listed wastestreams, which contain individual hazardous constituents. As the Agency has stated (54 FR 33440, August 14, 1989), to assign an RQ to a RCRA wastestream, the Agency determines the RQ for each constituent within the wastestream and establishes the lowest RQ value of these constituents as the adjusted RQ for the wastestream.

Adjusted RQs for 2,4,6-tribromophenol and K140. Waste U408 is 2,4,6-tribromophenol, an individual hazardous substance. It has been evaluated for the six primary RQ adjustment criteria—aquatic toxicity, acute mammalian toxicity, ignitability, reactivity, chronic toxicity, and potential carcinogenicity—and the secondary adjustment criteria of BHP. Available studies of aquatic toxicity have measured an LC50 of 6.54 mg/L for the fathead minnow, resulting in a primary criterion RQ of 100 pounds for the substance.

In addition, based on an analysis of the structural and chemical similarities of 2,4,6-tribromophenol and 2,4,6-trichlorophenol and an evaluation of the potential carcinogenicity of the latter of the two substances, EPA has estimated a low hazard ranking for the potential carcinogenicity of 2,4,6-tribromophenol. This low hazard ranking results in a primary criterion RQ of 100 pounds. Based on this evaluation and the absence of relevant BHP data, the Agency today is finalizing an adjusted RQ of 100 pounds for 2,4,6-tribromophenol.

The EPA is adjusting the RQ of waste K140 in accordance with the methodology for adjusting RQs of hazardous wastestreams by assigning them RQs equal to that of the wastestream constituent with the lowest RQ.

XI. Regulatory Impact Analysis and Compliance Costs

A. Regulatory Impact Analysis Pursuant to Executive Order 12866

Executive Order 12866 requires that a regulatory agency determine whether a new regulation will have ''significant regulatory action'' and, if so, that a cost-benefit analysis be conducted. This analysis is a quantification of the potential benefits, costs, and economic impacts of a rule. A significant regulatory action is defined as a regulation that has an annual cost to the economy of $100 million or more that adversely affects in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or

[11] The toll free telephone number of the National Response Center is 800–424–8802; in the Washington, DC metropolitan area, the number is 202–267–2675.

[12] For more detailed information on this methodology, see the preamble to an RQ adjustment final rule published on August 14, 1989 (54 FR 33426). A different methodology is used to assign adjusted RQs to radionuclides (see 54 FR 22524, May 24, 1989).

[13] No RQ level increase based on BHP occurs if the primary criteria RQ already is at its highest possible level (100 pounds for potential carcinogens and 5000 pounds for all other types of hazardous substances except radionuclides). BHP is not applied to radionuclides.

state, local, or tribal governments or communities; creates a serious inconsistency with actions taken or planned by another agency; materially alters the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations or recipients thereof; or raises 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 estimated the costs of today's rule to determine if it is a significant regulation as defined by Executive Order 12866. Today's rule is estimated to have an annualized incremental cost of well below $100,000. Based on this compliance cost estimate, today's rule is not considered to be an economically significant regulatory action. However, the Agency believes that this action is significant for novel policy reasons. The following section discusses the results of the economic analyses used to support the Agency's determination.

Approach

To estimate the costs, economic impacts, and benefits of today's rule, the Agency compared post-regulatory costs, benefits, and economic impacts with those resulting under baseline conditions. Benefits are addressed in the risk assessment section of this preamble. The baseline management practice for this waste is disposal in a Subtitle D landfill, because this would the least expensive disposal option.

Results

The facility generating this waste is already in the Subtitle C universe because it generates other listed hazardous wastes. Therefore, costs associated with entering the RCRA hazardous waste system are not attributable to this listing. The owner/operator of the affected facility currently manage wastes off-site, and it is assumed for purposes of this analysis that off-site management would continue under Subtitle C.

At the time of the proposed listing there were two available options for handling the waste—land filling and incineration. The initial costs were based on the cost of management in a Subtitle C landfill. During the time between the proposal and final promulgation of this listing, Land Disposal Restrictions (LDRs), requiring incineration, were proposed for this waste. Using costs from the *Assessment of the Potential Costs and Benefits of the Hazardous Waste Identification Rule for Industrial Process Wastes*, Volume One: Chapter 3, May 25, 1995, incineration of low volumes of hazardous waste are assumed to be $1,428/ton. Additionally, costs of $130/ton are needed to handle the residual which is assumed to be one-quarter of the original tonnage, by weight. For disposal of the 34 tons [14] of waste and residual generated by the affected facility, the marginal compliance cost of this listing would be' would less than $48,000 per year. The transportation costs are assumed to equivalent to the Subtitle D handling because there is a hazardous waste incinerator in El Dorado, Arkansas.

Disposal method		Cost/year	Marginal difference
Hazardous			
	Incineration	$48,552	
	Residual-Sub C	1,105	
	Land filling		
	Total post-rule	49,657	
Baseline	Subtitle D landfilling	1,700	47,957

B. Regulatory Flexibility Analysis

Pursuant to the Regulatory Flexibility Act of 1980, 5 U.S.C. 601 *et seq.*, when an agency publishes a notice of rulemaking, for a rule that will have a significant effect on a substantial number of small entities, the agency must prepare and make available for public comment a regulatory flexibility analysis that considers the effect of the rule on small entities (*i.e.*, small businesses, small organizations, and small governmental jurisdictions).

With respect to organobromine producing facilities that are small entities, the Agency does not believe that today's final rulemaking will have a significant impact. The organobromine chemical-producing industry in the U.S. is geographically limited by the location of underground bromide-bearing brine deposits. EPA identified two firms in southern Arkansas that account for 95% of the organobromine chemicals produced in the U.S. EPA evaluated the economic effect of the rule as discussed in the cost and economic impact section of this rulemaking, and determined that no facilities would be significantly affected.

For the reasons discussed above in the cost and economic impact section, EPA has determined that today's final rule will not have a significant impact to a substantial number of these small entities. Based on the foregoing discussion, I hereby certify that this rule will not have a significant adverse economic impact on a substantial number of small entities. This rule, therefore, does not require a regulatory flexibility analysis.

XII. Paperwork Reduction Act

This rule does not contain any new information collection requirements subject to OMB review under the Paperwork Reduction Act of 1995, 44 U.S.C. 3501 *et seq.* Facilities will have to comply with the existing Subtitle C recordkeeping and reporting requirements for the newly listed wastestreams.

To the extent that this rule imposes any information collection requirements under existing RCRA regulations promulgated in previous rulemakings, those requirements have been approved by the Office of Management and Budget (OMB) under the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.*, and have been assigned OMB control numbers 2050–0009 (ICR 1573, Part B Permit Application, Permit Modifications, and Special Permits); 2050–0120 (ICR 1571, General Facility Hazardous Waste Standards); 2050–0028 (ICR 261, Notification of Hazardous Waste Activity); 2050–0034 (ICR 262, RCRA Hazardous Waste Permit Application and Modification, Part A); 2050–0039 (ICR 801, Requirements for Generators, Transporters, and Waste Management Facilities under the Hazardous Waste Manifest System); 2050–0035 (ICR 820, Hazardous Waste Generator Standards);

[14] In the proposal, this analysis considered waste volumes as CBI, however, in the docket comments received by the Agency from Great Lakes Chemical Company publicly state the generation of 34 tons of waste per year.

and 2050-0024 (ICR 976, 1997 Hazardous Waste Report).

Release reporting required as a result of listing wastes as hazardous substances under CERCLA and adjusting the reportable quantities (RQs) has been approved under the provisions of the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.*, and has been assigned OMB control number 2050–0046 (ICR 1049, Notification of Episodic Release of Oil and Hazardous Substances).

XIII. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Public Law 104–4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on state, local, and tribal governments, and on 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.

EPA has determined that this rule does not include a Federal mandate that may result in estimated costs of $100 million or more to either State, local, or tribal governments in the aggregate because this rule imposes no enforceable duty on any State, local, or tribal governments. The rule would not impose any federal intergovernmental mandate because it imposes no enforceable duty upon State, tribal or local governments. States, tribes and local governments would have no compliance costs under this rule, which applies only to facilities managing the listed organobromine production wastes and the discarded product waste. It is expected that states will adopt similar rules, and submit those rules for inclusion in their authorized RCRA programs, but they have no legally enforceable duty to do so.

For the same reasons, EPA also has determined that this rule contains no regulatory requirements that might significantly or uniquely affect small governments. In addition, as discussed above, the private sector is not expected to incur costs exceeding $100 million. EPA has fulfilled the requirement for analysis under the Unfunded Mandates Reform Act.

XIV. National Technology Transfer and Advancement Act

Under section 12(d) of the National Technology Transfer and Advancement Act (''NTTAA''), the Agency is required to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., materials specifications, test methods, sampling procedures, business practice, etc.) which are developed or adopted by voluntary consensus standard bodies. Where available and potentially applicable voluntary consensus standards are not used by EPA, the Act requires the Agency to provide Congress, through the Office of Management and Budget, an explanation of the reasons for not using such standards. EPA identified no potentially applicable voluntary consensus standards for today's final rule.

XV. Submission to Congress and the General Accounting Office

Under 5 U.S.C. 801(A)(1)(a) as added by the Small Business Regulatory Enforcement Act of 1996, EPA submitted a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives and the Comptroller General of the General Accounting Office prior to publication of the rule in today's **Federal Register**. This rule is not a ''major rule'' as defined by 5 U.S.C. 804(2).

List of Subjects

40 CFR Part 148

Administrative practice and procedure, Hazardous waste, Reporting and recordkeeping requirements, Water supply.

40 CFR Part 261

Environmental protection, Hazardous wastes, Recycling, Reporting and recordkeeping requirements.

40 CFR Part 268

Hazardous waste, Reporting and recordkeeping requirements.

40 CFR Part 271

Environmental protection, Administrative practice and procedure, Confidential business information, Hazardous materials transportation, Hazardous waste, Indian lands, Intergovernmental relations, Penalties, Reporting and recordkeeping requirements, Water pollution control, Water supply.

40 CFR Part 302

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

Dated: April 15, 1998.

Carol M. Browner,

Administrator.

For the reasons set out in the preamble, title 40 of the Code of Federal Regulations is amended as follows:

PART 148—HAZARDOUS WASTE INJECTION RESTRICTIONS

1. The authority citation for part 148 continues to read as follows:

Authority: Secs. 3004, Resource Conservation and Recovery Act, 42 U.S.C. 6901 *et seq.*

2. Section 148.18 is amended by adding paragraph (f) to read as follows:

§ 148.18 Waste specific prohibitions-newly listed and identified wastes.

* * * * *

(f) Effective August 3, 1998, the wastes specified in 40 CFR 261.32 as EPA Hazardous Waste number K140, and in 40 CFR 261.33(f) as EPA Hazardous Waste number U408 are prohibited from underground injection.

PART 261—IDENTIFICATION AND LISTING OF HAZARDOUS WASTE

3. The authority citation for Part 261 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a), 6921, 6922, 6924(y) and 6938.

4. In § 261.32 the table is amended by adding in numerical order the following waste stream to the subgroup 'Organic chemicals':

§ 261.32 Hazardous wastes from specific sources.

* * * * *

Industry and EPA hazardous waste No.	Hazardous waste	Hazard code
*	*	*
K140	Floor sweepings, off-specification product and spent filter media from the production of 2,4,6-tribromophenol.	(T)

Industry and EPA hazardous waste No.	Hazardous waste	Hazard code
*	*	*

5. In § 261.33(f) the table is amended by adding in numerical order the following substance to read as follows:

§ 261.33 Discarded commercial chemical products, off-specification species, container residues, and spill residues thereof.

* * * * *

(f) * * *

Hazardous waste No.	Chemical abstracts No.	Substance
*	*	*
U408	118–79–6	2,4,6-Tribromophenol.
*	*	*

6. Appendix VII to Part 261 is amended by adding the following waste stream in alphanumeric order.

Appendix VII to Part 261—Basis for Listing Hazardous Waste

EPA hazardous waste No.	Hazardous constituents for which listed
*	*
K140	2,4,6-Tribromophenol.
*	*

7. Appendix VIII to Part 261 is amended by adding the following hazardous constituent in alphabetical order:

Appendix—VIII to Part 261—Hazardous Constituents

Common name	Chemical abstracts name	Chemical abstracts No.	Hazardous waste No.
*	*	*	*
2,4,6-Tribromophenol	Tribromophenol, 2,4,6–	118–79–6	U408
*	*	*	*

PART 268—LAND DISPOSAL RESTRICTIONS

8. The authority citation for Part 268 continues to read as follows:

Subpart C—Prohibitions on Land Disposal

Authority: 42 U.S.C. 6905, 6912(a), 6921, and 6924.

9. Section 268.33 is added to read as follows:

§ 268.33 Waste-specific prohibitions—organobromine wastes.

(a) Effective November 4, 1998, the waste specified in 40 CFR 261.32 as EPA Hazardous Wastes Numbers K140, and in 40 CFR 261.33 as EPA Hazardous waste number U408 are prohibited from land disposal. In addition, soils and debris contaminated with these wastes, radioactive wastes mixed with these hazardous wastes, and soils and debris contaminated with these radioactive mixed wastes, are prohibited from land disposal.

(b) Between May 4, 1998 and November 4, 1998, the wastes included in the paragraph (a) of this section may be disposed in a landfill or surface impoundment only if such unit is in compliance with the requirements specified in § 268.5(h)(2).

(c) The requirements of paragraphs (a) and (b) of this section do not apply if:

(1) The wastes meet the applicable treatment standards specified in subpart D of this part;

(2) Persons have been granted an exemption from a prohibition pursuant to a petition under § 268.6, with respect to those wastes and units covered by the petition;

(3) The wastes meet the applicable treatment standards established pursuant to a petition granted under § 268.44;

(4) Hazardous debris that has met treatment standards in § 268.40 or in the alternative treatment standards in § 268.45; or

(5) Persons have been granted an extension to the effective date of a prohibition pursuant to § 268.5, with respect to these wastes covered by the extension.

(d) To determine whether a hazardous waste identified in this section exceeds the applicable treatment standards specified in § 268.40, the initial generator must test a sample of the waste extract or the entire waste, depending on whether the treatment standards are expressed as concentrations in the waste extract or the waste, or the generator may use knowledge of the waste. If the waste contains constituents (including underlying hazardous constituents in characteristic wastes that have been diluted to remove the characteristic) in excess of the applicable Universal Treatment Standard levels of § 268.48, the waste is prohibited from land disposal, and all requirements of this part 268 are applicable, except as otherwise specified.

Subpart D—Treatment Standards

10. In § 268.40 the table is amended by adding in alphanumeric order the following new entries. The appropriate footnotes are republished without change.

§ 268.40 Applicability of treatment standards.

* * * * *

TREATMENT STANDARDS FOR HAZARDOUS WASTES

[Note: NA means not applicable]

Waste Code	Waste Description and Treatment/Regulatory Subcategory [1]	Regulated Hazardous Constituent		Wastewaters	Non-wastewaters
		Common Name	CAS [2] number	Concentration in mg/L [3]; or Technology Code [4]	Concentration in mg/kg [5] unless noted as "mg/L TCLP"; or Technology Code
*	* * *	*	*	*	
K140	Floor sweepings, off-specification product, and spent filter media from the production of 2,4,6-tribromophenol.	2,4,6-Tribromophenol	118–79–6	0.35	7.4
*	* * *	*	*	*	
U408	2,4,6-Tribromophenol	2,4,6-Tribromophenol	118–79–6	0.035	7.4
*	* * *	*	*	*	

[1] The waste descriptions provided in this table do not replace waste descriptions in 40 CFR 261. Descriptions of Treatment/Regulatory Subcategories are provided, as needed, to distinguish between applicability of different standards.

[2] CAS means Chemical Abstract Services. When the waste code and/or regulated constituents are described as a combination of a chemical with it's salts and/or esters, the CAS number is given for the parent compound only.

[3] Concentration standards for wastewaters are expressed in mg/l are based on analysis of composite samples.

[4] All treatment standards expressed as a Technology Code or combination of Technology Codes are explained in detail in 40 CFR 268.42 Table 1—Technology Codes and Descriptions of Technology-Based Standards.

[5] Except for Metals (EP or TCLP) and Cyanides (Total and Amenable) the nonwastewater treatment standards expressed as a concentration were established, in part, based upon incineration in units operated in accordance with the technical requirements of 40 CFR Part 264 Subpart O or Part 265 Subpart O, or based upon combustion in fuel substitution units operating in accordance with applicable technical requirements. A facility may comply with these treatment standards according to provisions in 40 CFR 268.40(d). All concentration standards for nonwastewaters are based on analysis of grab samples.

* * * * *

11. In § 268.48(a), the table is amended by adding in alphabetical order the following new entry as follows: The appropriate footnotes are republished without change.

§ 268.48 Universal treatment standards.

(a) * * *

UNIVERSAL TREATMENT STANDARDS

[Note: NA means not applicable]

Regulated constituent/common name	CAS [1] Number	Wastewater standard	Nonwastewater standard
		Concentration in mg/L [2]	Concentration in mg/kg [3] unless noted as "mg/L TCLP"
* * * * *	*		*
2,4,6-Tribromophenol	118–79–6	0.035	7.4
* * * * *	*		*

[1] CAS means Chemical Abstract Services. When the waste code and/or regulated constituents are described as a combination of a chemical with it's salts and/or esters, the CAS number is given for the parent compound only.

[2] Concentration standards for wastewaters are expressed in mg/l are based on analysis of composite samples.

[3] Except for Metals (EP or TCLP) and Cyanides (Total and Amenable) the nonwastewater treatment standards expressed as a concentration were established, in part, based upon incineration in units operated in accordance with the technical requirements of 40 CFR part 264, subpart O or 40 CFR part 265, subpart O, or based upon combustion in fuel substitution units operating in accordance with applicable technical requirements. A facility may comply with these treatment standards according to provisions in 40 CFR 268.40(d). All concentration standards for nonwastewaters are based on analysis of grab samples.

* * * * * *

PART 271—REQUIREMENTS FOR AUTHORIZATION OF STATE HAZARDOUS WASTE PROGRAMS

12. The authority citation for Part 271 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a), and 6926.

13. Section 271.1(j) is amended by adding the following entries to Tables 1 and 2 in chronological order by date of publication to read as follows.

§ 271.1 Purpose and scope.

* * * * *

(j) * * *

TABLE 1.—REGULATIONS IMPLEMENTING THE HAZARDOUS AND SOLID WASTE AMENDMENTS OF 1984

Promulgation date	Title of regulation	Federal Register reference	Effective date
* *	* *	* *	* *
May 4, 1998	Listing of Organobromine Production Wastes.	[Insert Federal Register reference page cite from publication date]..	November 4, 1998
* *	* *	* *	* *

* * * * *

TABLE 2.—SELF-IMPLEMENTING PROVISIONS OF THE SOLID WASTE AMENDMENTS OF 1984

Effective date	Self-implementing provision	RCRA citation	Federal Register reference
* *	* *	* *	* *
August 3, 1998	Prohibition on land disposal of newly listed and identified wastes.	3004(g)(4)(C) and 3004(m)	[Insert date of publication; FR page numbers]
May 4, 2000	Prohibition on land disposal of radioactive waste mixed with the newly listed and identified wastes, including soil and debris.	3004(m) 3004(g)(4)(C) and 3004(m)	Do. Do. Do.
* *	* *	* *	* *

* * * * *

Part 302—DESIGNATION, REPORTABLE QUANTITIES, AND NOTIFICATION

14. The authority citation for Part 302 continues to read as follows:

Authority: 42 U.S.C. 9602, 9603, and 9604; 33 U.S.C. 1321 and 1361.

15. Section 302.4 is amended by adding the following entries to Table 302.4 and its Appendix A as set forth below. The appropriate footnotes to Table 302.4 are republished without change.

TABLE 302.4.—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code +	RCRA Waste Number	Category	Pounds (Kg)
2,4,6-tribromophenol	118796		100	4	U408	B	100 (45.4)
* *	*	*	*	*	*	*	*
K140 Floor sweepings, off-specification product and spent filter media from the production of 2,4,6-tribromophenol..			1*	4	K140	B	## 100 (45.4)
* *	*	*	*	*	*	*	*

* * * * * * *

4—indicates that the statutory source for designation of this hazardous substance under CERCLA is RCRA Section 3001.

1*—indicates that the 1-pound RQ is a CERCLA statutory RQ.

* * * * * * *

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES

CAIRN	Hazardous substance
* * * * * * *	
118796	2,4,6-Tribromophenol
* * * * * * *	

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