ENVIRONMENTAL PROTECTION AGENCY

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

[SWH–FRL–6864–5]

RIN 2050–AE49

Hazardous Waste Management System; Identification and Listing of Hazardous Waste: Inorganic Chemical Manufacturing Wastes; Land Disposal Restrictions for Newly Identified Wastes; and CERCLA Hazardous Substance Designation and Reportable Quantities

AGENCY: Environmental Protection Agency.

ACTION: Proposed rule.

SUMMARY: The Environmental Protection Agency (EPA) proposes to amend the regulations for hazardous waste management under the Resource Conservation and Recovery Act (RCRA) by listing as hazardous three wastes generated from inorganic chemical manufacturing processes. We also propose not to list as hazardous various other process wastes. This action proposes to add the toxic constituents found in the wastes to the list of constituents that serves as the basis for classifying wastes as hazardous, and to establish treatment standards for the wastes.

The effect of this proposed regulation would be to subject the wastes to stringent management and treatment standards under Subtitle C of RCRA. Additionally, this action proposes to designate the wastes proposed for listing as hazardous substances subject to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and to adjust the one-pound statutory reportable quantities (RQs) for some of these substances.

DATES: EPA will accept public comments on this proposed rule until November 13, 2000. Comments postmarked after this date will be marked ''late'' and may not be considered. Any person may request a public hearing on this proposal by filing a request with Mr. David Bussard by September 28, 2000.

ADDRESSES: If you wish to comment on this proposed rule, you must send an original and two copies of the comments referencing docket number F–2000–ICMP–FFFFF to: RCRA Information Center, Office of Solid Waste (5305G), U.S. Environmental Protection Agency Headquarters, 1200 Pennsylvania Avenue, NW, Washington, D.C. 20460. Hand deliveries of comments should be made to RCRA Information Center, Crystal Gateway I, First Floor, 1235 Jefferson Davis Highway, Arlington, VA.

You also may submit comments electronically by sending electronic mail through the Internet to: *rcradocket@epamail.epa.gov.* You should identify comments in electronic format with the docket number F–2000–ICMP–FFFFF. You must submit all electronic comments as an ASCII (text) file, avoiding the use of special characters and any form of encryption.

Address requests for a hearing to Mr. David Bussard at: Office of Solid Waste, Hazardous Waste Identification Division (5304W), U.S. Environmental Protection Agency, 1200 Pennsylvania Avenue, NW, Washington, D.C. 20460, (703) 308–8880.

FOR FURTHER INFORMATION CONTACT: For general information, contact the RCRA/Superfund Hotline at (800) 424–9346 or TDD (800) 553–7672 (hearing impaired). In the Washington, D.C., metropolitan area, call (703) 920–9810 or TDD (703) 412–3323. For specific aspects of the rule, contact Ms. Gwen DiPietro, Office of Solid Waste (5304W), U.S. Environmental Protection Agency, 1200 Pennsylvania Avenue, NW, Washington, D.C., 20460. [E-mail addressee and telephone number: *dipietro.gwen@epa.gov* (703–308–8285).] For technical information on the CERCLA aspects of this rule, contact Ms. Lynn Beasley, Office of Emergency and Remedial Response, Analytical Operations and Data Quality Center (5204G), U.S. Environmental Protection Agency, 1200 Pennsylvania Avenue, NW, Washington, D.C. 20460, [E-mail address and telephone number: *beasley.lynn@epa.gov* (703–603–9086).]

SUPPLEMENTARY INFORMATION: If you do not submit comments electronically, we ask you to voluntarily submit one additional copy of your comments on labeled personal computer diskettes in ASCII (text) format or a word processing format that can be converted to ASCII (text). It is essential to specify on the disk label the word processing software and version/edition as well as your name. This will allow us to convert the comments into one of the word processing formats we utilize. Please use mailing envelopes designed to physically protect the submitted diskettes. We emphasize that submission of comments on diskettes is not mandatory nor will it result in any advantage or disadvantage to any commenter.

You should not submit electronically any confidential business information (CBI). You must submit an original and two copies of CBI under separate cover to: RCRA CBI Document Control Officer, Office of Solid Waste (5305W), U.S. EPA, 1200 Pennsylvania Avenue, NW, Washington, D.C. 20460. Any CBI data should be specifically and clearly marked. In addition, please submit a non-CBI version of your comments for inclusion in the public record.

Supporting documents in the docket for this proposal are also available in electronic format on the Internet: <*http://www.epa.gov/epaoswer/hazwaste/id/inorchem/pr2000.htm*>.

We will keep the official record for this action in paper form. Accordingly, we will transfer all comments received electronically into paper form and place them in the official record, which also will include all comments submitted directly in writing. The official record is the paper record maintained at the RCRA Information Center, also referred to as the Docket.

Our responses to comments, whether the comments are written or electronic, will be in a notice in the **Federal Register** or in a response to comments document placed in the official record for this rulemaking. We will not immediately reply to commenters electronically other than to seek clarification of electronic comments that may be corrupted in transmission or during conversion to paper form, as discussed above.

You may view public comments and supporting materials in the RCRA Information Center (RIC), located at Crystal Gateway I, First Floor, 1235 Jefferson Davis Highway, Arlington, VA. The RIC is open from 9 a.m. to 4 p.m., Monday through Friday, excluding federal holidays. To review docket materials, we recommend that you make an appointment by calling 703–603–9230. You may copy a maximum of 100 pages from any regulatory docket at no charge. Additional copies cost $0.15/page.

Customer Service

How Can I Influence EPA's Thinking on This Proposed Rule?

In developing this proposal, we tried to address the concerns of all our stakeholders. Your comments will help us improve this rule. We invite you to provide your comments on all data, assumptions and methodologies used to support our proposal, your views on options we have proposed, your ideas on new approaches we have not considered, any new data you may have, your views on how this rule may affect you, and other relevant information. Your comments must be submitted by the deadline in this proposal. Your comments will be most effective if you follow the suggestions below:

- Explain your views as clearly as possible and provide a summary of the reasoning you used to arrive at your conclusions. Provide examples to illustrate your views wherever possible.
- Provide solid technical data to support your views.
- If you estimate potential costs, explain how you arrived at your estimate.
- Tell us which parts of this proposal you support, as well as which parts you disagree with.
- Offer specific alternatives.
- Reference your comments to specific sections of the proposal by using section titles or page numbers of the preamble or the regulatory citations.
- Clearly label any CBI submitted as part of your comments.
- Include your name, date, and docket number with your comments.

Contents of This Proposed Rule

I. Overview

A. Who Potentially Will Be Affected by This Proposed Rule?

Beginning January 1, 1999 all documents related to EPA's regulatory, compliance and enforcement activities, including rules, policies, interpretive guidance, and site-specific determinations with broad application, should properly identify the regulated entities, including descriptions that correspond to the applicable SIC codes or NAICS codes (source: October 9, 1998 USEPA memo from Peter D. Robertson, Acting Deputy Administrator of USEPA). Today's action, if finalized, could potentially affect those who handle the wastes that we are proposing to add to EPA's list of hazardous wastes under the RCRA program. This action also may affect entities that may need to respond to releases of these wastes as CERCLA hazardous substances. These potentially-affected entities are described in the Economics Background Document placed in the docket in support of today's proposed rule. A summary is shown in the table below.

SUMMARY OF FACILITIES POTENTIALLY AFFECTED BY THE USEPA'S 2000 INORGANIC CHEMICAL MANUFACTURING WASTE LISTING PROPOSAL

Item	SIC code	Industry sector name	Number of U.S. relevant inorganic mfg. facilities
1	2816	Inorganic Pigments	3
1	2819	Industrial Inorganic Chemicals, not elsewhere classified	3

The list of potentially affected entities in the above table may not be exhaustive. Our aim is to provide a guide for readers regarding entities likely to be regulated by this action. This table lists those entities that we are aware potentially could be affected by this action. However, this action may affect other entities not listed in the table. To determine whether your facility is regulated by this action, you should examine 40 CFR Parts 260 and 261 carefully in concert with the proposed rules amending RCRA that are 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 section entitled **FOR FURTHER INFORMATION CONTACT.**

B. Why Does This Rule Read Differently From Other Listing Rules?

Today's proposed listing determination preamble and regulations are written in ''readable regulations'' format. The authors tried to use active rather than passive voice, plain language, a question-and-answer format, the pronouns ''we'' for EPA and ''you'' for the owner/generator, and other techniques to make the information in today's rule easier to read and understand. This new format is part of our efforts toward regulatory re-invention, and it makes today's rule read differently from other listing rules. We believe that this new format will help readers understand the regulations, which should then increase compliance, make enforcement easier, and foster better relationships between EPA and the regulated community.

C. What Are the Statutory Authorities for This Proposed Rule?

These regulations are proposed under the authority of Sections 2002(a), 3001(b), 3001(e)(2), 3004(d)–(m) and 3007(a) of the Solid Waste Disposal Act, 42 U.S.C. 6912(a), 6921(b) and (e)(2), 6924(d)–(m)and 6927(a), as amended several times, most importantly by the Hazardous and Solid Waste Amendments of 1984 (HSWA). These statutes commonly are 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 to 6992(k) (42 U.S.C. 6901–6992(k)).

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

II. Background

A. How Does EPA Define a Hazardous Waste?

Section 3001 of RCRA and EPA's regulations establish two ways of identifying wastes as hazardous under RCRA. A waste may be hazardous either if it exhibits certain properties (called ''characteristics'') which pose threats to human health and the environment, or if it is included on a specific list of wastes EPA has evaluated and found to pose unacceptable risks. EPA's regulations in the Code of Federal Regulations (CFR) define four hazardous characteristics: ignitability, corrosivity, reactivity, or toxicity. (See 40 CFR 261.21 through 261.24.) As a generator, you must determine whether or not a waste exhibits any of these characteristics by testing the material or by using your knowledge of the process that produced the waste. (See 40 CFR 262.11(c).)

EPA may also conduct a more specific assessment of a waste or category of wastes and ''list'' them if they meet criteria set out in 40 CFR 261.11. As described in 40 CFR 261.11, we may list a waste as hazardous if it:

—Exhibits any of the characteristics noted above , *i.e.,* ignitability, corrosivity, reactivity, or toxicity (261.11(a)(1));
—Is ''acutely'' hazardous, *i.e.,* if they are fatal to humans or in animal studies at low doses, or otherwise capable of causing or significantly contributing to an increase in serious illness (261.11(a)(2)); or
—Is capable of posing a substantial present or potential hazard to human health or the environment when improperly managed (261.11(a)(3)).

Under the third criterion at 40 CFR 261.11(a)(3), we may decide to list a waste as hazardous (1) if it contains hazardous constituents identified in Appendix VIII to 40 CFR Part 261, and (2) if, after considering the factors noted in this section of the regulations, we ''conclude that the waste is capable of posing a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.'' We place a chemical on the list of hazardous constituents on Appendix VIII only if scientific studies have shown a chemical has toxic effects on humans or other life forms. When listing a waste, we also add the hazardous constituents that serve as the basis for listing to Appendix VII to part 261.

Residuals from the treatment, storage, or disposal of most listed hazardous wastes are also classified as hazardous wastes based on the ''derived-from'' rule (see 40 CFR 261.3(c)(2)(i)). For example, ash or other residuals from the treatment of a listed waste generally carries the original hazardous waste code and is subject to the hazardous waste regulations. Also, the ''mixture'' rule (see 40 CFR 261.3(a)(2)(iii) and (iv)) provides that, with certain limited exceptions, any mixture of a listed hazardous waste and a solid waste is itself a RCRA hazardous waste.

Some materials that would otherwise be classified as hazardous wastes under the rules described above are excluded from jurisdiction under RCRA if they are recycled in certain ways. The current definition of solid waste at 40 CFR 261.2 excludes secondary materials from the definition of solid waste that are used directly (*i.e.,* without reclamation) as ingredients in manufacturing processes to make new products, used directly as effective substitutes for commercial products, or returned directly to the original process from which they are generated as a substitute for raw material feedstock. (See 40 CFR 261.2(e).) As discussed in the January 4, 1985, rulemaking that promulgated this regulatory framework, these are activities which, as a general matter, resemble ongoing manufacturing operations more than conventional waste management and so are more appropriately classified as not involving solid wastes. (See 50 FR 637–640). Our approach to these issues is described in more detail below in section III.D.4.

B. How Does EPA Regulate RCRA Hazardous Wastes?

Wastes exhibiting any hazardous characteristic or listed as hazardous are subject to federal requirements under RCRA. These regulations affect persons who generate, transport, treat, store or dispose of such waste. Facilities that must meet the hazardous waste management requirements, including the need to obtain permits to operate, commonly are referred to as ''Subtitle C'' facilities. Subtitle C is Congress' original statutory designation for that part of RCRA that directs EPA to issue those regulations for hazardous wastes as may be necessary to protect human health or the environment. EPA standards and procedural regulations implementing Subtitle C are found generally at 40 CFR Parts 260 through 272.

All RCRA hazardous wastes are also hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as described in section 101(14)(C) of the CERCLA statute. This applies to wastes listed in 40 CFR 261.31 through 261.33, as well as any wastes that exhibit a RCRA characteristic. Table 302.4 at 40 CFR 302.4 lists CERCLA hazardous substances along with their reportable quantities (RQs). Anyone spilling or releasing a substance at or above the RQ must report this to the National Response Center, as required in CERCLA Section 103. In addition, Section 304 of the Emergency Planning and Community Right-to-Know Act (EPCRA) requires facilities to report the release of a CERCLA hazardous substance at or above its RQ to State and local authorities. Today's rule proposes to establish RQs for some of the newly listed wastes.

C. What Is the Consent Decree Schedule for and Scope of This Proposal?

The 1984 Hazardous and Solid Waste Amendments (HSWA) to RCRA require EPA to make listing determinations for several specified categories of wastes, including ''inorganic chemical industry wastes'' (see RCRA section 3001(e)(2)). In 1989, the Environmental Defense Fund (EDF) filed a lawsuit to enforce the statutory deadlines for listing decisions in RCRA Section 3001(e)(2). (*EDF* v. *Browner;* D.D.C. Civ. No. 89–0598). To resolve most of the issues in the case, EDF and EPA entered into a consent decree, which has been amended several times to revise deadlines for EPA action. Paragraph 1.g (as amended) of the consent decree addresses the inorganic chemical industry:

> EPA shall promulgate a final listing determination for inorganic chemical industry wastes on or before October 31, 2001. This listing determination shall be proposed for public comment on or before August 30, 2000. The listing determination shall include the following wastes: sodium dichromate production wastes, wastes from the dry process for manufacturing phosphoric acid, phosphorus trichloride production wastes, phosphorus pentasulfide production wastes, wastes from the production of sodium phosphate from wet process phosphoric acid, sodium chlorate production wastes, antimony oxide production wastes, cadmium pigments production wastes, barium carbonate production wastes, potassium dichromate production wastes, phenyl mercuric acetate production wastes, boric acid production wastes, inorganic hydrogen cyanide production wastes, and titanium dioxide production wastes (except for chloride process waste solids). However, such listing determinations need not include any wastes which are excluded from hazardous waste regulation under section 3001(b)(3)(A)(ii) of RCRA and for which EPA has determined that such regulation is unwarranted pursuant to section 3001(b)(3)(C) of RCRA.

Today's proposal satisfies EPA's duty under paragraph 1.g to propose determinations for inorganic chemical industry wastes.

As described above, the consent decree provides that EPA does not need to make listing determinations for certain wastes that it has exempted from hazardous waste regulations under the ''Bevill amendments'' to RCRA. See the discussion of ''exempt mineral processing'' wastes in section III.B.1 below.

III. Approach Used in This Proposed Listing

A. Summary of Today's Action

Manufacturers of the inorganic chemical products described above identified over 170 categories of residuals generated as part of their production processes. We first determined which of these residuals fell within the scope of our consent decree obligations. We then evaluated the risks posed by each of the remaining categories of residual materials. In some cases we used quantitative or qualitative screening methods. For 18 wastes we conducted full-scale modeling to predict risks.

As a result of this evaluation, we found that three wastes generated in the 14 inorganic chemicals manufacturing operations which we evaluated meet the criteria for listing set out in either 40 CFR 261.11(a)(1) or 261.11(a)(3). We conducted full-scale modeling of two of these wastes and propose to list them under 40 CFR 261.11(a)(3). We found that one waste warranted listing under 40 CFR 261.11(a)(1) because it exhibited hazardous waste characteristics. We did not model this waste. Since these are wastes from specific inorganic chemical industries, we propose to add them to Section 261.32 with K-waste codes. The three wastestreams we propose to list as hazardous, along with their corresponding hazard code and proposed EPA Hazardous Waste Numbers, are:[1]

K176 Baghouse filters from the production of antimony oxide. (E)
K177 Slag from the production of antimony oxide that is disposed of or speculatively accumulated. (T)
K178 Nonwastewaters from the production of titanium dioxide by the chloride-ilmenite process. (This listing does not apply to chloride process waste solids from titanium tetrachloride production exempt under 40 CFR 261.4(b)(7).) (T)

We found that all of the remaining wastes that we evaluated did not meet the criteria for listing in 40 CFR 261.11, and we are proposing not to list them as hazardous wastes. More information on our evaluations of particular wastes is set out in the background documents and the sector-specific discussions in section III.F of this preamble.

We have previously listed as hazardous a number of wastes in 40 CFR 261.32 from other inorganic chemicals industries, including wastes from the production of inorganic pigments (codes K002 through K008), and wastes from chlorine production (codes K071, K073, and K106). Today's proposal does not affect the scope of any existing hazardous waste listing, and we are not soliciting comments on those existing listing determinations.

We are also proposing other changes to the RCRA regulations as a result of the proposed listings. These changes include adding constituents to Appendices VII and VIII for Part 261, and setting new land disposal restrictions. We are proposing to add the following constituents to Appendix VII that serve as the basis for listing: K176—arsenic and lead, K177—antimony, and K178—manganese and thallium. We are also proposing to add manganese to the list of hazardous constituents in Appendix VIII, based on scientific studies that demonstrate manganese has toxic effects on humans and other life forms. Section IV of today's proposal describes the proposed changes to the land disposal restrictions, which would establish treatment standards for specific constituents in the wastes proposed for listing.

Also as a result of the proposed listings, these wastes would become hazardous substances under CERCLA. Therefore, in today's rule we are proposing to designate these wastestreams as CERCLA hazardous substances, and to adjust the one-pound statutory RQs for two of these wastestreams; this is described in section VII of today's proposal.

B. What Wastes Associated With the 14 Sectors Are Outside the Scope of the Consent Decree?

Determining the scope of our consent decree obligations was more complicated than usual for two reasons. First, Paragraph 1.g (quoted above in II.C) does not tell EPA which wastestreams it must evaluate. For most other listing obligations set out in the consent decree, the decree specifies particular wastestreams which EPA must evaluate for listing. See, for

---

[1] As required in 40 CFR 262.30, the listing description includes the hazard code. Wastes listed under 40 CFR 261.11(a)(1) due to the toxicity characteristic are designated ''E,'' and wastes listed under 40 CFR 261.11(a)(3) for toxicity are designated ''T''.

example, paragraph 1.k identifying 14 specific petroleum wastestreams.[2] Second, paragraph 1.g contains an exemption for wastes found to be exempt from hazardous waste regulation in previous EPA actions implementing the so-called ''Bevill exemptions'' for mineral processing wastes. Thus, we needed to conduct some analysis to determine the scope of our obligations.

We began by asking facilities to identify all of the residuals generated by their production processes. We then reviewed their lists. We found that some residuals were actually exempt ''Bevill'' wastes that we need not address. We found that other wastes were really associated with the manufacture of other materials. Also, we concluded that a few residuals were not ''production'' wastes and therefore were not covered by the decree. With the exceptions discussed below in our evaluation of the sodium dichromate and titanium dioxide sectors, we chose not to evaluate any of the wastes that we considered to be outside the scope of the decree. We concluded that evaluation was not possible under the time frame set out in the decree. In the following sections we provide an overview of the types of wastes that we consider outside the scope.

1. Mineral Processing Wastes Exempt Under the ''Bevill'' Exemptions

Many of the inorganic chemical manufacturing processes we address in this rule use ores and minerals as feedstocks. Some wastes derived from the processing of ores and minerals are exempt from regulation as RCRA hazardous wastes under decisions EPA made under statutory requirements known as the ''Bevill'' amendments. RCRA Sections 3001(b)(3) and 8002(p) required EPA to determine whether wastes from the extraction, beneficiation or processing of ores and minerals warranted regulation as hazardous wastes under Subtitle C of RCRA. Between 1989 and 1991 EPA completed a series of rules and studies establishing which mining wastes fit within the ''extraction,'' ''beneficiation,'' or ''processing'' definitions, and which of the wastes within each category were exempt from regulation as hazardous wastes. EPA concluded that all wastes produced during extraction and beneficiation are entitled to an exemption. EPA found that 20 categories of wastes from subsequent ''mineral processing'' operations met the ''high volume/low toxicity'' criteria and were exempt as well. See 54 FR 36592 (Sept. 1, 1989), 55 FR 2322 (Jan. 23, 1990), the July 31, 1990 Report to Congress on Wastes from Mineral Processing, and 56 FR 27300 (June 13, 1991).

EPA codified these ''Bevill'' exemptions at 40 CFR 261.4 (b)(7). EPA discussed some of these exemptions further in a 1998 final rule promulgating treatment standards for non-exempt mineral processing wastes that exhibit the toxicity characteristic. See the Land Disposal Restrictions Phase IV Final Rule at 63 FR 28598 (May 26, 1998).

Paragraph 1.g of the consent decree provides that EPA need not make listing determinations for wastes from any of the 14 inorganic chemical manufacturing processes which are ''excluded from hazardous waste regulation under Section 3001(b)(3)(A)(ii) of RCRA and for which it has determined that such regulation is unwarranted pursuant to Section 3001(b)(3)(C) of RCRA.'' In other words, the consent decree does not require us to make listing determinations for wastes which we exempted under the statute's ''Bevill'' provisions.

Paragraph 1.g. of the consent decree requires EPA to make a listing determination for ''* * * titanium dioxide production wastes (except for chloride process waste solids).'' EPA interprets the exception to refer to the chloride process waste solids from the production of titanium tetrachloride which are exempt under the Bevill rule, rather than all solids from the chloride process. Solids generated after titanium tetrachloride forms fall within the scope of the consent decree.

We reviewed the generators' lists of process residuals to determine whether they had included any Bevill exempt wastes which we need not assess. (In some cases, the generators had claimed that certain wastes were exempt under EPA's Bevill decisions.) This process was not always simple. We found it was sometimes difficult to determine whether a particular facility's waste fit within one of the exempt categories. For example, the mineral processing exemption for titanium dioxide covers only solid materials from an initial step in the production process. It was not always easy to tell whether particular waste solids were generated from the portion of the process that would make them exempt, or from later production steps. Sector-specific information regarding our conclusions appears in section III.F of this preamble for those sectors where we found this exemption had some relevance. We found that facilities in only three of the consent decree sectors generate Bevill exempt wastes: Boric acid, sodium dichromate, and titanium dioxide.

In other sectors, the facilities produce inorganic product chemicals from a mineral product. Under the Bevill exemption (54 FR 36620–21), chemical manufacturing begins if there is any further processing of a saleable mineral product. Since these facilities use saleable mineral products as feedstock, their processes are chemical manufacturing, and may not be classified as mineral processing. Therefore, none of the wastestreams generated by these facilities in the production of the other inorganic chemicals are Bevill exempt.

We emphasize that we are not re-opening any Bevill decisions made in earlier actions regarding the exemptions. We are not re-defining the boundaries between ''extraction'' and ''beneficiation,'' between ''beneficiation'' and ''mineral processing,'' or between ''mineral processing'' and non-exempt chemical manufacturing. Nor are we revisiting our decision that all wastes uniquely associated with the extraction and beneficiation of ores and minerals are exempt. Similarly, we are not re-opening any of our earlier decisions as to which categories of mineral processing wastes are exempt. Rather, we are determining whether particular wastestreams fall within any of the exempt categories. We are not requesting comment on, and do not intend to respond to comments relating to the earlier decisions.

We also found that some inorganic chemical processes generate composite wastestreams that contain both a Bevill exempt waste and one or more non-exempt wastes. We evaluated the non-exempt portions of such wastes to fulfill our consent decree requirements. We apportioned risks between the exempt and nonexempt portion of such commingled wastes, and made listing determinations for the non-exempt portions. We did not, however, assess the exempt portions of such streams. This assessment, therefore, does not re-open any earlier decision regarding exemptions for the ''Bevill'' component of the commingled streams.

2. Residuals Used or Reused in Different Industrial Processes

In some cases, facilities within the 14 inorganic chemicals sectors set out in the consent decree produce residuals that are used or reused in processes that are not among those listed in the decree. Those industries in turn produced residuals derived from the materials generated in the consent decree industries. We evaluated the

---

[2] The revised consent decree is available in the docket for today's proposal.

management of the original industry's material up to the point that the second industry inserts it into its production process. However, we generally considered the second production process and its associated wastes to be beyond the scope of the consent decree. We did not evaluate for listing purposes wastes generated from these non-consent decree industries. For example, in the titanium dioxide sector, one facility uses a residual from the production of titanium dioxide as an ingredient to make salt. We considered salt-making to be a separate production process outside the scope of the consent decree. We are not proposing any listing determinations for wastes generated in the salt plant.

However, in some cases, the reuse of the residual from a consent decree process involved an activity which we always regulate as waste management. In this situation, we considered the reuse to be waste management, and the waste to be within the scope of the consent decree. Consequently, we evaluated the residual for listing. For example, we found that one of the facilities which produces boric acid generates a waste which is used as a fuel. Under our recycling regulations, we regulate burning for energy recovery and so, we evaluated this waste. See 40 CFR 261.2(c)(2). We found that the waste is already being managed in a RCRA Subtitle C unit and decided not to list the waste. Others examples of reuse that we evaluated include land application of biological treatment solids from hydrogen cyanide production as a fertilizer or soil amendment, and land application of gypsum from the titanium dioxide sector. In two cases, however, we decided to make listing decisions for residuals generated during the production of non-consent decree products. In the titanium dioxide sector, the residuals are commingled with other wastes clearly within the scope of the decree. See the discussions of the sodium dichromate sector and the titanium dioxide sector in section III.F. In the sodium dichromate sector, residuals from the non-consent decree process are piped back to the consent decree process, making it difficult to determine whether the two processes are really separate.

3. Debris and Other Nonprocess Wastes

Some generators also identified debris and structural components of their production plants as intermittently-generated wastes. We concluded that these materials do not fall within the scope of the decree. Most of the wastes that fell in this category were refractory bricks which become wastes when facilities remove them to refurbish their furnaces. We consider this material to be a structural component of the plant where production takes place rather than a waste from the ''production'' of an inorganic chemical. Similarly, we consider a few analogous types of plant debris to fall outside the scope of the decree. This debris includes miscellaneous construction materials, insulation, reactor bed material, and piping. These wastes were reported for the following inorganic sectors: Phosphoric acid, barium carbonate, sodium dichromate, hydrogen cyanide, antimony oxide, sodium phosphate, and titanium dioxide.

We have never interpreted the decree to require us to consider listing tanks, pads, or other structural components housing production processes when they become wastes by being removed from use. Other paragraphs of the decree support this position. Paragraphs 1.c. (coke byproducts) and 1.k. (petroleum refining wastes) cover production processes involving reaction vessels lined with refractory or similar materials, and in neither case did the decree include wastes related to the reaction vessels themselves or related materials. Nor do any other provisions in the decree direct us to list any other type of structural components. We note that discarded refractory bricks and other debris would be regulated as hazardous wastes, if these materials were contaminated with a listed waste (including wastes listed as a result of today's rulemaking), or if they exhibited a hazardous waste characteristic.

A few facilities also reported environmental media (excavated soils or recovered groundwater) contaminated with process residuals as wastes from their production processes. We consider such contaminated media to be outside the scope of today's listing determinations, because these are not wastes generated during production processes, but rather wastes generated due to construction or remedial action. We note that none of the other consent decree provisions require us to evaluate contaminated media. See the specific listing background documents for the different sectors for a full listing of the wastes we considered to be out of scope of the decree.

C. What Information Did EPA Collect and Use?

Our investigation of the wastes generated by the inorganic chemicals manufacturing industry included two major information collection efforts: A survey of the industries and field investigations. The survey effort included the development, distribution, and assessment of an extensive questionnaire sent under the authority of RCRA section 3007 to all known facilities engaged in any of the 14 inorganic chemical manufacturing processes. During our field investigations we made site visits to familiarize ourselves with processes and residuals, and made additional visits to collect samples of residuals which we sent to laboratories for analysis. Finally, we collected data from other sources to help characterize the settings in which some of the wastes are managed. Each of these efforts is summarized below.

1. The RCRA Section 3007 Survey

We developed an extensive questionnaire under the authority of Section 3007 of RCRA for distribution to the inorganic chemicals manufacturing industry. The purpose of the survey was to gather information about solid and hazardous waste generation and management practices in the U.S. for the fourteen inorganic chemical industry sectors. The questionnaire collected information about the inorganic chemical products manufactured, the processes used, the wastes generated, the wastes characteristics, and how the wastes were managed. The questionnaire is included in the ''General Background Document for the Inorganic Chemical Listing Determination.'' which is in the docket for today's proposal. This document also provides more details on the producers identified in the inorganic sectors.

We distributed the survey in March of 1999 to all 124 facilities that we had identified as potential manufacturers of chemicals in the 14 targeted sectors. We developed the list of facilities from a review of the available literature, which included directories of chemical producers, reference works of chemical technology, chemical profile information, and previous work by EPA on these industries. From the surveys distributed, 57 facilities indicated that they manufacture chemicals from at least one of the 14 sectors. The other facilities notified us that they had either stopped operations or did not manufacture inorganic chemical products. From the survey, we confirmed that one product was no longer manufactured in this country (phenyl mercuric acetate).

We also conducted an exhaustive engineering review of the submitted surveys for accuracy and completeness. We conducted quality assurance reviews of the data to identify any inappropriate entries and missing data. The engineering review of each facility's response resulted in follow-up letters and/or telephone calls to the facilities seeking clarifications, corrections, and additional data where needed.

Where we conducted sampling and analysis of the waste, we used this analytical data in our analysis (see the following section). Facilities also submitted data in their survey on the composition of some of their wastes. In the absence of our own analytical data, we used data provided by facilities in our evaluation. These cases are noted in the sector-specific discussions in section III.F. In some cases, these data consisted of results from testing to determine whether the wastes exhibited characteristics. We thought such data were reliable because of the consequences the facilities would face if their characteristic data were not accurate. In addition, survey respondents were required to certify the accuracy of their submittal.

2. Field Work: Site Visits, Sampling and Analysis

As part of our field work, we visited production facilities (engineering site visits), we took preliminary samples (familiarization sampling), and we obtained samples to fully characterize the waste for constituents of concern (record sampling). We initiated the sampling phase of this listing determination with the development of a Quality Assurance Project Plan (QAPP) for sampling and analysis. The QAPP describes the quality assurance and quality control requirements for the data collection. We also developed sampling and analysis plans (SAPs) for sampling at individual facilities. The QAPP and the SAPs are available in the public docket for this proposal.

The primary purpose of the engineering site visits was to gain first hand knowledge of the manufacturing processes, the waste generation and management, and to identify potential locations for waste sampling. We conducted site visits at 25 facilities in 12 of the sectors. We selected the facilities to visit based on logistics and to visit sites that represent the variety of process and wastes generated within industry sectors. Site visit reports are available in the docket for today's rule. During some of the engineering site visits, we collected 22 familiarization samples to help us identify potential sampling or analytical problems for the wastes of interest. For example, we used the familiarization samples to assess the effectiveness of the analytical methods that we planned to use during record sampling for a number of the targeted waste matrices.

During record sampling, we collected 69 waste samples from 13 different facilities. Additional samples were collected for QA/QC purposes. Largely due to the time constraints imposed by our consent decree schedule, we focused the sampling effort on the wastes that we most expected to present significant potential risks. Based on information obtained from the RCRA Section 3007 Surveys, we established sampling priorities by considering the reported management practices (e.g., wastes going to Subtitle D landfills and impoundments were of concern), and the likely presence of contaminants of concern.

We also found that we were able to make listing decisions on a variety of reported wastes without conducting sampling. In some cases, we were able to use information about the processes and the raw materials to conclude that a waste was not likely to present a significant risk. Also, we did not typically sample wastes that were reported to be characteristically hazardous waste and were already regulated as hazardous under RCRA. We felt that, for these wastes, we could make listing decisions without further information on waste constituents. In addition, we did not attempt to sample wastes that we found to be outside the scope of the consent decree, as described in Section III.B. Thus, for example, we did not sample a number of wastes that appeared to be exempt under the Bevill regulations.

We believe that the 69 record samples from 13 sites provide an adequate characterization of the wastes that we sampled. The 13 sites represent approximately 30% of the 42 identified production facilities within the specific sectors we chose for sampling. The wastes sampled also represent the major waste types of concern, e.g., specific process wastes/sludges, wastewater treatment sludges, wastewaters, and spent filter material. Section III.F of this proposal provides information on the specific wastes sampled in each sector. The docket for today's proposal also contains background documents for the specific sectors, which give details on which wastes we sampled and our evaluation of the need for sampling or modeling certain wastes.

For most sectors, we focused our analyses on metal constituents, because these are the constituents expected from the inorganic processes under evaluation. We analyzed for other constituents in those cases where we expected they might be present in the waste, or if other constituents showed up in the familiarization sampling. Thus, we analyzed wastes from the inorganic hydrogen cyanide industry for cyanide and volatile organics because of their potential to be present from the process. Similarly, in the titanium dioxide sector, we analyzed waste samples for semivolatile and chlorinated organics due to the use of coke and chlorine as raw materials in the production process for the titanium chloride intermediate. The overall list of target analytes are in the QAPP, which is in the docket for today's rule. The docket also contains the background documents for each sector and the corresponding waste characterization data reports, which show the chemical analyses performed and the analytes found in the waste samples.

In our analyses of wastes samples, we performed analyses to measure constituent concentrations in the wastes themselves (''total'' analysis), as well as analyses for constituents that leach out of the wastes. We generally used the methods specified in OSW's methods manual (''Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,'' SW–846), as described in the QAPP, the SAPs, and the background documents for the specific sectors. We used two extraction methods to measure leaching, the Toxicity Characteristic Leaching Procedure (TCLP, SW–846 method 1311), and the Synthetic Precipitation Leaching Procedure (SPLP, SW–846 method 1312).

In general, we were able to measure the concentrations of constituents in waste samples at very low detection levels. However, for some constituents in some matrices the SPLP and/or TCLP analyses provided detection limits that were somewhat above health-based levels of concern. In such cases, we examined all of the analytical data to determine if the undetected constituent might possibly present a potential risk. Where we did not detect the constituent in the total analysis (*i.e.,* the analysis of a sample prior to any leaching), we assumed that the constituent was not present in the leachate. However, if the totals analysis showed the presence of a constituent that we did not detect in the leachate, then we assessed the risk that would be posed if the constituent were present at a concentration equal to one-half the detection limit. Section III.F shows the cases where we used this assumption in our evaluation of wastes for the different inorganic sectors, and further details are available in the background documents for each sector.

3. Other Sources

We also collected data from a variety of other sources to help characterize the settings in which these wastes are managed. For example, we contacted several state and local authorities to collect information regarding the location of drinking water wells. We also obtained information and, in some cases analytical data, from state authorities and other sources to help in our evaluations. We note these sources in the sector-specific discussions in Section III.F when we relied on such data.

D. How Did EPA Evaluate Wastes for Listing Determinations?

1. Listing Policy

As discussed in section II.A. of this preamble, we consider the listing criteria set out in 40 CFR 261.11, in light of all the information we have relevant to the criteria, in making listing determinations. For decisions made under 40 CFR 261.11(a)(3), today's proposed listing determinations follow the elements of the EPA's hazardous waste listing policy presented the proposed listing for wastes generated by the dyes and pigments industry (see FR 66072, December 22, 1994). We have modified and adapted this policy in subsequent listings. See for example the recent Petroleum Refining proposal (60 FR 57747; November 20, 1995) and the Solvents waste proposal (61 FR 42318; August 14, 1996).

This policy uses a ''weight-of-evidence'' approach in which calculated risk information is a key factor to consider in making a listing determination under 40 CFR 261.11(a)(3). The criteria provided in 40 CFR 261.11(a)(3) include eleven factors for determining ''substantial present or potential hazard to human health and the environment.'' We incorporate nine of these factors, as described generally below, into our risk evaluation for the wastestreams of concern:

—Toxicity (261.11(a)(3)(i)) is considered in developing the health benchmarks used in the risk evaluation.
—Constituent concentrations and waste quantities (261.11(a)(3)(ii) and 261.11(a)(3)(viii)) are used to define the initial conditions for the risk evaluation.
—Potential to migrate, persistence, degradation, and bioaccumulation of the hazardous constituents and any degradation products (261.11(a)(3)(iii), 261.11(a)(3)(iv), 261.11(a)(3)(v), and 261.11(a)(3)(vi)) are all considered in our evaluation of constituent mobility (e.g., leaching from waste) and fate and transport models we used to project potential concentrations of the contaminants to which individuals might be exposed.

We considered two additional factors, plausible mismanagement and other regulatory actions (261.11(a)(3)(vii) and 261.11(a)(3)(x)) in selecting the waste management scenarios we evaluated in our risk assessments. For example, we used information that the waste generators submitted in their Section 3007 questionnaires to decide what types of waste management units are used. Using information about other federal environmental regulatory programs, we concluded that some units or some pathways did not pose risks requiring evaluation.

We separately considered the remaining factor, whether the available information indicated any impact on human health or the environment from improper management of the wastes of concern (261.11(a)(3)(ix)). Thus, we examined a variety of databases for information on damage incidents for the inorganic chemical production processes under investigation. For example, we examined databases for information on potential and actual Superfund sites (CERCLIS), releases reported under the Toxic Release Inventory System (TRIS), civil cases filed on behalf of EPA, and spills and releases reported to the National Response Center (NRC). A full description of our search is in the docket for this rule.

Most of the cases found for these industries typically resulted from spills or releases of products, and did not provide any useful information of possible risks presented by the wastes we evaluated for listing. In a few cases we found sites on the Superfund National Priority List (NPL) that included inorganic manufacturing processes. However these sites usually encompassed a variety of chemical manufacturing and mining industries, and it is difficult to attribute the damage reported to the specific inorganic manufacturing wastes under evaluation. Furthermore, contamination at these sites appears linked to historical management practices at closed or inactive manufacturing plants, and these were not useful in assessing current or potential hazards for the wastes at issue. In addition, Federal and State regulatory controls are now in place that would prevent mismanagement. For example, many of the wastes examined in today's proposal are regulated as characteristic waste, and releases or disposal to the land are addressed under the existing RCRA regulations. We did not find any evidence of actual damage cases.

We describe our decisions under 40 CFR 261.11(a)(3) in more detail in the sector-specific discussion in section III.F below, and in the background documents. Generally, we conducted full-scale risk modeling for 18 wastes in 5 sectors. We found that we could adequately address the risks of the remaining wastes with a variety of less time-consuming approaches. Some were qualitative; others were quantitative, but not as complex as full modeling.

We evaluated one waste using the single criterion set out in 40 CFR 261.11(a)(1) rather than the eleven factors referenced in 40 CFR 261.11(a)(3). This is the first time under this consent decree that we have proposed to make a listing decision based on this criterion. It relies on the existing characteristics to identify wastes posing significant risks and does not require the use of modeling. See the discussion of wastes from the production of antimony oxide in section III.F.1 of the preamble.

Our proposed listing determinations are based upon estimates of individual risk. We relied on individual risk estimates (HQs > 1), and not population risk estimates, because we are concerned about risks to individuals who are exposed to potential releases of hazardous constituents. We believe that using individual risk as a basis for our listing determinations (rather than population risk estimates) also is appropriate to protect against potential risks, as well as present risks that may arise due to the generation and management of particular wastestreams. EPA acknowledges that in cases where small populations are exposed to particular wastes and waste management practices, population risks may be very small. We did not attempt to calculate population risks for the proposed listings. In general, we expect population risks arising from contaminated groundwater due to waste management to be small, because often only a limited number of domestic wells will be near these facilities, and groundwater contamination often moves very slowly. Nevertheless, the increased risk for an exposed individual may be significant. In proposing the listing determinations for K176, K177, and K178, EPA is protecting against the potential risk for exposed individuals, regardless of how many individuals are exposed.

We set out below general observations about some of our approaches to risk assessment.

2. Characteristic Hazardous Waste

We describe in Section a. below our analysis for wastes which are ''100% characteristic''—wastes which all generators report as characteristic and which all generators appear to manage in compliance with applicable hazardous waste regulations. We describe our approach to wastes which are occasionally characteristic—but managed in compliance—in Section b. below. Finally, we discuss in Section c. one waste which appears to exhibit a characteristic frequently, but does not appear to be managed in compliance with hazardous waste regulations.

a. Wastes consistently exhibiting characteristics. For wastes which these industries identified as characteristic and managed in compliance with hazardous waste regulations, we are proposing to find that there is no ''plausible mismanagement'' scenario to evaluate for listing. (See 40 CFR 261.11(a)(3)(vii).) The Subtitle C rules applying to characteristic wastes adequately protect human health and the environment, especially where waste generators are complying with them. 40 CFR 261.11(a)(3)(x) authorizes us to consider actions taken by other regulatory programs. We believe we can reasonably interpret this to include the rules for characteristic wastes under Subtitle C .

We acknowledge that the regulation of characteristic wastes differs in some ways from the regulation of listed wastes. For example, for characteristic wastes, residues from treatment required by the land disposal restrictions need not always be placed in hazardous waste disposal units. However, we do not regard the differences as ''mismanagement.'' Rather, we believe that both approaches protect human health and the environment. Consequently, for the purposes of this rule we decided that we would not propose to list a ''100% characteristic'' waste unless we found evidence of extraordinary risks under one or more of the other factors in 40 CFR 261.11(a)(3).

For a few of the 100% characteristic wastes in this rule, we found factors warranting further consideration. For example, we found that the sole generator of cadmium pigment wastes codes them as hazardous, arranges for treatment to comply with the land disposal restrictions, and then disposes of treated residues in a Subtitle D landfill. At the same time, we found that the waste contains very high levels of cadmium. We decided to investigate further to ensure that the treatment residues did not present significant risks. We examined data relating to the treatment process and leachate monitoring data from the landfill receiving the residues. Based on these data, we concluded that the residues did not pose risks warranting listing.

b. Wastes which sometimes exhibit characteristics. Information submitted in responses to the Section 3007 questionnaires also showed that there are a number of wastes that exhibit characteristics at some facilities, but not others. Consistent with previous listing decisions (see for example, the most recent petroleum refining listing at 63 FR 42137), we focused on the volumes of waste that did not exhibit characteristics in our listing evaluation. For wastestreams identified as exhibiting characteristics and apparently managed in compliance with applicable regulations, we relied on the ''no plausible mismanagement'' and ''other regulations'' analysis described above. A hypothetical example follows. If one facility generated 40 tons per year of a properly-managed characteristic waste, and a second facility generated 60 tons per year of a non-characteristic waste, we would not evaluate the total of 100 tons of waste under a single approach. Rather, we would evaluate the characteristic waste under the approach described above. For the waste that did not exhibit a characteristic, we would conduct the type of risk assessment described below in section III.E.

c. Characteristic wastes not managed in compliance with Subtitle C. In one case, we found a characteristic waste where we believe that existing Subtitle C rules do not adequately prevent mismanagement. Four facilities generate a baghouse filter waste from the production of antimony oxide. Data from our sampling and analysis at 2 facilities showed exceedences of the toxicity characteristic. Two facilities recycle these wastes in a manner that may comply with applicable regulations. Two other facilities, however, did not identify their waste as characteristic wastes, and appear to manage them in ways which do not comply with Subtitle C rules. Because of this apparent noncompliance, we concluded that it would be appropriate to disregard the characteristic rules in an analysis of the factors in 40 CFR 261.(a)(3). However, we also concluded that it was not necessary to conduct such an analysis. Since this waste fails the toxicity characteristic, it clearly contains levels of constituents which could pose threats to human health via groundwater when placed in a municipal landfill, if leachate were to migrate to a drinking water well at sufficient concentrations. Since the generators are not managing the wastes in compliance with applicable Subtitle C regulations, we assume that this type of mismanagement could occur at other sites. Accordingly, we exercised our authority to propose to list this waste under 40 CFR 261.11(a)(1). As noted above, this provision authorizes (but does not require) EPA to list wastes that exhibit characteristics without the analysis required under 40 CFR 261.11(a)(3). We believe that noncompliance is an appropriate reason to use this authority to list a characteristic waste.

d. Non-characteristic wastes disposed of in hazardous waste units. We identified nine wastes which do not appear to exhibit any characteristic, but which are disposed of in Subtitle C management units. Four of these wastes are sent to combustion unit regulated under Subtitle C of RCRA. The remaining 5 wastes are sent to Subtitle C landfills. We found that all of these wastes receive some treatment before land disposal. In one case available data indicates that the waste meets applicable LDR treatment standards as generated.

In general, these wastes have very limited potential for mismanagement under 40 CFR 261.11(a)(3)(vii). This is particularly true for wastes which generators place in on-site, Subtitle C units with ample capacity. Also, in some cases, some of the wastes are generated in very small quantities (less than 1 metric ton per year). These wastes are distinguishable from a non-characteristic organobromine waste sent to a hazardous waste unit that we decided to list in 1998. That waste had extremely high concentrations of a constituent posing significant risks, and received no treatment (see May 4, 1998; 63 FR 24596).[3] We request comment on the individual rationales set out in the sector-specific discussions and the background documents.

3. Evaluations of Particular Units and Pathways of Release

We are proposing to find that some pathways of release from some units present low risks because they are adequately controlled under other Federal environmental regulations that minimize the likelihood of releases. We are also proposing to find that other risk pathways present low risks due to physical or chemical attributes of the wastes. In some cases, we evaluated all release pathways at a single unit under a combination of these approaches.

a. Wastewater management. Facilities in these industries generally treat wastewaters in on-site wastewater treatment plants and discharge to surface waters, or pretreat the waste and discharge to an off-site wastewater

---

[3] On April 9, 1999, the D.C. Circuit in Great Lakes Chemical Corporation v. EPA ordered that the organobromine listing determinations be vacated. Accordingly, EPA removed the listings from CFR (see 65 FR 14472: March 17, 2000).

treatment facility, *e.g.,* a Publicly Owned Treatment Works (POTW). Under the Clean Water Act (CWA), discharges to surface waters are controlled under the National Pollutant Discharge Elimination System (NPDES) and require an NPDES permit, while discharges to a POTW are subject to State and national pretreatment standards.[4] Point source discharges for the various sectors in the inorganics listing are regulated under the CWA by the effluent guidelines and pretreatment standards in 40 CFR Parts 415 (Inorganic chemical manufacturing) and 422 (Phosphate manufacturing). Therefore, we did not evaluate NPDES effluent or discharges to POTWs in today's proposal. This approach is consistent with other listing rules. See, for example, 60 FR 57759 (November 20, 1995, petroleum refining wastes proposal). In a few cases, facilities reported disposal of wastewaters by deep well injection in a permitted Class I UIC hazardous waste injection well. In these cases, the wells were units regulated by the Underground Injection Control (UIC) program under the Safe Drinking Water Act (40 CFR Part 144). These wells also had no migration exemptions under Section 148.20 to allow disposal of untreated hazardous waste. Therefore, we did not evaluate this scenario further.

For surface impoundments, we concluded that releases to air were not likely to present concerns. For most sectors, the constituents of concern are nonvolatile metals, and this makes volatilization a highly unlikely pathway for constituents from normal wastewater treatment practices. We recognize that releases of volatile organic chemicals from impoundments may be a potential route of concern for one sector, inorganic hydrogen cyanide production. EPA is developing maximum achievable control technology (MACT) standards for cyanide manufacturing under the Clean Air Act (CAA), which may address these emissions.[5] EPA is evaluating possible air releases from wastewaters in impoundments as part of the MACT rulemaking. Therefore, we did not do any further evaluation of these emissions as part of today's listing determination. We assessed the potential for groundwater releases from the impoundments.

For sectors and wastes where facilities did not use surface impoundments for wastewater management, we determined that "plausible mismanagement" would be continued management in existing tank-based treatment systems. We do not view abandonment of existing treatment systems for surface impoundments as "plausible," because the manufacturers have already made a considerable investment in wastewater treatment systems using tanks and will continue to use them. Further, we assumed that wastewater treatment tanks retain sufficient structural integrity to prevent wastewater releases to the subsurface (and therefore to groundwater), and that overflow and spill controls prevent significant wastewater releases. Thus, based on the lack of any significant likelihood of release of the constituents to groundwater, we did not project significant risks to groundwater from these wastes in the tank-based wastewater treatment scenario. We did not model any releases to groundwater from tanks. This is consistent with our approach in other listing rules (see, for example, the proposed rule for chlorinated aliphatics production wastes at 64 FR 46476; August 25, 1999). We also considered the possibility of air releases from tanks. For most wastes, the constituents of concern are nonvolatile metals, making volatilization a very unlikely pathway of release from tanks. For the hydrogen cyanide sector, where volatile compounds are likely and tanks are used in wastewater treatment systems, the tanks will also be covered by other CAA regulations as described above. In addition, in many cases facilities have installed tank covers, further reducing the likelihood of release to the air. As a result, we have not modeled releases to air from tanks for any wastes in this listing determination.

b. Waste solids management. We concluded that we did not need to model any releases of volatile constituents from solids for the same reasons set out above. The management practices of concern for waste solids were landfills, including disposal in on-site and off-site landfills, and in a few cases, waste piles. We evaluated the potential for groundwater releases from all landfills and piles. We also considered the possibility of releases of airborne particulates by a multistep process where we compared the total concentrations of the constituents of concern to a series of soil screening levels (see section III.E.3).

4. Evaluation of Secondary Materials

RCRA gives EPA jurisdiction only over materials that are discarded. EPA's current definition of discard is set out in the definition of solid waste at 40 CFR 261.2. Under this approach, process residuals (or "secondary materials") destined for recycling are solid wastes within our jurisdiction if the recycling closely resembles waste management. Conversely, if the materials are recycled as part of an ongoing manufacturing process, they are not solid wastes. The existing rules specifically exclude secondary materials from jurisdiction that are used directly (without reclamation), as ingredients in manufacturing processes to make new products, used directly as effective substitutes for commercial products, or returned directly to the original process from which they are generated as a substitute for raw material feedstock. 40 CFR 261.2(e). In addition, the existing rules allow for closed loop reclamation where secondary materials can be reclaimed and returned to the original production process provided that the entire process is closed, the reclamation does not involve controlled flame combustion, and the reclaimed material is not used to produce a fuel or a material that is used in a manner constituting disposal. (40 CFR 261.4(a)(8)) As discussed in the January 4, 1985, rulemaking, these are activities which, as a general matter, resemble ongoing manufacturing operations more than conventional waste management and so are more appropriately classified as not involving solid wastes. However, materials which would otherwise qualify for exclusion under these provisions are not excluded if EPA finds that the recycling is not legitimate. EPA considers a variety of economic and chemical factors when it determines whether or not a specific recycling practice is legitimate. (See Memorandum from Sylvia K. Lowrance, Director Office of Solid Waste, concerning F006 Recycling, dated April 26, 1989). These determinations are very site-specific and tend to be very time consuming. EPA typically makes them in the context of site-specific enforcement or permitting actions.

The existing rules, however, do not exclude materials that are either contained in or used to produce fuels or that are directly used, or incorporated into a product that is used, in a manner constituting disposal. EPA asserts RCRA jurisdiction for these types of use/reuse

---

[4] In fact, 40 CFR 261.4 excludes "any mixture of domestic sewage and other wastes that passes through a sewer system to a POTW for treatment" (40 CFR 261.4(a)(1)(ii), and industrial wastewater discharges that are point source discharges subject to regulation under Section 402 of the CWA (40 CFR 261.4(a)(2)).

[5] Clean Air Act—Title III: Upcoming MACT Standards—Cyanide Chemical Manufacturing; Unified Air Toxics Website: *http://www.epa.gov/ttn/uatw/mactupd.html:* The hydrogen cynaide industry would also be subject to regulations under 40 CFR Part 60, Subpart YYY under the CAA for volatile organic compound (VOC) emissions from wastewater treatment at facilities in the synthetic organic chemical manufacturing industry (SOCMI), which was proposed September 19, 1994 (59 FR 46780).

circumstances as they more closely resemble conventional waste management rather than ongoing manufacturing. (See 50 FR 637–640, January 4, 1985).

A series of court decisions also address the issue of our jurisdiction over recycled materials. In general, they hold that EPA lacks authority to regulate materials that are immediately reused in an ongoing manufacturing or industrial process. *American Mining Congress* v. *EPA* (824 F. 2d 1177 (D.C. Cir. 1987) (AMC I)); *American Mining Congress* v. *EPA* (907 F. 2d 1179, 1186 (D.C. Cir. 1990) (AMC II)); *American Petroleum Institute* v. *EPA* (216 F. 3d 50 (D.C. Cir. 2000)). The most recent decision, *Association of Battery Recyclers, Inc.* v. *EPA* (208 F. 3d 1047 (D.C. Cir 2000)), remanded a rule regulating the reuse of some closely related materials. We are still evaluating the impacts of this decision. However, the remand does not affect this rule because we are not relying on the exemptions in the remanded rule.[6]

For almost all of the residual materials from these manufacturing processes which are re-used or recycled in some way, we decided not to attempt to determine whether the recycling practice is not subject to regulation under the court decisions and regulations described above. Such determinations can be very time-consuming, particularly where we find recycling practices that appear not to be regulated, and then need to determine whether or not such practices are legitimate. Consequently, we decided that it would be more efficient to examine first the potential risks posed by the reported recycling practices. If we found no significant risks, we would decide not to list the material. If, on the other hand, we found risks, we evaluate the recycling practice prior to making a listing decision.

To assess the risks of materials recycled on-site by reusing them in one of the consent decree manufacturing processes, we first evaluated the management of the materials prior to their re-use. We looked for closed piping, covers on containers, or similar barriers to releases to the environment. Where we found such management practices, we determined that there was no significant potential for releases. We then evaluated the potential for releases from the consent decree process itself. We found that the only points at which releases were expected were either those where we were already evaluating solid wastes for the purposes of this listing or points where the facility released uncontained gases outside of RCRA jurisdiction. Consequently, we felt that we were evaluating all of the potential risks (within our jurisdiction) associated with the recycling of these materials. In the antimony oxide sector, however, we found one residual that was being held in containers for several years for potential reuse. Our rules identify this practice as ‘‘speculative accumulation’’ and classify the materials held in such a manner as solid wastes. Accordingly, we assessed the risks posed by these accumulated wastes.

We found that a few materials are inserted into separate manufacturing processes co-located on-site with consent decree processes. We evaluated the potential for releases prior to reinsertion into that separate process. However, as explained above in section III.B, we did not evaluate any risks posed by use of residuals in processes that are not subject to our consent decree deadline.

We also considered the risks of materials recycled off-site. We considered the potential for release before the materials were transferred off-site. We did not assess the off-site uses which involved non-consent decree manufacturing processes. In a few cases, however, we found that the reuse involved land placement or burning for energy recovery. These activities are always regulated as waste management under the rules and court decisions described above. In those cases, we concluded that the materials were wastes from the consent decree process where they were generated, and we evaluated risks posed by the use. For example, we evaluated the risks posed by use of residual materials from the production of boric acid as fuels for cement kilns. In one case involving antimony oxide residuals, we found that the residuals were sent off-site to another smelter producing antimony oxide. This smelter happens to be located outside of the country. We did not evaluate risks from its residuals, as we have no legal jurisdiction to regulate them. We have evaluated the production of antimony oxide within the U.S. in this rulemaking, so we have evaluated the risks that would be posed if this generator changed its practice and sent the materials to an antimony oxide smelter located within the U.S.

For purposes of convenience, in the sector specific discussions below (and in the various background documents) we describe all of the residuals as wastes. We emphasize, however, that we have not determined whether any of the residuals that are recycled are solid wastes as defined in 40 CFR 260.2. We believe it is more appropriate to leave such site-specific determinations to other decision-making processes.

E. Description of Risk Assessment Approaches

Before turning to the details of the risk assessment approaches used, we want to highlight two general issues. First, we note that for this proposal we used a variety of screening methodologies to assess a large number of wastes. Due to time constraints imposed by the consent decree schedule, we chose —where appropriate— to use these methodologies rather than conducting more time-consuming, full-scale, risk assessment modeling. In general, however, we believe that these screening methodologies conservatively assessed risks, so that wastes that we ‘‘screened out’’ are unlikely to present significant risks.

Second, we want to describe our selection of plausible mismanagement practices for both screening and full modeling assessments. In general, we assessed the types of management units which, according to data available to us, facilities have actually used or contemplated using. Frequently, we found that facilities had made economic investments that would make them likely to continue to use the same types of units. For example, where facilities had paid to install tanks to store or treat wastes, we assumed that they would continue to use tanks rather than place wastes in pits or surface impoundments. Furthermore, we found that some waste quantities were so large that it would be prohibitively expensive to transport wastes off-site. Similarly, where facilities had installed piping to return residual materials to their production processes, we assumed that they would continue to use these systems to recycle those residuals. We also assumed that such facilities had found it more economical to return those residuals to their processes, and were thus not likely to send them to landfills or other types of disposal units.

We seek comment on all data, assumptions and methodologies used in our risk assessment for this proposal.

---

[6] On May 26, 1998, we promulgated a conditional exclusion from the definition of solid waste for secondary materials (other than listed wastes) generated within the primary mineral processing industry from which minerals, acids, cyanide, water, or other values are recovered by mineral processing, with certain provisions. Because this conditional exclusion only applied to non-listed wastes, and we were making listing determinations, we did not use this exclusion as a basis to not evaluate wastes for listing purposes. On April 21, 2000, the D.C. Circuit Court issued a decision vacating a portion of this conditional exclusion. [See *Association of Battery Recyclers, Inc.* v. *EPA.* 208 F.3d 1047 (D.C. Cir. 2000)].

1. What Risk Thresholds Were Used?

EPA's listing program generally defines risk levels of concern for carcinogens as risks within or above a range of 1×10^{-6} to 1×10^{-4} (from 1 in 1,000,000 to 1 in 10,000) at the upper end of the risk distribution (*e.g.,* 90th or 95th percentile risk for a particular exposure scenario). The level of concern for non-cancer effects is generally indicated by a hazard quotient (HQ) of 1 or greater at the upper end of the distribution. Consistent with the listing policy described in the dyes and pigments proposal (59 FR 66075–66078) we used a 1×10^{-5} risk level and/or HQs of one to identify which wastes are candidates for listing. To make a listing determination, we then used a weight-of-evidence approach that considers the risk estimates along with other information related to the factors described in 40 CFR 261.11(a)(3). For cancer, a risk threshold of one in 1,000,000 represents the probability that an individual will develop cancer over a lifetime as a result of exposure to a chemical contaminant. When we estimate the lifetime excess cancer risk, we use an upper bound estimate of the carcinogenic slope factor (CSF) as derived from laboratory studies in animals or from human epidemiological studies. In addition, because the CSF typically relies on a number of extrapolations (*e.g.,* from animals to humans and from high doses to low doses) there is some uncertainty in the value of the CSF.

For non-cancer effects, which include a wide variety of health effects, we used EPA's reference dose (RfD) as a risk threshold. A reference dose is an estimate of an oral exposure that is likely to be without an appreciable risk of adverse effects in the general population, including sensitive individuals, over a lifetime. The RfD can be derived from a NOAEL, LOAEL, or benchmark dose. Uncertainty factors are applied to address limitations of the available toxicological data and are necessary to ensure the RfD is protective of individuals in the general population. The use of uncertainty factors is based on long-standing scientific practice. Uncertainty factors when combined commonly range from 10 to 1000 depending on the nature and quality of the underlying data. The RfD methodology is expected to have an uncertainty spanning perhaps an order of magnitude. To assess risks associated with non-cancer effects, we used a hazard quotient (HQ), which is defined as the ratio of the estimated dose of a given chemical to an individual to the reference dose for that chemical. A hazard quotient (HQ) of one (1) indicates that the estimated dose is equal to the reference dose (RfD) and, therefore an HQ of 1 is EPA's threshold of concern for non-cancer effects. Usually, doses less than the RfD ($HQ<1$) are not likely to be associated with adverse health risks and, therefore, are less likely to be of regulatory concern. As the frequency and/or magnitude of the exposures exceeding the RfD increase ($HQ>1$), the probability of adverse effects in a human population increases. However, it should not be categorically concluded that all doses below the RfD are ''acceptable'' (or will be risk-free) and that all doses in excess of the RfD are ''unacceptable'' (or will result in adverse effects).

The values of the CSF and RfD that we use for assessing risks are generally taken from EPA's on-line toxicity data base called IRIS. However, in some cases we used EPA's compilation of toxicity benchmarks known as HEAST or other sources, such as toxicological issue papers prepared by EPA's National Center for Environmental Assessment (NCEA).[7]

2. What Leaching Procedures Were Used?

As noted in III.C, we used the TCLP and SPLP leaching procedures to evaluate the wastes in today's rule. EPA developed the TCLP as a tool to predict the leaching of constituents from the waste in a municipal solid waste landfill, and the TC regulations use this method to determine if a waste is hazardous under 261.24 (see the Toxicity Characteristic rule, 55 FR 46369; November 2, 1990). We have also used the TCLP in the listing program to estimate leaching concentrations for use in groundwater modeling (for example, see the recent petroleum listing, 63 FR 42110, August 6, 1998). We believe the TCLP is the most appropriate leaching procedure to use for wastes in municipal landfills, because the leaching solution is similar to the type of leachate generated from the decomposition of municipal waste. The TCLP leaching solution is a solution containing acetic acid that is adjusted to a pH of 4.93 or 2.88, depending on the acidity of the waste sample.

EPA developed the SPLP as a method to predict leaching from wastes or soils under exposure to the slightly acidic, dilute solution generated by normal rainfall. The SPLP test uses a leach solution which mimics acid rain, while the TCLP uses a leach solution which mimics acids formed in municipal landfills. In past actions, EPA has recognized that the TCLP's use of organic acids may not be appropriate for disposal scenarios that do not involve municipal landfills. For example, in the proposed rule for management and disposal of lead-based paint debris, EPA used the SPLP to assess leaching from landfills that do not accept municipal wastes (see 63 FR 70189; December 18, 1998). Similarly, EPA utilized the SPLP in screening low hazard wastes as part of its 1989 Bevill determination (see 54 FR 36592; September 1, 1989).

In the context of EPA's more recent mineral processing sector actions, we considered the relative merits of both the TCLP and the SPLP for various wastes in the mineral processing industries; EPA decided to continue to rely on the TCLP for defining characteristically hazardous Bevill wastes, in part because we found that disposal in municipal landfills did occur for some sectors. See the Land Disposal Restrictions Phase IV Final Rule at 63 FR 28598 (May 26, 1998). For today's rule, however, we have specific data showing that some wastes do not go to municipal landfills and are unlikely to be disposed of in municipal landfills. We used the SPLP sampling results for wastes that were not likely to go to municipal landfills, and we used the TCLP results for wastes going to municipal landfills.

3. How Were Wastes Screened To Determine If Further Assessment Was Needed?

We used a number of approaches to eliminate from further consideration those wastes that could not plausibly pose unacceptable risks. This served to identify those wastes and chemical constituents that required further assessment. Different screening approaches were used depending on the type of waste management practices employed in the industry and, in some instances, the waste volume and the location of the waste management units.

For wastes that are managed in landfills, groundwater contamination is the primary source of human exposures, particularly for certain metals and other inorganic compounds that are nonvolatile, such as those present in the wastes that are the subject of today's rule. We compared leachate concentrations derived from the TCLP or SPLP test measurements to levels in drinking water that are protective of human health. These levels, referred to as health-based levels (HBLs), are designed to be protective of both

---

[7] EPA's Integrated Risk Information System (IRIS) may be found at http://www.epa.gov/iris. See also ''Risk Assessment for the Listing Determinations for Inorganic Chemical Manufacturing Wastes'' (August 2000) for a discussion of the toxicity benchmark values used in today's rule.

children and adults. Health-based levels (HBLs) are levels in environmental media that would not exceed EPA's risk thresholds given conservative assumptions regarding exposure (*e.g.*, a level in drinking water that would not exceed a risk threshold for an individual whose drinking water intake was at the high end of the distribution for the general population).[8] Although an HBLs represents a concentration level at the point of exposure, we conservatively assumed direct contact with the wastes (*i.e.,* no dilution) for the purpose of screening out wastes and chemical constituents that could not pose unacceptable risks and, therefore, do not merit further analysis. As explained previously, we used SPLP measurements for wastes that are managed in landfills containing only industrial wastes and TCLP measurements for wastes that are managed in landfills which also contain municipal wastes. For wastewaters that are managed in surface impoundments, we used the concentration in the filtered liquid (*i.e.*, the SPLP filtrate) because the filtrate is more representative of the fraction of the waste that could infiltrate into the subsurface environment. Regardless of the type of measurement, if the result of the chemical analysis for a particular compound was below the limit of detection but the compound was detected in the waste, then we used ½ the value reported by the laboratory as the limit of detection for that compound. Any chemical contaminant in a waste that did not screen out against HBLs (*i.e.,* the waste concentration was a factor of 2 or less times the HBLs [9]) we identified as a constituent of concern (CoC) requiring further assessment. However, very low volume wastes were subject to further screening, as described below.

For very low volume wastes that did not screen out against HBLs, we performed an additional conservative screen to determine if the waste could plausibly pose a risk to human health when disposed of in a landfill. Typically wastes generated in volumes of less than 1 or 2 metric tons per year were considered as candidates for this *de minimis* analysis. This analysis assumed that the entire mass of the chemical contaminant in a volume of waste that is generated in a year's time would leach out of the waste and infiltrate into groundwater in the same year. The only dilution that was assumed to occur was with the volume of water that infiltrated into the landfill. To minimize the amount of dilution we chose a conservative infiltration rate based on the infiltration that could occur for a relatively low permeability soil underlying a relatively small landfill (corresponding to the 10th percentile of the distribution of municipal landfill areas nationwide). However, in some cases the resulting infiltration was less than the amount of water that would be withdrawn from a well by a household for domestic usage. In these instances, we diluted the infiltrate into the minimum volume of water needed to support a household well, which we estimated from data on U.S. per capita water consumption assuming a family of four. The concentration derived using this procedure was then compared to the HBLs. Any chemical contaminant that did not screen out as a result of this analysis we identified as a constituent of concern (CoC) requiring further assessment. While we do expect the *de minimis* screen to be conservative overall, the degree to which it is conservative depends on many waste and site-specific factors. (For example, our sampling and analysis data indicate that in some cases essentially all of the chemical constituent leached out of the sample over the duration of the leach test.)

For wastes managed in waste piles and landfills, we performed a multi-level screening analysis to determine if further assessment of the air pathway was needed. Wind blown dust from wastes managed in piles is a potential source of human exposures. This pathway is also possible for landfills, but likely to result in much lower releases due to the common usage of daily and longer-term cover at landfills. In the first level screen we compared the waste contaminant total concentrations to background levels in soils. Background soil levels were taken from published compilations of levels in native soils nationwide and were generally characterized using a geometric mean or (in a few instances) an arithmetic mean concentration of the available data.[10] If the waste concentrations exceeded background levels in soils, we performed a second level screen by comparing the waste concentrations with soil ingestion HBLs. Soil ingestion HBLs assume direct contact with the waste and, therefore, are more conservative than HBLs based on inhalation exposures. In those instances when the waste concentrations exceeded both background levels and soil ingestion HBLs, we performed a third level screen using the results of EPA's air characteristics study. This study developed levels of chemical contaminants in wastes that are protective of human health with respect to inhalation exposures when managed in a variety of ways.[11] In particular, air characteristic levels were developed for waste piles at several different distances from a potential receptor. We used the air characteristic levels corresponding to a downwind distance of 25 or 150 meters (80 or 500 feet). Because the air characteristic levels include the effect of atmospheric dilution, they are significantly higher than soil ingestion HBLs. In most cases waste concentrations are either below background or below soil ingestion HBLs for the wastes EPA evaluated. Moreover, we found no instances in which air characteristic levels are exceeded. In the cases where waste concentrations exceeded the soil ingestion levels, the exceedence was typically less than a factor of 2 to 3. We believe it is highly unlikely that off-site exceedences due to windblown dust from piles or landfills would actually exceed the soil ingestion levels given this low level of exceedence in the waste. Therefore, we conclude that risks associated with particulates from piles and landfills transported by an air pathway are not significant and no further assessment is needed.

---

[8] Details on how HBLs are derived may be found in the risk assessment background document for today's proposal, "Risk Assessment for the Listing Determinations for Inorganic Chemical Manufacturing Wastes" (August 2000).

[9] We used professional judgment to screen out constituents with concentrations within a factor of two of the HBLs. Historically, our models have suggested that the dilution and attenuation of constituents in the subsurface will generally result in dilution and attenuation factors (DAFs) of 2 or greater. (See, for example, the DAFs estimated for the petroleum refining listing determination, 63 FR 42110, and the docket for today's rulemaking for DAFs calculated to support today's proposal.) If our consideration of site-specific factors had indicated that a very low DAF were likely for actual exposure (*e.g.* known drinking water wells placed very close to the management until boundary), we would have modeled that waste rather than screening it out using professional judgment.

[10] Different statistics may be used for characterizing background levels depending on the data available. The mathematical properties of the arithmetic mean allow it to be used when only average values rather than the original data are available. However, if the original data are available, the data can be pooled and a geometric mean can be calculated. If the data are positively skewed, as is often the case, the arithmetic mean will be higher than the geometric mean. We consider either statistic to be a central tendency measure of background levels. However, background levels are highly variable and may be considerably higher or lower than the national average at any given location. See, for example, the U.S. Geological Survey paper "Elemental Concentrations in Soils and Other Surficial Materials in the Conterminous United States," paper 1270, U.S. Government Printing Office, 1984.

[11] See U.S. EPA, "Revised Risk Assessment for the Air Characteristic Study," Office of Solid Waste, EPA 530–R–99–019, November 1999.

EPA derived HBLs for chemical contaminants from toxicity benchmarks and a set of exposure assumptions that differ depending on the type of health effect and exposure pathway. For carcinogenic effects, HBLs were derived from a cancer slope factor (CSF) for the oral route of exposure. For non-cancer effects, HBLs were derived from EPA's oral reference dose (RfD) for the compound. Risk thresholds were as described previously. Drinking water and soil ingestion HBLs for individual chemical contaminants are presented elsewhere.[12] The exposure assumptions we used for deriving the HBLs are described as follows.

For drinking water exposures, we derived HBLs for carcinogenic effects for an adult exposed for 30 years and having a tap water intake of 1.4 liters per day. This represents 21 milliliters per day on a per kilogram body weight basis, which is the mean tap water intake for adults. A duration of exposure of 30 years represents the 95th percentile of the distribution of residential occupancy periods for adults nationwide. We derived HBLs for non-cancer effects for a child having a tap water intake of 1.3 liters per day. This represents 64 milliliters per day on a per kilogram body weight basis and corresponds to the 90th percentile of the distribution of tap water intakes in children that are 1 to 10 years of age.[13] Because the drinking water HBLs incorporate conservative exposure assumptions, we consider them to be appropriate for screening purposes.

Soil ingestion HBLs were derived from either the CSF or the RfD assuming a soil ingestion rate of 200 milligrams per day and an exposure duration of 8 years. A soil ingestion rate of 200 milligrams per day (about 3/100th of a teaspoon) is a conservative estimate of the mean intake rates for children in the age range of 1 to 7. An exposure duration of 8 years is an estimate of the mean residential occupancy period for a 6 year old child. In selecting these values for use in deriving soil ingestion HBLs, we considered the likelihood that children would actually come into direct contact with the wastes.

In cases where wastes are known to be managed in on-site landfills or surface impoundments that are located adjacent to or in close proximity to surface waters, we used additional screening criteria to identify wastes that could have the potential to adversely impact surface waters before eliminating the wastes from further consideration. We used EPA's national water quality criteria for this purpose. Specifically, we compared waste concentrations (*i.e.*, SPLP measurements for wastes managed in on-site landfills and SPLP filtrate measurements for wastes managed in surface impoundments) directly to ambient water quality criteria that have been established for the protection of both human health and aquatic life. Any chemical contaminant in a waste managed under these circumstances that did not screen out against ambient water quality criteria (within a factor of 2) we identified as a constituent of concern (CoC) requiring further assessment.

EPA recently republished ambient water quality criteria for a large number of chemical contaminants (see 63 FR 68354; December 10, 1998). Separate criteria for the protection of aquatic life have been established for fresh water and salt water. In a number of instances waste management units are located adjacent to estuarine environments. In these cases, for screening purposes, we used the lower of the fresh water and salt water criteria.

4. How Was the Groundwater Pathway Evaluated?

We conducted modeling analyses to assess possible risks to human health from wastes managed in land-based units such as landfills and surface impoundments. We used fate and transport models to estimate contaminant concentrations that might occur in a residential drinking water well from migration of uncontrolled releases of leachate from a waste management unit through the subsurface environment. We assessed human exposures to these contaminants from information on the amount of tap water an individual drinks and the length of time an individual might reside at a residence and utilize water from a residential well. We then assessed what the human health risks would be as a consequence of such exposures.

We took a probabilistic approach to the assessment of human exposures. In this approach, we used Monte Carlo simulation techniques to determine the distribution of groundwater concentrations to which an individual could be exposed and combined this with distributional data for the general population on the intake rates of tap water and the duration of exposure. We then assessed the risks to human health from both the middle (central tendency) and upper (high end) portions of the distribution of human exposures. EPA defines high end as the 90th percentile and greater of the distribution of exposures in the population. Central tendency generally refers to the mean or 50th percentile of the distribution. Central tendency and high end estimates may be generated using either probabilistic or deterministic approaches.[14]

We evaluated potential groundwater exposures over a 10,000 year time period. Evaluating peak doses over this time horizon allows the model to capture the slow movement of some chemicals through the subsurface. While exposure assumptions (*e.g.,* land use patterns, climate, environmental and other exposure assumptions) are expected to change over 10,000 years, such changes are difficult to predict. We believe such a time period is appropriate to ensure human health is protected. Even with long time periods, we are still concerned with the risk that would result once contamination reaches potential drinking water wells. Given that the metals of concern do not degrade in the environment, we believe a long modeling time period is necessary. Further, there is uncertainty in when peak concentrations at the receptor well may occur, and using the 10,000 year time frame makes it more likely that we will capture the peak risk in our evaluation. EPA has used similar time horizons for groundwater modeling in past hazardous waste rules.[15]

For modeling chemical concentrations in ground water, many input parameters were varied. These included waste characterization data (*e.g.,* chemical concentrations and waste volumes), waste management practices (*e.g.,* waste management unit size and infiltration rates), hydrogeological parameters (*e.g.,* depth to water table, hydraulic conductivity, and aquifer thickness), and chemical parameters (*e.g.,* soil-water partition coefficient). We conducted extensive sensitivity analyses to determine which of these parameters had the greatest influence on the risk results. For a detailed discussion of the ground water analysis, including parameter distributions, input assumptions, and sensitivity analyses, see the risk assessment background document for today's proposal, ''Risk Assessment for the Listing Determinations for Inorganic Chemical Manufacturing Wastes'' (August 2000).

---

[12] See the risk assessment background document for today's proposal, ''Risk Assessment for the Listing Determinations for Inorganic Chemical Manufacturing Wasters'' (August 2000).

[13] See EPA's ''Exposure Factors Handbook'' (EPA/600/P–95/002Fa), August 1997, for additional details on human exposure factors.

[14] We relied upon the probabilistic risk estimates for today's proposal. However, both deterministic and probabilistic approaches are presented in the risk assessment background document.

[15] See HWIR proposal at 64 FR 63429, November 19, 1999, and the final rule for the recent listing of wastes from petroleum refining at 63 FR 42157, August 6, 1998.

In assessing groundwater exposures for wastes managed in off-site landfills, we considered the locations of every industrial and municipal landfill known to receive the wastes and the volume of wastes managed at each of these sites. In so doing, we considered only that volume of waste that is currently not being managed as hazardous waste. For wastes managed on-site by multiple facilities, we generally considered only those facilities where groundwater exposures are expected to be the highest. These locations were identified by considering the concentration levels of chemical constituents in the waste managed at the site and the proximity of on-site waste management units, namely landfills and surface impoundments, to potential off-site receptors. Our rationale for selecting particular locations for conducting modeling analyses is discussed in section III.F for the specific inorganic sectors.

a. *How were contaminant concentrations in groundwater modeled?* For modeling fate and transport in the subsurface environment, we used the groundwater model EPACMTP (EPA's Composite Model for Leachate Migration with Transformation Products). The model consists of two coupled modules: (1) A one-dimensional module that simulates infiltration and dissolved contaminant transport through the unsaturated zone, and (2) a three-dimensional saturated zone flow and transport module. Fate and transport processes accounted for in the model are advection, hydrodynamic dispersion, sorption equilibria, hydrolysis, and dilution from recharge to the saturated zone. The model assumes that the soil and aquifer are uniform porous media. EPACMTP (as used in this analysis) does not account for heterogeneity of the aquifer or for preferential migration pathways such as fractures and macro-pores or for colloidal transport, any or all of which could be important at a particular site. Although EPACMTP simulates steady-state groundwater flow in both the unsaturated zone and the saturated zone, the model (as used in this analysis) simulates contaminant transport from a finite source and predicts the peak contaminant concentration arriving at a down-gradient groundwater well. Only migration of chemical contaminants within the surficial aquifer is modeled by EPACMTP. We did not model migration of contaminants to deeper aquifers but, instead, based our assessment on exposures that might occur from groundwater withdrawn from the uppermost aquifer where contaminant concentrations are expected to be the highest.

Equilibrium sorption of chemical contaminants onto soil and aquifer materials is parameterized in the EPACMTP model using a soil-water partition coefficient (Kd). For today's proposed rule, we used values for Kd that have been derived from field studies and have been published in the scientific literature. An empirical distribution was used to characterize the variability of Kd for chemical contaminants for which sufficient published data were available. However, for several chemical contaminants having relatively few published values (*e.g.,* antimony and thallium), a log uniform distribution was used.[16] Our use of empirically derived partition coefficients assumes that sorption is linear with respect to groundwater concentration (*i.e.,* the Kd isotherm is linear). However, sorption is not unlimited and will tend to level off as groundwater concentrations increase beyond the linear range (*i.e.,* the Kd isotherm becomes non-linear). This condition is most likely to occur in the unsaturated zone where dilution is limited, if leachate concentrations are sufficiently high.

EPA has sometimes used the MINTEQA2 equilibrium speciation model to estimate Kd's for a variety of metals rather than relying solely on field measurements. However, recently a number of technical issues have been raised concerning the model and its application. EPA is in the process of evaluating the model to address those issues. Therefore, we have decided not to use MINTEQA2 for today's proposed rule. Once the evaluation is completed and the issues are satisfactorily resolved, EPA may again choose to use the model in an appropriate form in future rulemakings.

Infiltration of leachate from landfills into the subsurface is modeled using the HELP model (Hydrologic Evaluation for Landfill Performance), a quasi-two-dimensional hydrologic model used to compute water balances for landfills. We assumed that landfills have a final earthen cover but no liner or leachate collection system. The net infiltration rate that is calculated by the model considers, among other factors, precipitation, evapotranspiration, and surface runoff and depends on the type of soil and the climate where the landfill is located. For surface impoundments, the infiltration rate is estimated from the liquid depth in the impoundment and from the hydraulic conductivities and thicknesses of the sediments and the underlying soil. We assumed that surface impoundments have no liner or leachate collection system. Unconsolidated or loose sediments are treated as free liquid so that the pressure head on the underlying, consolidated sediments is determined by the depth of the liquid in the impoundment and the depth of the unconsolidated sediments. As sediment accumulates at the base of the impoundment, the weight of the liquid and upper sediments acts to compress (or consolidate) the lower sediments. The result is the formation of a consolidated sediment layer having a hydraulic conductivity that is much lower than the previously unconsolidated sediment.

We assumed that landfills have an operational life of 30 years.[17] In landfills, leaching of contaminants from the waste leads to an exponential decrease in the leachate concentration with time. The rate at which this occurs depends on the volume of waste disposed of in the landfill and the total concentration of chemical contaminants in the waste. We used the measured TCLP concentration (for disposal in a municipal landfill) or SPLP concentration (for disposal in an industrial landfill) as the initial leachate concentration for modeling. In contrast, we assumed that surface impoundments have an operational life of 50 years.[18] Many surface impoundments are periodically dredged and, therefore, can be maintained in service for longer periods of time. With surface impoundments, leachate concentrations are not expected to decrease over time and, therefore, leachate concentrations are assumed to remain constant during their operational life. We used the total concentration of chemical contaminant measured in the wastewater or (for wastewaters with high levels of solids) the concentration measured in the SPLP filtrate as the leachate concentration for modeling.

The fate and transport simulation modules in EPACMTP are linked to a Monte Carlo module to allow quantitative consideration of variability

---

[16] A log uniform distribution is a distribution that has equal probabilities at all percentiles when the parameter is transformed into logarithms. For these chemical constituents, we used a log uniform distribution that was centered on the geometric mean of the available data and had a width of 3 logs. This was done to better account for the variability normally seen in measurements of Kd.

[17] U.S. Environmental Protection Agency, "Draft National Survey of Solid Waste (Municipal) Landfill Facilities," Office of Solid Waste, Washington, D.C., 1988 (EPA/530–SW–88–034).

[18] See assumptions made for the recent proposed hazardous waste identification rule at 64 FR 63382; November 19, 1999.

and uncertainty in groundwater concentrations due to variability and uncertainty in model input parameters. We use a regional site-based methodology to associate the appropriate regional climatic and hydrogeologic conditions to the location of actual waste management sites. This methodology accommodates dependencies between the various model input parameters. In this approach, a site location is assigned to one of 13 hydrogeologic regions and one of 97 climatic regions that are linked to databases of climatic and hydrogeologic parameters. A climatic data set provides infiltration and recharge values for three soil textures at each of 97 climatic centers in the contiguous United States. The soil textures are based on a Soil Conservation Service soil mapping database and U.S. Department of Agriculture definitions of coarse, medium, and fine soil textures. (These textures are represented in EPACMTP by sandy loam, silt loam, and silty clay loam, respectively.) Infiltration rates for the waste management unit and the recharge rate for the surrounding region were determined for each soil type and climatic center using the HELP model. A site location is generally assigned to the climatic center that is geographically closest to the site.

Each site location is also located on a groundwater resource map (from a U.S. Geological Survey inventory of State groundwater resource maps) and a hydrogeologic region is assigned to the site based on the primary aquifer type at that location. A hydrogeologic database provides a distribution of values for depth to groundwater, aquifer thickness, hydraulic gradient, and hydraulic conductivity for each of 13 hydrogeologic regions. The hydrogeologic data base (HGDB) was developed from a survey of hydrogeologic parameters for approximately 400 hazardous waste sites nationwide. These site-specific data were then regrouped according to hydrogeologic classifications, and a distribution of parameter values was generated for each of the 13 hydrogeologic regions (made up of 12 specific hydrogeologic environments and one miscellaneous category). In the analysis for today's rule, we modified the above approach for on-site waste management units to enable available site-specific information on depth to groundwater to be used in place of the values found in the database.

We also used a regional site-based methodology to associate the appropriate soil characteristics to a given site location. In this approach, a distribution of soil textures at a site is determined by associating the site location with a soils classification region. We defined soil classification regions from information on the soil types found within a 100 mile radius of the site location. The distribution of soil textures for the region was determined by identifying the soil texture classifications from data contained in the U.S. Department of Agriculture (Natural Resources Conservation Service) STATSGO (State Soil Geographic) data base. The predominant soil textures within each mapping unit (which represents a collection of soils) were identified and the fraction of the three soil textures used in the EPACMTP model were determined (i.e, sandy loam, silt loam, and silty clay loam). These soil classification regions were used for modeling off-site municipal and industrial landfill sites. A similar approach was taken for on-site landfills and surface impoundments except that the predominate soil textures from mapping units that correspond to the site location itself were identified. These were compared for consistency with other soils information available for the site. Once the fraction of the three soils textures is determined for a given site location, a distribution of soil parameter values is generated from information on the distribution of soil parameter values for the three soil textures and the fraction of each soil texture for the site. These parameters are used for modeling groundwater flow and contaminant transport in the unsaturated zone and include saturated conductivity, moisture retention properties, water content, and organic matter content.

A full description of the groundwater modeling analyses conducted for today's proposed rule may be found in the background document, ''Risk Assessment for the Listing Determinations for Inorganic Chemical Manufacturing Wastes'' (August, 2000).

b. How were human exposures assessed? Our assessment of human exposures to contaminated ground water is based on a residential drinking water scenario. A different approach was used for determining the location of exposure depending on whether the wastes are managed on-site or are shipped off-site for disposal. For waste shipped to off-site municipal landfills, we used EPA's National Survey of Municipal Landfills [19] to determine the distance from the landfill to the receptor well. We also used these same data for off-site industrial landfills. For wastes managed on-site in either landfills or surface impoundments, we attempted to determine the closest point at which a residential well could be located and, therefore, the point at which human exposures could plausibly occur. We considered the location of the facility property boundary, the type of land use adjacent to the property boundary, the presence of surface waters that could intercept ground water flow, utilization of ground water for residential or agriculture uses, and the existence of residential drinking water wells in the direction of ground water flow. For both on-site and off-site waste management, we assumed the receptor well was located down-gradient from the waste management unit and that ground water is withdrawn from the top ten meters of the aquifer and within the lateral extent of the contaminant plume. Exposures were further assumed to occur out to a distance of a mile from the waste management unit.

Our assessment of human exposures did not consider naturally occurring background levels in ground water. Background levels in ground water are not a significant source of human exposure for several of the more important chemical constituents in the wastes that are the subject of today's proposal (*e.g.*, antimony and thallium). However, for manganese, dietary exposures are a significant source of background exposures. We did not attempt to quantify the cumulative risks from both dietary and drinking water exposures combined and, therefore, this is a source of uncertainty in our assessment of risks from manganese in these wastes.

Human exposures were characterized in terms of lifetime average daily dose (LADD) and average daily dose (ADD) for both children and adults. We used the LADD for assessing cancer risks and the ADD for assessing risks from non-cancer effects (including reproductive, developmental, neurological, cardiovascular, hematologic, metabolic, and a wide variety of other physiologic effects). Exposures to children of age one to six years and adults of age 20 to 64 years were assessed. We used information from EPA's Exposure Factors Handbook [20] to characterize tap water intake rates for individuals and residential occupancy periods of households (and, therefore, the length of time an individual could be exposed to contaminated ground water). Distributional data on tap water intake rates for individuals and residential occupancy periods for households were

---

[19] *Ibid.*

[20] U.S. Environmental Protection Agency, ''Exposure Factors handbook'', Volumes I and III, Office of Research and Development, National Center for Enironmental Assessment, Washington, DC., August 1997 (EPA/600/P–95/002Fa and c).

used to generate both the ADD and LADD exposure estimates. For assessing lifetime exposures, we averaged the well water concentrations over the duration of exposure (*i.e.*, the residential occupancy period). We also averaged the tap water intake rates over the duration of exposure to account for the changes in tap water intake rates with age that are seen among children. For estimating the ADD, we used the peak 9-year average well water concentration but did not further average the estimated exposure (which we believe would be inappropriate given the range of possible health effects we want to protect against). Previous work with the EPACMTP ground water model has shown that the peak 9-year concentration and the maximum predicted concentration are nearly identical.

A full description of the methods and data used in the exposure assessment for today's proposed rule may be found in the background document, ''Risk Assessment for the Listing Determinations for Inorganic Chemical Manufacturing Wastes'' (August, 2000).

5. How Was the Surface Water Pathway Evaluated?

A number of facilities that generate wastes covered by today's proposed rule are located adjacent to rivers or bays. As a consequence, the potential exists for subsurface releases of chemical contaminants from on-site management of the wastes to enter these river and bay systems through ground water inflow. In instances where no direct contact with ground water is likely to occur (as there would otherwise be if, for example, ground water was being used for residential drinking water), it becomes important to evaluate the potential water quality impacts of these releases on surface waters in the context of hazardous waste listings. However, we wish to emphasize that the surface water impacts considered in today's proposed rule are due to subsurface releases to ground water only. Direct discharges to surface waters are already regulated by the Clean Water Act under the NPDES permit system and are not considered further in today's proposal.[21]

We conducted a screening level analysis to evaluate potential surface water impacts. In this analysis, we estimated the volume of leachate that would infiltrate into ground water and assumed that this entire volume would be intercepted by surface water. Because this is a screening analysis, we made conservative assumptions that are likely to overstate the infiltration of leachate and, therefore, the potential release to surface water. For example, for on-site landfills, we assumed a soil type (sandy loam) that is likely to overstate the infiltration rate even in the absence of liners or leachate collection systems. Similarly, for surface impoundments we assumed a sludge thickness (8 inches) and soil type (sandy loam) that is likely to overstate the infiltration rate. In addition, we assumed no retardation in the migration of chemical contaminants in ground water due to sorption or other processes.

Due to the nature of these releases, which are likely to occur over a wide area, we assumed that the inflow of contaminated ground water was rapidly diluted into surface water and that there was little or no mixing zone. We followed EPA's Office of Water guidance for determining the design flows for rivers as regards water quality criteria. The appropriate design flow depends on the particular water quality impact being evaluated. For assessing potential impacts on aquatic life, we used the ''7Q10'' as the design flow. The 7Q10 is the seven day low flow with a return frequency of once every 10 years and is the recommended design flow for use with chronic water quality criteria for the protection of aquatic life. We believe that chronic water quality criteria are the appropriate criteria for evaluating the potential impact of continuing steady releases, such as those that would result from subsurface discharge of contaminated ground water. On the other hand, EPA generally uses the ''30Q5'' as the design flow for assessing potential impacts on human health. The 30Q5 is the thirty day low flow with a return frequency of once every 5 years and is the recommended design flow for use with water quality criteria for the protection of human health as regards non-cancer effects. However, a 30Q5 design flow was not available in all cases. In these instances, we estimated the 30Q5 based on the 7Q10 design flow.[22] For carcinogens (*e.g.,* arsenic), lifetime exposures are the primary concern and a design flow that corresponds to a longer averaging time is appropriate. For this reason, EPA recommends the long-term harmonic mean be used as the design flow.[23] The harmonic mean is always less than the arithmetic mean and is used in place of it because low flow conditions drive long-term average water quality. However, because this flow statistic was not available, we estimated the harmonic mean flow from the arithmetic mean flow and the 7Q10.

As a result of the screening level analysis, all wastes screened out for which the ground water to surface water pathway was a concern. Therefore, no additional analysis of this pathway was conducted.

6. What Are the Limitations and Uncertainties of the Assessment?

Our assessment of exposures and risks is subject to a variety of limitations and uncertainties. These are discussed in some detail in the background document for today's proposed rule. A number of these are highlighted here.

We assumed our sampling and analysis data are fully representative of the range of wastes generated in the effected industries. However, our own data show that there are significant variations in waste concentrations across facilities in a given industry. Variability in waste concentration that is unaccounted for could lead to an over- or under-estimation of risks. However, any tendency toward under-estimation is likely to be mitigated to some extent by our selection of wastes and exposure scenarios that are intended to capture the highest risks.

We also assumed that our methods for measuring the leaching behavior of wastes (*i.e.,* the TCLP and SPLP test procedures) are both representative of the range of leaching conditions that exist under real world conditions and accurately quantify the concentrations of contaminants that leach into the subsurface environment from a given waste management unit. However, we know that many metals exhibit varying (or amphoteric) behavior with respect to pH and that any one test procedure is capable of characterizing leaching behavior only under a particular set of conditions.

The ground water model we used in our analysis (*i.e.,* EPACMTP) is designed to characterize dilution and attenuation in the subsurface environment under homogeneous conditions. The model does not account for subsurface heterogeneities, nor does it account for fractured flow or colloidal transport. These conditions, if present at

---

[21] Industrial wastewater discharges that are regulated under the National Pollutant Discharge Elimination System (NPDES) Permit Program are specifically excluded from regulation as hazardous wastes under 40 CFR 261.4(a)(2).

[22] EPA guidance provides a simple rule of thumb for estimating the 30Q5 from the 7Q10 depending on the size of the river. For smaller rivers (defined as those with a low flow of 50 cfs or less), the 30Q5 is 1.1 times the 7Q10. For larger rivers (low flow of 600 cfs or greater), the 30Q5 is 1.4 times the 7Q10. See ''Technical Support Document for Water Quality-Based Toxics Control,'' EPA/505/2–90–001, March 1991.

[23] The harmonic mean is defind as the inverse of the average of the sum of the inverses of the recorded flows.

a site, can lead to less dilution and attenuation of contaminant levels than predicted by the model, causing ground water concentrations to be under estimated. In addition, sorption of metal species onto soil and aquifer materials exhibits considerable variability depending on geochemical conditions and the total concentration of the metal present at a given location. Although our use of empirically derived Kd values captures some of this variability, the available published data are fairly limited for certain metals (*e.g.*, antimony). We have accounted for the uncertainty associated with the small number of data points explicitly for these metals by expanding the range of Kd values used for modeling (to three orders of magnitude). Even for metals that have abundant data (e.g., arsenic), it is unlikely that the range of variability apparent in the data could exist at a given site.

Uncertainty associated with the specification of Kd as noted above could lead to an over- or under-estimation of risk. However, a tendency toward over-estimation is likely to be mitigated by the fact that under near steady-state conditions (when ground water impacts are the greatest), concentrations in ground water are little influenced by Kd. Under non-steady conditions, any tendency toward over- or under-estimation is limited by the variability inherent in the empirical distributions of Kd used in the analysis, which include both relatively high and relatively low values of Kd. Nevertheless, in general the risk estimates are sensitive to the specification of Kd and, therefore, this is an important source of uncertainty in our analysis.

As indicated previously, for wastes managed on-site we based our assessment of human exposures on the plausibility of ground water being used for drinking water. While some information was available on utilization of ground water for drinking water, very limited information was available from which to determine the location of exposure at a given site. For wastes managed off-site we assumed that ground water is used for drinking water (or will be in the future) and we used national data on the distribution of distances to residential wells to assess human exposures and risk. Our analysis did not consider possible changes in the location of on-site waste management operations in the future. These exposure assumptions (about which there is considerable uncertainty) may have an impact on the estimated risks and, therefore, the outcome of the risk assessment.

Other important uncertainties include those related to the health effects of chemical contaminants in humans (hazard identification), absorption and metabolism of ingested contaminates (pharmacokinetics), and biological response (dose-response relationships). These and other limitations and uncertainties are discussed in the background document, ''*Risk Assessment for the Listing Determinations for Inorganic Chemical Manufacturing Wastes*'' (August, 2000).

F. Sector-Specific Listing Determination Rationales

We seek comments on all proposed listing decisions in this section, and the underlying rationales used to support our proposals.

1. Antimony Oxide

a. Summary. We have evaluated antimony oxide production wastes and propose to list two wastes from this process as hazardous: (1) Baghouse filters and (2) slag that is disposed of or speculatively accumulated. We propose to list the baghouse filter waste under the criterion in 40 CFR 261.11(a)(1) because it routinely exhibits one or more of the characteristics of hazardous waste, but the waste is not consistently managed in compliance with Subtitle C regulations. We propose to list the slag under the criteria in 40 CFR 261.11(a)(3) because of risks associated with land disposal.

K176 Baghouse filters from the production of antimony oxide. (E)
K177 Slag from the production of antimony oxide that is disposed of or speculatively accumulated (T).

Other wastes generated by the antimony oxide industry do not meet the criteria set out at 40 CFR 261.11(a)(3) for listing a waste as hazardous. They do not pose a substantial present or potential threat to human health or the environment. We identified no risks of concern associated with the current management of these other wastes.

b. Description of the antimony oxide industry. Antimony oxide was produced by four facilities in the United States in 1998. Antimony oxide is used as a flame retardant in plastics and textiles, a smoke suppressant, a stabilizer for plastics, an opacifier in glass, ceramics and vitreous enamels, and a coating for titanium dioxide pigments and chromate pigment.

The manufacturers use two different processes to produce antimony oxide. In the first process, antimony metal is roasted in the presence of air. The antimony oxide forms as a fume, cools and condenses in a baghouse. In the second process, crude (low grade) antimony oxide is roasted in the presence of air to produce higher grade antimony oxide. The antimony oxide cools and condenses in a baghouse. The crude antimony oxide comes either from off-site or is recycled from within the facility.

c. How does the Bevill Exclusion apply to wastes from the antimony oxide manufacturing processes? Antimony oxide producers use a range of raw materials to produce antimony oxide, including antimony metal ingots, sodium antimonate, and antimony ore concentrate, and some facilities have claimed that wastes generated from the production of antimony oxide are Bevill exempt. Wastes generated from processes using either antimony ingots or sodium antimonate (both of which are saleable mineral products) are considered chemical manufacturing wastes rather than mineral processing wastes and are not eligible for the Bevill exemption. The September 1, 1989 Bevill final rule states at 54 FR 36620–21 that chemical manufacturing begins if there is any further processing of mineral product.

Two of the facilities also purchase an antimony ore concentrate as a raw material and place this material in kilns to produce antimony oxide. The smelting of a ore concentrate above the fusion point is defined as mineral processing (See 54 FR 36618). At these antimony oxide facilities, since mineral processing has begun, wastes from the process are not eligible for the Bevill exemption as beneficiation wastes (See 40 CFR 261.4(b)(7)(i)). In addition, although there is a Bevill exemption for 20 specific mineral processing wastes form various mineral processing sectors, the wastes generated from antimony oxide mineral processing are not included as one of these 20 wastes and are not excluded. (See 40 CFR 261.4(b)(7)(ii)). Thus there are no antimony oxide wastes that qualify for the Bevill exemption.

d. Wastes generated by these processes. Table III–1 summarizes our information about the wastes generated from the production of antimony oxide:

TABLE III–1.—ANTIMONY OXIDE PRODUCTION WASTES

Waste category	Number of reported generators	1998 volume (MT)	Reported waste hazard codes	Management practices
Antimony slag not recycled in process	3	113	D008	Sent to lead smelters for lead and/or antimony recovery; or on-site drum storage prior to future on-site land disposal.
Baghouse filters	4	9	No code reported	In-process antimony recovery; off-site antimony recovery; industrial Subtitle D landfill; or non-hazardous waste incinerator.
Empty supersacks	1	15	No code reported	Disposal in off-site Subtitle D landfill or recycled.

In addition to these wastes, there are other materials produced that are reused in the antimony oxide production process. Antimony oxide and antimony slag are captured at various points in the facility and reinserted into a furnace to produce antimony oxide, either on-site or off-site. Because these materials are managed prior to reuse in ways that present low potential for release, and because we evaluated process waste generated after the secondary materials are reinserted into the process, we do not believe that these secondary materials present significant risks.

e. Agency evaluation. (1) Antimony slag not recycled in antimony oxide process.

How Are These Wastes Currently Managed?

Three facilities produced antimony slag that is not recycled in the antimony oxide process. Two of these facilities send the slag to lead smelters. One of the two facilities reported its slag to be TC hazardous because of its lead content (D008). The third facility, however, has historically stored a portion of its slag on-site in drums, reporting that they plan to reclaim antimony when antimony prices are more favorable. Recent revisions to the facility's Operating Permit,[24] however, require that the slag be placed in an on-site engineered ''slag storage pit'' to be constructed in the next two to three years.

We assessed the on-site disposal scenario, reflecting the projected management practice for this waste. For a number of years, the facility has been placing approximately 20 MT/yr in steel drums on pallets on the ground. The facility reported that they intend to reclaim the antimony from this slag when antimony prices are favorable. We consider storage on-site for more than one year to be speculative accumulation and consider these materials to be solid wastes. We believe that the length of time secondary materials are accumulated before being recycled is an important indicator of whether or not they are wastes. This is supported by the large number of recycling damage cases where secondary materials that were overaccumulated over time caused extensive harm. (See 50 FR 614) ''Under RCRA and the implementing regulations, permanent placement of hazardous waste, including perpetual ''storage'' falls into the regulatory category of land disposal.'' [25] (See also *American Petroleum Institute* v. *EPA,* 216 F. 3d 50 (D.C. Cir. 2000).) Since the Operating Permit requires the facility to build and use an on-site, land-based unit for this waste, we assessed the on-site landfill scenario for this waste.

How Was This Waste Category Characterized?

We selected two of the three facilities for sampling and analysis. At the site which stores the slag indefinitely, we collected one sample of ''reduction furnace slag'' that was designated as containing less than 5 percent antimony (AC–1–AO–01) and one sample of ''reduction furnace slag'' that was designated as containing between 5 and 10 percent antimony (AC–1–AO–06). Based on characterization information provided by the facility in its RCRA Section 3007 Survey response, we believe these samples are representative of all of the slags generated at the facility. We conducted total, TCLP and SPLP analyses of these slags. The analytical results for the constituents found to be present in the leachates at levels exceeding the HBLs are presented in Table III–2.

We collected a third sample (LI–1–AO–01) at a facility that reclaims its slag for lead. This sample failed the TC for lead, as the facility reported in its RCRA Section 3007 Survey response. The results are available in ''Waste Characterization Report, Laurel Industries Inc., La Porte, Texas'' in the docket for today's proposal.

TABLE III–2.—CHARACTERIZATION OF SPECULATIVELY ACCUMULATED ANTIMONY SLAG

Constituent of concern	AC–1–AC–01			AC–1–AO–06			HBL mg/L
	Total mg/kg	TCLP mg/L	SPLP mg/L	Total mg/kg	TCLP mg/L	SPLP mg/L	
Antimony	11,500	55.8	114	127,000	110	211	0.006
Arsenic	301	2.0	2.9	478	3.1	3.8	0.0007
Boron	<500	9.8	9.3	<2,500	8.5	8.1	1.4
Selenium	<50	0.6	0.6	<250	0.6	0.3	0.08
Vanadium	<50	1.3	1.1	<250	0.6	1.0	0.14

---

[24] ''United States Antimony Corp. Stibnite Hill Mine Project Operating Permit 00045'', 6th review draft, January 1999. This draft permit is issued under the Metal Mine Reclamation Act, 82–4–301 MCA. It was prepared by the facility, approved by the State of Montana on August 12, 1999 (with a number of stipulations), and subsequently approved by the Forest Service.

[25] ''Above Ground Land Emplacement Facilities, N.J. Law,'' Letter to Honorable James J. Florio, Chairman, Subcommittee on Commerce, Transportation, and Tourism, Committee on Energy and Commerce, House of Representatives, from J. Winston Porter, Administrator, EPA, dated March 26, 1986.

How Was the Groundwater Ingestion Risk Assessment Established?

We modeled the annual volume reported to be stored on-site indefinitely (20 MT). (The facility reports that it processes sodium antimonate from two facilities and returns the resultant slag to the process for further processing. We did not include these recycled slag volumes in our modeling.)

We used the total and SPLP results as model inputs, reflecting the industrial nature of the on-site unit. We used only the analytical results for the facility that stores the slag indefinitely. Both of the samples for this facility are relevant because they represent the material stored on-site and destined for the on-site slag pit. We did not model the sample from the other sampled facility because they acknowledged that their waste exhibited the TC. Both this facility and the facility that was not sampled reclaim these wastes in a manner that is excluded from regulation under Subtitle C. We believe that it is reasonable to assume that they will continue to manage their slags in ways that do not violate Subtitle C regulations. Also, in this case, the SPLP results are higher than the TCLP results, making the industrial landfill the worst case scenario.

We examined records available from the State where the slag is stored to determine the appropriate distance-to-well to model. We identified four residential wells within several miles of the facility. These data demonstrate that groundwater is a viable and actively used resource in this area. One well is located 1.4 miles directly downgradient. Based on local topography and groundwater information, we do not believe the other identified wells could be affected by releases to groundwater from the facility. We modeled potential releases to a downgradient residential well. Given that our groundwater model is not configured at this time to model releases further than one mile, we did not assess the full distance to the known well. In our probabilistic analysis, we varied the well distance from the closest property boundary that appeared to be potentially downgradient to the limit of the model (one mile). Our results therefore are conservative with respect to this particular well, but otherwise reflect the fact that future residences and wells may be placed closer to the facility and any potential groundwater plumes associated with its operation. Specifically, we modeled potential distances to wells from the facility's southern boundary to one mile.

We used a regional site-based approach in modeling this unit, as described in section III.E.4. We modified this to enable us to use available depth to groundwater information at this particular site.

What Is EPA's Listing Rationale for This Waste?

Where these slags are reused and present no exposure route of concern, we did not evaluate these secondary materials further.

The results of the risk assessment for the on-site disposal scenario for boron, selenium, and vanadium were very low. In the 90th to the 95th percentile range, the highest hazard quotient for these three constituents was in the range of 0.001. For this reason, the full results for these three constituents are not presented here. The results of the risk assessment for the on-site disposal scenario for antimony and arsenic are presented in Table III–3:

TABLE III–3.—PROBABILISTIC RISK ASSESSMENT RESULTS FOR SPECULATIVELY ACCUMULATED ANTIMONY SLAG

Percentile	Adult risk	Child risk	Adult risk	Child risk
	[1]Antimony hazard quotient		[1]Arsenic—cancer risk	
90th%	2.2	4.6	4 E–07	3 E–07
95th%	4.5	9.4	1 E–06	9 E–07

For a more complete description of this analysis, see ''Risk Assessment for the Listing Determinations for Inorganic Chemical Manufacturing Wastes'' (August 2000) in the docket for today's proposal.

In our modeling results, the dilution and attenuation factors (DAFs) were relatively high. For example, high end antimony DAFs were as high as 8,000. This is the result of the hydrogeological setting of the site evaluated. Due to the high hydraulic conductivity we used in modeling, the landfill leachate is readily diluted into a large volume of groundwater. Given the uncertainty about the actual ultimate management practice and the site-specific nature of the modeling, DAFs could be considerably lower in other disposal scenarios, resulting in much higher hazard quotients and, therefore, higher potential risks.

Our modeling approach assumes that the slag will be placed in an unlined unit. Information from the facility, however, indicates that they plan to place the waste in an on-site lined storage pit, upon completion of construction, that will be governed by a state mining permit. We considered whether our decisionmaking should account for the added protection provided by a liner system. Our first consideration is the current uncertainty regarding this waste's disposition. While the facility has stated its intended placement of this waste in a lined unit, our most recent information indicates that construction had not yet begun. The facility may in fact choose to place this waste in an off-site commercial landfill that would not necessarily be lined. This uncertainty is greater than in most waste management scenarios that we have assessed in this rulemaking, where there is a long term history of management in a particular type of management unit (*e.g.*, an operating on-site landfill, a local off-site landfill). Because of this uncertainty, we are hesitant to give much weight to a liner system that may be constructed in the future.

More generally, we considered the efficacy of landfills (and any liners) over the modeled risk assessment period, which covers 10,000 years. Landfills are used actively until their capacity is reached (our models assume an active life of 30 years), and at the end of their active life, we assume landfills are closed and the wastes remain in the unit indefinitely. The effectiveness of liner systems depends on how they are designed. Composite and double liners that combine two or more layers of liner material with leachate collection and leak detection will no doubt minimize leakage to the subsurface during the period when the leachate collection system is actively managed. However, depending on the regulatory controls relevant for a particular unit, monitoring would continue for a limited post-closure period. There is also uncertainty associated with liner performance, in the near term as well as in the long term. There are a variety of factors that may influence longevity and performance, such as poor construction, installation or facility operation, or geologic movement below the liner that can cause holes, tears or larger failures. Some defects may have a significant effect. Because of our uncertainty regarding the efficacy of the liner system over long periods of time, and the uncertainty over the ultimate disposal for this waste, we believe our use of the modeling results for an unlined landfill is appropriate.

In deciding whether to list this waste as hazardous, we also considered other factors in addition to the risk results noted above. First, we considered the very high levels of toxic constituents present in the waste and in test leachate (which is one of the criterion cited in 261.11(a)(3)(ii)). The levels of antimony and arsenic are quite high. The antimony level exceeds 10% in the waste (up to 127,000 mg/kg), and the SPLP antimony concentration exceeds the drinking water HBL by a factor of >35,000. Another key factor is the lack of any appreciable degradation expected for these metals (a constituent's degradation or persistence is also a criterion for listing given in 261.11(a)(3)). Unlike some organic compounds, metals such as antimony will not degrade over time. Thus, even if the loss in effectiveness of a liner system only occurs over the very long term, the metals would still be present for leaching. It is difficult to assess the impact of the long-term effectiveness of the liner system in question for today's proposal. However, we note that the effectiveness of the liner system would have to be sufficient to reduce the antimony concentration at the well by close to 90% in order to keep the risks below an HQ of 1.

Therefore, given the reasons cited above, we propose to list these slags as hazardous:

K177 Slag from the production of antimony oxide that is disposed of or speculatively accumulated.

It is important to note that this listing has been developed to capture only those wastes that are not recycled. Thus, this listing, as proposed, would not apply to generators that recycle or reclaim this material as long as it is not speculatively accumulated. If slags have been speculatively accumulated (*i.e.,* held for more than a calendar year without recycling) at the time of the effective date of this final rule, these slags would meet the listing immediately.[26]

We also propose to add antimony to Appendix VII to Part 261, which designates the hazardous constituents for which K177 would be listed.

(2) Baghouse filters.

How Are These Wastes Currently Managed?

These filters capture product or off-specification product. Two facilities place antimony laden baghouse filters in their on-site production furnaces. One of these facilities also sends a portion of its baghouse filters to Mexico for antimony recovery. Two other facilities dispose of these wastes in a non-hazardous waste incinerator and an industrial Subtitle D landfill. None of these wastes are handled as hazardous, although our sampling efforts showed this waste to exhibit the toxicity characteristic for lead and arsenic.

How Was This Waste Category Characterized?

We collected a total of three samples of this waste category from two facilities. At one facility we collected one sample of the "oxidation furnace" baghouse filters (AC–1–AO–03) and one sample of the "reduction furnace" baghouse filters (AC–1–AO–07). At the other facility, we collected a sample of the baghouse associated with its kiln (LI–1–AO–03). Because the facilities sampled represented the range of production practices within the industry, we believe these samples are representative of all of the baghouse filters generated by this industry. We conducted total, TCLP and SPLP analyses of these baghouse filters. The analytical results for the constituents found to be present in the leachates at levels exceeding the HBLs are presented in Table III–4. Two of the three samples of the waste, one from each facility that generate this waste, exceed the toxicity characteristic for either lead or arsenic. (The third sample exhibits TCLP lead levels close to the TC standard).

TABLE III–4.—CHARACTERIZATION OF BAGHOUSE FILTERS FROM ANTIMONY OXIDE PRODUCTION (MG/KG OR MG/L)

Constituent of Concern	LI–1–AO–03			AC–1–AC–03			AC–1–AO–07			HBL	TC
	Total	TCLP	SPLP	Total	TCLP	SPLP	Total	TCLP	SPLP		Limit
Antimony	91,400	9.3	6.2	150,000	9.9	4.3	145,000	68.7	287	0.006	....
Arsenic	114	<0.5	0.6	<250	<0.5	0.09	<250	[1]6.9	6.9	0.0007	5.0
Boron	24.0	6.5	1.0	<2500	<2	0.2	<2500	<2	0.7	1.4	....
Cadmium	5.3	0.3	0.5	<250	0.3	0.3	411	<0.05	0.9	0.0078	1.0
Lead	3.1	[1]8.5	16.9	<2500	2.8	1.0	<250	<0.5	<0.05	0.015	5.0
Mercury	0.9	<0.002	0.001	0.1	<0.002	<0.0002	95.2	0.03	0.4	0.0047	0.2
Thallium	<2	<2	0.06	<1000	<2	0.06	<1000	<2	0.1	0.0013	....

[1] Exceeds Toxicity Characteristic level.

What Is EPA's Listing Rationale for This Waste?

We propose to list the baghouse filters waste because our data show it routinely exhibits one or more of the characteristics of hazardous waste (*i.e.,* TC lead or arsenic), yet the generators do not identify their wastes as exhibiting the toxicity characteristic and the generators that dispose of this waste do not comply with Subtitle C regulations. We propose to list this waste under the 261.11(a)(1) criteria:

K176 Baghouse filters from the production of antimony oxide (E).

Because we believe we have sufficient reason to list this waste under 261.11(a)(1) based on the TC exceedences and lack of compliance with hazardous waste regulation, we chose to conserve our time and resources and did not conduct formal risk assessment modeling of the off-site landfill scenario, as we would traditionally do to support a 261.11(a)(3) listing. Such modeling would reflect reported management practices. Antimony is not a TC constituent and, therefore, was not considered in the 261.11(a)(1) listing decision. However, antimony levels are high and would likely result in risk if modeled. Leach results for the waste exceed the HBLs by

---

[26] A material is not accumulatively speculatively, however, if the person accumulating it can show that the material is potentially recyclable and has a feasible means of being recycled and that—during the calendar year (commencing on January 1)—the amount of material that is recycled or transferred to a different site for recycling equals at least 75 percent by weight or volume of the amount of that material accumulated at the beginning of the period. (40 CFR 261.1(c)(8))

a wide margin, *e.g.,* the SPLP results for antimony are up to 48,000 times the HBL. The high levels of antimony in the waste (up to 15%) would provide a long-term source of the metal for leaching into the groundwater. Thus, we expect that modeling an off-site Subtitle D scenario would yield significant drinking water risk.

Note that, when facilities process the antimony oxide product captured in these filters by reinserting the product-containing filters back into the furnace where the antimony oxide originated, without reclamation, these materials would not be solid wastes.[27]

We also propose to add arsenic and lead to Appendix VII to Part 261, which designates the hazardous constituents for which K176 would be listed.

The ''mixture'' rule for listed wastes currently provides an exemption for wastes listed solely because they exhibit characteristics (see 40 CFR 261.3(a)(2)(iii)). Mixtures of such listed wastes lose their listed waste status when they cease to exhibit characteristics for which they were listed. (However, they would still need to comply with Land Disposal Restriction requirements.) In the both of the last two Hazardous Waste Identification Rule (HWIR) proposals (60 FR 66344, December 21, 1995) and (64 FR 63382, November 19, 1999), we proposed to narrow the exemption to only include wastes listed for ignitability, corrosivity, and reactivity.

This narrowing would make any waste listed for the toxicity characteristic (TC) (including the waste proposed today for listing under the (a)(1) criteria) ineligible for the current exemption. In other words, under current mixture rule regulations, mixtures containing these baghouse filters would become nonhazardous wastes once they ceased exhibiting the characteristic. Under the HWIR proposal, however, such mixtures would remain hazardous wastes even after they cease to exhibit the TC. As we state in the TC rule, chemicals can still pose hazardous at levels below the TC (see 55 FR 11799, March 29, 1990). Under an amended consent decree (*Environmental Technology Council* v. *Browner, C.A.* No. 94–2119 (TFH), April 11, 1997), EPA is required to sign a notice taking final action with respect to the proposed revisions to the mixture rule by April 30, 2001.

(3) Empty supersacks. One facility ships crude antimony oxide in supersacks and then reuses them to store intermediate materials until they wear out. The facility then sends these empty supersacks either to an off-site industrial Subtitle D landfill or to an off-site plastic recycler. The facility claims that the supersacks are empty and would meet the standard in 40 CFR 261.7 (which exempts ''empty'' containers formerly used to manage hazardous waste). Although 40 CFR 261.7 does not literally apply to these sacks, we think it is reasonable to take a similar approach here. We believe that the levels of crude antimony oxide in worn-out supersacks would be low because the material is the primary feedstock (raw material) used in this process. We do not believe it follows that these supersacks should be regulated, when other similarly empty containers would be exempt. Therefore, we propose not to list this waste as hazardous.

2. Barium Carbonate

a. Summary. We have evaluated the wastes, waste management practices, and potential risk exposure pathways associated with the barium carbonate production processes and propose not to list any wastes from this industry as hazardous under Subtitle C of RCRA. Some wastes in this industry are D002 or D005 characteristic hazardous wastes, which are both currently subject to RCRA Subtitle C regulation and managed in compliance with those regulations. For other wastes, not identified as characteristic hazardous wastes, we have identified no risks of concern associated with the current management of these wastes that would warrant listing. These wastes do not meet the criteria listed under 40 CFR 261.11(a)(3) for listing a waste as hazardous.

b. How is barium carbonate produced? There are two facilities in the United States that produce significant quantities of barium carbonate. A Georgia facility produces barium carbonate for commercial sale. A Pennsylvania facility produces barium carbonate only for use as a feedstock in its own internal manufacturing processes. A third facility is a specialty manufacturer that produces extremely small amounts of barium carbonate (approximately 10 kg in 1998).[28] For more detailed information concerning this industry, see ''Barium Carbonate Listing Background Document for the Inorganic Chemical Listing Determination'' in the docket for today's proposal.

Barium carbonate ($BaCO_3$) has a wide range of uses, including feedstock for production of other barium chemicals, an additive in various glasses, ceramics, bricks, and other construction materials, an additive in oil-drilling suspensions, and a brine purification chemical in the chlor-alkali industry.

The two primary barium carbonate production facilities use different manufacturing processes to make barium carbonate. The Georgia facility uses locally mined barite ore, containing barium in the form of barium sulfate, as the primary feedstock. The ore is crushed and milled, thermally reduced in a roasting kiln, and leached with water to dissolve the barium. The resulting barium sulfide solution is filtered and reacted with carbon dioxide gas to produce a barium carbonate precipitate. This precipitate is then dried, and sized for sale.

The Pennsylvania facility uses a commercially purchased high purity barium chloride solid as the primary feedstock. The facility dissolves the barium chloride in water, heats and filters the resulting solution, and precipitates barium carbonate by reacting the barium chloride solution with ammonium bicarbonate. The resulting barium carbonate precipitate is washed, filtered, dried and sized before the facility utilizes it as a feedstock in other manufacturing processes on-site.

c. What wastes are generated? Table III–5 below briefly lists the facility-reported residuals from the barium carbonate manufacturing processes, residual volumes generated in 1998, reported RCRA hazard codes, and residual management practices.

---

[27] As noted above, these filters capture product materials. EPA does not regulate reclamation of these products. See 50 FR 14216, April 11, 1985: ''Under the final rules, commercial chemical products and intermediates, off-specification variants, spill residues, and container residues listed in 40 CFR 261.33 are not considered solid wastes when recycled except when they are recycled in ways that differ from their normal use—namely, when they are burned for energy recovery or used to produce a fuel''

[28] Since, as explained below, we find no significant risks from the larger volume wastes we assessed, we conclude that any low volume wastes from this third facility also would not pose any risks warranting listing.

TABLE III–5.—BARIUM CARBONATE PRODUCTION WASTES

Waste category	1998 volume (MT)	Reported RCRA hazard codes	Sequential residual management practices
Barite Ore Feedstock Process—Georgia Facility			
Treated barium wastes (D005 barium wastes include barite ore leaching waste, barium sulfide filtration sludge, and barium carbonate production area cleaning and maintenance wastes).	18,300	None (D005 prior to treatment).	Disposal in local, captive, industrial Subtitle D landfill (after treatment of D005 wastes in on-site Subtitle C treatment unit).
Wastewater from $BaCO^3$ precipitate dewatering	313,000	None	Treatment in on-site, tank-based WWTP prior to NPDES discharge to Etowah River.
WWTP sludge	11,000	None	(1) Dewatered; (2) Treated on-site; (3) Disposal in local, captive, industrial Subtitle D landfill.
Spent polypropylene and nylon filter media and baghouse dust collector bags.	3 (filter media) ~1.5 (baghouse bags).	None	(1) Washed and washwaters re-inserted to barium carbonate production process. Solids managed as barium carbonate production area cleaning and maintenance wastes. (2) Treated materials disposed in off-site municipal Subtitle D landfill.
High Purity Barium Chloride Feedstock Process—Pennsylvania Facility			
Ammonia vapor scrubber water and ammonia reclamation unit wastewaters.	Not reported	D002	Treatment in on-site, tank-based WWTP.
Barium carbonate precipitate washwater	1,600	None	Treatment in on-site, tank-based WWTP prior to NPDES discharge to Susquehanna River.
WWTP sludge	8,200	None	(1) Stored in roll-off bin; (2) Disposal in off-site municipal Subtitle D landfill.
Ammoniated spent process solution storage tank solids.	1	None	Disposal in off-site municipal Subtitle D landfill.
Sludge and spent filter media from filtration of barium chloride solution and $BaCO_3$ drying and sizing unit dusts.	<1.23	D005	(1) Stored in closed container; (2) Sent to off-site Subtitle C facility for treatment and disposal.

In addition to these wastes, the two barium carbonate manufacturing facilities also produce other materials which are either piped directly back to the production process or are used for other purposes. Residues from the barite ore feedstock production process, ore crusher/grinder, kiln, barium carbonate drier, granulation and packaging processes are directly returned to their unit of origin with no significant pathways for exposure of these materials to the environment prior to reuse. Barium carbonate production area cleaning and maintenance wastewaters are also re-inserted to the barium carbonate production process with no significant pathways for exposure of these materials to the environment prior to reuse. Because these materials are managed prior to reuse in ways that present low potential for release, and because we evaluated all wastes generated after they are reinserted into the process, we do not believe that these secondary materials present significant threats.

The barite ore feedstock facility also produces molten sulfur or sodium hyposulfate from hydrogen sulfide gas piped from the barium carbonate manufacturing process. Because the material is a gas from a production unit, rather than from a waste management unit, and is conveyed to its destination through piping, the gas is not a solid waste. RCRA Section 1004(27) excludes non-contained gases from the definition of solid waste, and therefore they cannot be considered a hazardous waste (see 54 FR 50973).

The facility using barium chloride as its feedstock reclaims ammonia in the form of ammonium hydroxide from barium carbonate production wastes and uses this material throughout the facility as a feedstock and reagent. Spent ammoniated process solution is piped from the process unit where it forms to a storage tank where it is commingled with ammoniated spent process solutions from several other on-site manufacturing processes. The ammoniated spent process solutions from these other manufacturing processes are beyond the scope of this listing determination. From the storage tank, the facility pipes the commingled ammoniated spent process solutions to an ammonia reclamation unit which reclaims the ammonia in the form of ammonium hydroxide. Ammonium hydroxide is used on-site in various manufacturing processes, including the production of ammonium bicarbonate solution for use in the barium carbonate production process. Because the spent solution is piped to the reclamation unit with no significant potential for exposure to the environment, we did not evaluate the solution further.

Both facilities produce barium carbonate from a saleable mineral product.[29] Under the Bevill exemption (54 FR 36620–21), chemical manufacturing begins if there is any further processing of a saleable mineral product. Since these facilities use saleable mineral products as feedstock, their processes are chemical manufacturing, and are not classified as mineral processing. Therefore none of the wastestreams generated by these facilities during the production of barium carbonate are Bevill exempt.

See the ‘‘Barium Carbonate Listing Background Document for the Inorganic Chemical Listing Determination’’ for more details on these residuals.

---

[29] Note that primary barite ore has wide use in drilling muds for the petroleum industry and numerous other industrial uses, including use as feedstock for barium chemicals; see ‘‘Barite’’ U.S. Geological Survey—Minerals Information, 1997, http://minerals.usgs.gov/minerals/pubs/commodity/barite/index.htm.

d. *Waste characterization and Agency evaluation.* Barium is the primary constituent of potential concern in the wastes from both facilities. Barium occurs in several production wastes at high levels, in some cases exceeding the TC level (100 mg/L) in TCLP leachate samples. These TC wastes are coded and treated as hazardous (D005). The Georgia facility holds a hazardous waste treatment permit to allow on-site stabilization of barium, and the Pennsylvania facility sends all of their D005 wastes off-site for treatment and disposal at a hazardous waste treatment and disposal facility.

We decided not to do characterization sampling for wastes from either facility because both facilities submitted information to us on the nature of their wastes. We also received some additional analytical data from the State of Georgia for the Georgia facility. These data provided information on the concentrations (or absence) of the metal constituents of potential concern in the wastes and in test leachates from the wastes. We believe the available information is sufficient to adequately characterize the wastes and to allow us to evaluate their risk potential for the purposes of a listing decision. ''Barium Carbonate Listing Background Document for the Inorganic Chemical Listing Determination'' summarizes the analytical data and other information available for these wastes.

We propose not to list any of the wastes from the barium carbonate manufacturing industry. Many wastes from this industry are characteristically hazardous and managed as hazardous wastes either on-site or at permitted Subtitle C treatment facilities off-site. Other wastes did not exhibit constituents at levels of concern for purposes of a listing given the nature of their management and disposal.

Several groups of wastes from each of the facilities are disposed of in a treated form, rather than an as-generated form. In general, therefore, we focused our evaluation on the treated form of the wastes.

The paragraphs below describe how the wastes are generated and managed for the two processes and our rationale for proposing not to list the wastes. We solicit comments on the proposed listing decisions described below.

(1) Wastes from the production of barium carbonate from barite ore feedstock. (a) Treated barium wastes. The waste category, ''treated barium wastes,'' is the treatment residue from the commingling and treatment of several barium wastes in an on-site hazardous waste treatment unit. The barium wastes, which are consistently characteristically hazardous for barium (D005) before treatment (or are consistently assumed by the facility to be D005 wastes), include:

—Barite ore leaching waste, which is solids from the filtration of the liquid product stream from the barite ore roasting and leaching units,
—Barium sulfide sludge, which is from polishing filtration of liquid barium sulfide, and,
—Wastes from cleaning and maintenance of the barium carbonate production area.

A RCRA Subtitle C hazardous waste treatment facility permit governs the on-site treatment process for these barium wastes. The three wastes are sent directly to the treatment unit, or they are stored prior to treatment for short time periods in Subtitle C closed containers. The treatment process is a stabilization process for barium using gypsum (primarily calcium sulfate) to precipitate soluble barium as less soluble barium sulfate. According to RCRA Subtitle C regulations, the treated barium waste must meet the LDR UTS. Treatment takes place in concrete mixer-type trucks. Once treatment is complete, the treatment trucks immediately transport the waste to the facility's captive Subtitle D landfill for disposal, located approximately 2 miles from the production facility on facility-owned property.

State and facility information indicate that the treated barium wastes no longer exceed the TC level for barium (100 mg/L from TCLP analysis) and typically leach less than 1 mg/L barium, according to both SPLP and TCLP analyses. In addition, according to data the facility and the state of Georgia submitted to EPA from sampling events conducted during the past two years at the facility, the waste meets the LDR UTS for all regulated constituents.

The treated barium wastes are disposed of in the landfill without daily cover. However, the waste has a relatively high moisture content (approximately 50%) when placed in the landfill and, according to the facility, hardens over time and does not create dust. In addition, the waste does not contain any known volatile constituents of concern.

To assess the potential for groundwater releases from the captive, industrial landfill, we compared the SPLP leaching data from the facility and the state of Georgia to existing HBLs for ingestion of groundwater. SPLP data are appropriate for evaluating this waste because it is placed in a Subtitle D industrial landfill. We did not find any constituents in the available SPLP data that exceeded the health-based levels by more than a factor of 2 (see section III.E.3 for a discussion of this risk-screening criterion). See the ''Barium Carbonate Listing Background Document for the Inorganic Chemical Listing Determination'' for further details on the available data.

In addition, we found only one exceedence of AWQC standards among the SPLP leaching data for treated barium wastes. Selenium was found at a level of 0.04–0.06 mg/L, which exceeds the AWQC standard (0.0050 mg/L) by a factor of 8 to 12. However, the landfill in which the treated barium wastes are placed is 1,700 feet from the nearest downgradient water body, the Etowah River, and also lies beyond the river's 100 year flood plain. In recent years, the Etowah River in the vicinity of the landfill has had a flow rate varying between 9.9 to 230 m^3 per second on a daily basis. Given the distance over which leachate from the treated barium wastes would need to travel before reaching the river, dilution and attenuation during transport in local groundwater, and further dilution in the Etowah River, we believe the levels of selenium in the leachate would decrease to a level which would no longer pose a risk to the environment.

We do not believe it is necessary to assess other management practices for the treated barium wastes. The facility has treated and disposed of their treatment residues in a similar manner for over 15 years. The production facility itself relies on a local source of barite ore, has operated from its current location since 1942 and is therefore not likely to change its location in the near future. The dedicated landfill has a remaining life of nearly 20 years and is located approximately 2 miles from the production facility. Given the dedicated nature of the landfill, its proximity to the production facility, and the significant remaining capacity, we believe it is unlikely that the Georgia facility will dispose of their wastes in any other unit in the near future. Thus there is no need to assess additional management scenarios for this wastestream.

Given the facility's Subtitle C waste treatment permit, we believe that the facility's untreated D005 wastes are adequately managed with respect to this rulemaking. In addition, we have found no potential for releases to air, groundwater, or surface water at levels of concern from the treated wastes. Therefore we propose not to list these wastes.

(b) Wastewater from barium carbonate precipitate dewatering. The facility filters barium carbonate precipitate from residual process solutions and sends this filtrate to the facility's tank-based wastewater treatment plant (WWTP) for treatment. According to the facility's RCRA Section 3007 Survey response, the wastewater does not exceed the TC level for any constituent.

Wastewater from the barium carbonate production process commingle in the WWTP with wastewaters from other facility processes beyond the scope of this rulemaking and comprise approximately 17% of the total WWTP flow-through. The wastewater treatment is an oxidation process. Treatment of the wastewaters occurs in tanks equipped with secondary containment. Given the controlled manner in which the wastewater is managed in tanks, the lack of any volatile constituents of concern, and NPDES regulation of the WWTP effluent, we propose not to list this wastewater.

(c) Treated wastewater treatment plant sludge. The facility's WWTP generates a treatment sludge from the commingling and treatment of wastewaters discussed above in the preceding section. The resulting sludge is dewatered to 25% solids content in an uncovered tank. None of the information the facility provided on this waste indicates the presence of volatile constituents of concern.

The facility places the dewatered WWTP sludge directly from the WWTP unit into a treatment unit consisting of a concrete mixer-type truck containing gypsum (primarily calcium sulfate). The truck mixes the wastewater treatment sludge with the gypsum to convert soluble barium to a less soluble barium sulfate prior to transporting the waste to the facility's off-site, captive, Subtitle D landfill. We found low potential for releases from either the dewatering tank or the treatment unit. Analytical data from the state shows that the treatment process reduced leachable barium in the sludge, according to SPLP analysis, from 53 mg/L to 0.03 mg/L.

SPLP analytical data from the State also show no potential constituents of concern in treated WWTP sludge samples at concentrations above HBLs or above AWQCs. Therefore, this waste screened out from any further risk evaluation for groundwater or surface water. The SPLP data are appropriate for evaluating this waste because it is placed in a Subtitle D industrial landfill.

Similar to the treated barium wastes described above in section (a), the waste has a high moisture content when placed in the landfill and is reported by the facility to harden over time. Therefore, we do not believe this waste poses a significant risk through releases of airborne dust. In addition, the waste does not contain any known volatile constituents of concern.

We do not believe it is necessary to assess other management practices for this waste. The facility has treated and disposed of their wastewater treatment plant sludge in a similar manner for over 15 years. Given the dedicated nature of the landfill, its proximity to the production facility, and the significant remaining capacity, we believe it is unlikely that the facility will dispose of their wastes in any other facility in the foreseeable future.

Based on our knowledge of the current nature of the management of the treated wastewater treatment plant sludge and of the low level of constituents of concern it contains, including volatile constituents, we propose not to list the treated wastewater treatment plant sludge.

(d) Spent polypropylene and nylon filter media and baghouse dust collector bags. Baghouse dust collector bags and polypropylene and nylon filter media fabric at the Georgia facility deteriorate over time and must be replaced periodically. The facility washes the bags and filters with water and then soaks them in sulfate solution to stabilize any remaining barium. The facility then disposes of the bags and filter fabric in a local municipal Subtitle D landfill. Wastewaters from the washing of the filters and bags are returned to the production process. Solids from the washing of the filters and bags become part of the cleaning and maintenance wastes that are treated as discussed above in section (a).

The facility did not provide chemical composition analyses for these wastes. However, we do not expect either baghouse bags or nylon and polypropylene filter fabrics, which are used primarily for physical separation of solids from liquids in the barium carbonate production process, to contain notable levels of any potential constituent of concern besides barium. According to the facility, neither the bags nor the filters exceed the TC level for any constituent. In addition, the facility treats the materials to stabilize any remaining barium before disposing of them in a Subtitle D municipal solid waste landfill. The facility does not produce a large volume of these wastes; approximately 3 metric tons per year of filters and approximately 1.5 metric tons per year of baghouse bags. Because barium is not volatile, and because we do not expect the filter media and bags to contain any other volatile constituents, we do not believe these residuals pose any risk through airborne pathways.

Given the relatively small volume of these wastes, the inert nature of the filters and bags themselves, and the facility's washing and stabilization of barium prior to disposal, we believe these treated bag wastes do not warrant listing as hazardous wastes.

(2) Wastes from the production of barium carbonate from high purity barium chloride feedstock. (a) Barium carbonate production wastewaters and wastewater treatment plant sludge. The Pennsylvania facility commingles and treats wastewaters from several manufacturing processes at their facility in an on-site, tank-based WWTP. Wastewaters from the barium carbonate production process are piped directly to the WWTP and comprise less than 1% of total WWTP flow through; the remainder of the wastewaters entering the WWTP are from manufacturing processes not within the scope of this listing determination. Wastewaters from the barium carbonate production process include:

—Ammonia vapor scrubber waters and ammonia reclamation unit wastewater.
—Barium carbonate precipitate washwater.

A scrubber captures ammonia vapor from the mixing of ammonium bicarbonate solution with the barium chloride solution to precipitate barium carbonate. Water, sodium hydroxide, and emissions from other manufacturing processes in the facility mix with the ammonia vapor in the scrubber to produce this wastestream.

An ammonia reclamation unit recovers ammonia from ammoniated spent process solutions from multiple manufacturing processes, including the barium carbonate manufacturing process, in the form of 28% ammonium hydroxide solution. The unit also produces a wastewater. Approximately 1% of the total ammonia reclamation unit inflow derives from the barium carbonate production process. Therefore, a small percentage of the unit's wastewater derives from barium carbonate production.

The facility also produces a wastewater from the washing of barium carbonate precipitate with deionized water in order to remove any process solution remaining on the precipitate.

The only possible release route of concern from the tank-based system for the wastewaters would be through air releases. This pathway is highly unlikely for the nonvolatile metals that are the potential constituents of concern in these wastes. Given the controlled manner in which the wastewaters are managed and the regulation of the treatment unit's discharge under the NPDES program, we propose not to list these wastewaters.

Treatment of the commingled wastewaters consists of neutralization followed by filtration. The treatment generates a sludge. According to the facility's RCRA Section 3007 Survey response, the sludge does not exceed the TC level for any constituent. The facility disposes of the sludge in a local Subtitle D municipal solid waste landfill. We do note the presence of some potential constituents of concern in the WWTP sludge. These constituents include vanadium, nickel, and antimony. However, we do not believe that these constituents derive from the barium carbonate manufacturing process.

Because the barium carbonate production process wastewaters contribute less than 1% of the total input to the on-site WWTP, any constituents in the barium carbonate production wastewaters sent to the WWTP also make a minimal contribution to the total level of constituents in the combined wastewater in the WWTP and the resulting sludge. In addition, the process uses high purity barium chloride dissolved in deionized water as its primary feedstock and reclaims much of the residual ammonia from its ammonium bicarbonate feedstock. Therefore, the likelihood that the constituents of concern in the sludge might arise from the barium carbonate production process is very low. Moreover, the facility has provided information to us indicating that the barium carbonate process is not the source of these potential constituents of concern and that they derive instead from on-site manufacturing processes beyond the scope of today's listing proposal (see ''Barium Carbonate Listing Background Document for the Inorganic Chemical Listing Determination'' for further details). Given the minimal potential for contribution of constituents of concern by the barium carbonate process wastewaters to the WWTP sludge, we propose not to list this sludge under this rulemaking effort.

(b) Ammoniated spent process solution storage tank solids. The facility pipes residual process solution containing ammonia directly from the barium carbonate precipitate settling unit to covered storage tanks prior to routing it through an on-site ammonia reclamation unit. The barium carbonate process wastewater is one of many ammoniated residual process solutions the facility routes to the storage tanks and constitutes approximately 1% of the unit's total input.

The ammoniated spent process solution storage tank accumulates solids which the facility removes and disposes of in a local Subtitle D municipal solid waste landfill on a yearly basis. The tank solids are a small volume waste of 1 MT/yr. According to analytical data provided by the facility, the solids do not exceed the TC level for any constituent, though they do contain vanadium, nickel, and antimony at levels of potential concern. However, as noted for the wastewater treatment plant sludge, the constituents of concern in the solids are unlikely to arise from the barium carbonate production process because the barium carbonate production process contributes only 1% of the total wastewaters in the storage tanks. In addition, information the facility provided indicates that the nickel, vanadium and antimony found in the sludge derive from other manufacturing processes that are beyond the scope of this listing determination. Thus, given the solids' small volume and the low likelihood that the barium carbonate process wastewater contributes any constituents of concern, we propose not to list the ammoniated spent process solution tank solids in this listing determination.

(c) Sludge and spent filter media from filtration of barium chloride solution and barium carbonate drying and sizing unit air pollution control residues. Both the air pollution control dusts from the barium carbonate drying and sizing unit and sludge and the spent filter materials from barium chloride solution filtration exceed the TC regulatory level for barium (100 mg/L). The facility codes the waste as characteristic hazardous waste (D005). The facility stores these small volume wastes in closed containers on-site before sending them to a RCRA Subtitle C hazardous waste treatment and disposal facility for treatment and disposal. We believe that the containers present no significant potential for release to the environment. We believe that regulations applying to characteristic wastes adequately protect against mismanagement. Furthermore, these wastes comprise a very small volume (<1.23 metric tons per year). Thus, we propose not to list these wastes.

3. Boric Acid

a. Summary. We have evaluated the wastes from the production of boric acid and propose not to list any wastes from this process as hazardous under RCRA. These wastes do not meet the criteria set out at 40 CFR 261.11(a)(3) for listing wastes as hazardous. They do not pose a substantial present or potential threat to human health or the environment. We have identified no risks of concern associated with the current management of the wastes.

b. Description of the boric acid industry. Boric acid was produced by two facilities in the United States in 1998. These two facilities are both located in the Mojave Desert in California, one of the few areas where borate minerals can be mined in the United States.

The two facilities mine borates from different sources to produce boric acid. The first recovers borate from brines pumped from beneath Searles Dry Lake, California. The second facility mines sodium borate ores near Boron, California.

The first facility extracts highly mineralized brine and uses a liquid-liquid extraction process to remove the borates from the brine. During the first production step, called the ''loading section,'' the facility mixes the brine with a chelating agent in a kerosene solution that causes most of the boron and some of the sodium and potassium compounds in the brine to bind to the extractant. The loaded extractant is sent through strippers where it is mixed with dilute sulfuric acid to strip the boron, sodium and potassium from the extractant to form boric acid, sodium sulfate and potassium sulfate. The solution is then sent to a solution settler from which the liquor goes to boric acid recovery using crystallization and evaporation techniques.

The second facility mines sodium borate kernite ore to produce boric acid through a process of dissolution, classification, thickening, filtration and crystallization.

Because the facilities use such different sources and production processes, their resulting wastes are very different and are discussed separately. For more detailed information concerning this industry, see the ''Boric Acid Background Document for the Inorganic Chemical Listing Determination'' in the docket for today's proposal.

c. Agency evaluation of wastes generated by the brine recovery process.

Are There Any Wastes in This Process That Fall Under the Bevill Exemption?

The depleted brine from the loading section of the brine recovery process is exempt as a mineral processing beneficiation waste under 40 CFR 261.4(b)(7)(i).[30] This waste from the

---

[30] The Agency has previously evaluated the Bevill status of wastestreams at the Searles Lake facility; see memos dated February 14, 1992 and June 30, 1993 in Appendix E of the ''Boric Acid Background

Continued

extraction/beneficiation of ores and minerals is thus outside the scope of the consent decree. The facility reported generating 4,600,000 MT in 1998. This Bevill exempt waste is commingled with wastes which do not qualify for the Bevill exclusion later in the process. The portion of the waste which does not qualify for the Bevill exclusion is within the scope of the consent decree and is discussed below.

As discussed in the Agency's prior Bevill evaluations for this facility, mineral processing begins at the liquid-liquid extraction step where sulfuric acid is added to the loaded extractant to produce sodium sulfate and boric acid. Wastes generated before this step, including spent brine, are beneficiation wastes and retain their Bevill exemption. All wastes generated after the beginning of mineral processing are non-exempt solid wastes. Therefore, all of the wastes at this facility which are generated from the liquid extraction step to the end of the process are all non'exempt solid wastes. See the ''Boric Acid Background Document for the Inorganic Chemical Listing Determination'' in the docket for more information on the Bevill exemption for wastes at this facility.

What Kinds of Wastes Are Generated by the Brine Recovery Process?

The Bevill exempt depleted brine from the loading section is sent through an API settler and Wemco floatation cells designed to separate organic compounds from the brine. The organic emulsions generated in these units and in the process settlers are sent to an on-site ''crud'' treatment facility which breaks down the emulsion into aqueous and organic components. This treatment process generates a non-exempt hydrocarbon waste (fuel oil) that is sent off-site to a used oil refinery. The Bevill exempt brine is sent to the ''Trona skimmer'' where it is combined with other non-exempt wastewaters generated during the process. The Trona skimmer acts as a settling pond promoting phase separation of remaining organic materials in the brine. The Bevill exempt brine is then returned to the dry lake for recharging as required by the facility's Bureau of Land Management permit. Because the non-exempt wastewaters are commingled with the Bevill exempt brine in the Trona skimmer, the non-exempt wastewaters are also returned to the dry lake as a small percentage of the overall volume. The non-exempt organic waste removed at the Trona skimmer is stored on-site in a tank until it is shipped off-site to a commercial blender and subsequently burned for energy recovery.

Additional wastes generated by the brine recovery process that are not Bevill exempt include:

—Petroleum contaminated sludges from containment areas around the API settler, Wemco floatation cells, loading section and liquid-liquid extraction (LLX) strippers

—Spent activated carbon collected from the carbon filter system used to purify the borate liquor before it goes into the crystallization units

In addition to the above wastes, the facility also produces other materials during the production of boric acid that are either piped directly back to the production process or used for other purposes. These materials include aqueous residuals and kerosene recovered from the crud treatment process, off-specification product, scrubber water and condensate that are returned to on-site production units for use. Because these materials are reused on-site in production units and there is no significant potential for exposure of these materials to the environment prior to reuse, we found that they present no significant threat. Also, off-specification product, when reinserted without reclamation into the process where it originated, is not a solid waste.

How Are the Wastes From the Brine Recovery Process Currently Managed?

Table III–6 summarizes our information about the wastes from this process:

TABLE III.–6.—BORIC ACID: BRINE RECOVERY PROCESS WASTES

Waste category	1998 volume (MT)	Sequential management practices
Fuel oil from crud treatment facility	690	(1) Stored in covered tank; (2) Sent off-site to a Subtitle C permitted used oil refinery.
Miscellaneous wastewaters	194,040 (The Bevill exempt partially depleted brine volume is 4.6 million MT).	(1) Combined wastewaters; discharged to Trona skimmer with the Bevill exempt partially depleted brine; (2) Removal of organics in skimmer unit; (3) Commingled partially depleted brine and process wastewaters are returned to Searles Dry Lake for recharging.
Organics from Trona skimmer	10	(1) Stored in covered tank; (2) Sent to off-site Subtitle C blender; (3) Burned for energy recovery.
Sludges from containment areas	20	(1) Drum storage; (2) 20 cubic yard roll-off bins; (3) Transported with manifest off-site to Subtitle C landfill as California-only hazardous waste.
Spent activated carbon	43	(1) Washed; (2) Reclaimed in an on-site furnace; (3) Reused in the process.

Document for the Inorganic Chemical Listing Determination'' in the docket.

What Is EPA's Decision About Whether to List These Wastes as Hazardous?

We propose not to list any wastes from the brine recovery process for the production of boric acid. Our rationale for each waste is presented below.

(1) Fuel oil from the crud treatment facility. We propose not to list the fuel oil generated at the crud treatment facility. The facility characterized the fuel oil as 100 percent hydrocarbons. The fuel oil is stored on-site in a covered tank prior to being shipped off-site to a Subtitle C permitted used oil refinery. For those scenarios where wastes are managed in a tank, the impervious nature of the construction materials (concrete, fiberglass, or steel) of tanks is unlikely to result in releases to groundwater in all but the most catastrophic scenarios. We also are not concerned with potential air releases because the tank is covered. The subsequent treatment at the permitted used oil refinery is already regulated under Subtitle C and the used oil regulations. Therefore, we propose not to list this waste.

(2) Miscellaneous wastewaters. We propose not to list the miscellaneous wastewaters. We evaluated the potential for an exposure pathway via groundwater ingestion and determined that no such pathway exists. The facility producing boric acid by recovering borates mined from Searles Dry Lake is located in California's Mojave Desert. The process and associated wastewaters are tied to the Mojave Desert location because it is the source of the borate rich brine. The environment is arid with only 4 inches of precipitation annually. The groundwater under the facility has total dissolved solids (TDS) levels as high as 450,000 ppm. All wastewaters, including the Bevill exempt depleted brine, are co-managed and ultimately returned to the dry lake resource. Due to the extremely high TDS levels in the area, the water is non-potable. The surrounding communities have drinking water piped in from 25 miles away. Therefore, no groundwater exposure pathway exists.

Furthermore, the total volume of the miscellaneous wastewaters is 4 percent of the volume of the depleted brine; any contaminants in these wastewaters would therefore be diluted by a factor of 25 prior to return to the dry lakebed. Most of the miscellaneous wastewaters are generated in the later part of the process and thus we do not expect they will contain constituents of concern at significant levels. There is one wastewater that contains organic constituents not found in the influent brine (formaldehyde and fuel hydrocarbons). This wastewater is generated at the carbon column. However, it only represents 0.03 percent of the total volume that is returned to the dry lake. Also, the reported level of formaldehyde in the waste would be well below the HBL for this chemical (3 mg/L)[31] after mixing with other wastewaters. We are not concerned with potential air releases because the Trona skimmer, where the wastes are mixed, is covered. The facility also mixes a characteristic (D002) HCl acid waste stream with the Bevill exempt depleted brine prior to reaching the Trona skimmer. The resultant mixture is not characteristic and the mixing takes place within a pipeline where there is no opportunity for exposure to the characteristic waste before or during the mixing. Given the factors listed above, particularly the lack of an exposure pathway, we propose not to list the miscellaneous wastewaters.

(3) Organics from the Trona skimmer. We propose not to list the organics (chlorinated hydrocarbons) recovered from the Trona skimmer. The organics are stored in a covered tank before being shipped off-site. For those scenarios where wastes are managed in a tank, the impervious nature of the construction materials (concrete, fiberglass, or steel) of tanks is unlikely to result in releases to groundwater in all but the most catastrophic scenarios. We also are not concerned with potential air releases because both the Trona skimmer and tank are covered. The waste is shipped off-site to a Subtitle C permitted blender prior to being burned for energy recovery in cement kilns. Burning by cement kilns is regulated under MACT standards for cement kilns (64 FR 31989, June 14, 1999 and 64 FR 52827, September 30, 1999). Therefore, we did not further evaluate potential risks from burning the organics under this listing. The facility reported a California-only hazardous waste code CA343 (organic liquids, unspecified) for the waste but did not report any federal characteristic codes. The facility manifests the waste using the California code when they send it to the blender. Because this waste has significant BTU value and also carries a state hazardous waste code, we expect this management practice to continue; we do not believe there would be any significant benefit to the environment by listing this waste.

(4) Sludges from containment areas. We propose not to list the sludges collected from containment areas around the process tanks, the loading section, LLX strippers, Wemco flotation cells and API settlers. The facility reported a California-only hazardous waste code CA611 (petroleum contaminated soils) for the waste but did not report any federal characteristic codes. The facility stores the waste on-site in drums, transfers to it to 20 cubic yard roll-off bins and mixes the sludge with soil, and then ships the waste off-site with a manifest as a California-only hazardous waste to a Subtitle C landfill. The facility is tied to its location in California so we believe it is plausible that the waste will always be treated as a California-only hazardous waste. We do not believe there would be any significant benefit to the environment by listing this waste.

(5) Spent activated carbon. We propose not to list the carbon that is regenerated on-site. The carbon is regenerated in an on-site furnace. The carbon filtration process occurs later in the process after much of the organic additives have settled out of the borate liquor. Consequently, we expect that the filters will not collect high concentrations of constituents of concern, except perhaps kerosene related organics. We expect any such constituents that are filtered out using carbon adsorption to be combustible. There is no potential for exposure prior to the regeneration process or during the return of the activated carbon to the carbon filter. The furnace is permitted by the State of California Air Control Board. Although the permit does not contain any requirements for emission controls, it does require annual reporting. We reviewed the emissions data and do not believe that the emissions from the furnace are of concern. The reported emission levels are significantly below the MACT standards for permitted hazardous waste incinerators (64 FR 52827, September 30, 1999). We expect the use of this furnace to continue because it is expedient to regenerate the carbon on-site, and the facility is unlikely to relocate given the proximity of the mineralized brine source. Therefore, we propose not to list this waste.

d. *Agency evaluation of wastes generated by the kernite ore process.*

What Kinds of Wastes Are Generated by the Kernite ore Process?

The facility generates two primary wastestreams: Tailings and gangue. The tailings include the wastewaters and fine insolubles from ore processing and boric acid production. The tailings are managed in tanks and then pumped to on-site evaporation ponds/surface impoundments. The boric acid gangue which includes clay, sand and other

---

[31] Based on the RfD in IRIS (2E–1 mg/kg-day) and a 90th percentile drinking water intake rate in children (64 mL/Kg/day).

course insolubles, is produced during the separation of solids from the borate liquor, a step the facility calls ''classification.'' The gangue is placed on a slab for drainage and then managed in on-site waste piles with gangue produced from the other production process at the facility. The drainage from the slab is sent to the tailings ponds. The remaining wastestream is comprised of the filters from the filtration of the borate liquor to remove any remaining insoluble ore material prior to crystallization. The filter aid is washed off weekly and managed with the tailings. The spent filters are transferred to a solid waste bin in preparation for on-site disposal in a industrial Subtitle D landfill.

In addition to the above wastes, the facility also produces off-specification product that is put directly back to the production process. Because the material is reused on-site in production units in ways that present low potential for release, and because we evaluated process waste generated after the secondary material is reinserted into the process, we do not believe that the off-specification product presents significant risks. Note that, when facilities process off-specification product by reinserting the off-specification product back into the process where it originated, without reclamation, the off-specification product would not be a solid waste.

The facility made beneficiation exemption claims under the Bevill amendments for the tailings and gangue wastes. Because we propose not to list these wastes, we did not review the facility's Bevill exemption claims.

How Are the Wastes From the Kernite Ore Process Currently Managed?

Table III–7 summarizes our information about these wastes:

TABLE III–7.—BORIC ACID: KERNITE ORE PROCESS WASTES

Waste category	1998 volume	Sequential management practices
Tailings	Up to 750,000 gallons/day[1]	(1) Stored in tank; (2) Pumped to evaporation ponds/surface impoundments.
Gangue	Portion of 900,000 MT[2]	(1) Placed on slab for drainage; (2) Trucked to on-site waste piles.
Spent filters	3	(1) Stored in solid waste bin; (2) On-site industrial Subtitle D landfill.

[1] Capacity volume for boric acid surface impoundments. Current daily quantity is lower. Source: California Regional Water Quality Control Board permit, board order 6–93–17.

[2] The boric acid coarse gangue is co-mingled with gangue from the other production process at the facility. That process is outside the scope of the consent decree. The boric acid gangue represents only a minor proportion of the total 900,000 tons of gangue typically deposited annually on the waste piles. Source: California Regional Water Quality Control Board permit, board order 6–93–17.

What Is EPA's Decision About Whether To List These Wastes as Hazardous?

For the reasons set out below, we propose not to list any wastes from the kernite ore process for the production of boric acid.

(1) Tailings. We propose not to list the tailings from boric acid production. The tailings are managed in a tank and then pumped to evaporation ponds. The facility provided TCLP data for the tailings. Those data show waste contains arsenic and antimony above health-based drinking water levels. The Agency also assumed that boron was present in significant levels due to the nature of the ore. The facility provided total levels for the boron concentration in the waste. We conducted an in-depth review of the groundwater conditions at the site and have concluded that a groundwater exposure pathway does not exist. No one is currently living near the facility boundary closest to the waste management unit areas and it is unlikely that future development will occur. The closest existing drinking water well is two miles away from the waste management units. It is a community well and is subject to all applicable drinking water standards. In addition, there are several factors described below which make contamination of this well from a potential release from the facility's evaporation ponds unlikely.

The groundwater under the off-site area of land closest to the waste management units is not suitable for use as drinking water. The ore body, which is the raw material for the process, has a localized impact on the groundwater in its vicinity. Monitoring wells in the area show that the groundwater in the geologic strata underneath the off-site area adjacent to the waste management units has total dissolved solids (TDS) levels in excess of three times the maximum level for an aquifer to be considered a drinking water source in California.[32] Additional factors such as low flow rate and high treatment cost make the potential for a private well in that area highly unlikely. Municipalities can tap into an alternative water source through a regional pipeline and need not rely on groundwater.

The geology of the area has several characteristics that reduce the potential for releases from the impoundments from reaching known drinking water sources. The transport time to groundwater for the constituents of concern appears to be significant given the depth to groundwater under the waste management units (170–220 feet) and the affinity of these constituents to bind with soil.[33] The area under the facility has several geologic faults that act as groundwater barriers. The South Borax fault is likely to prevent any potential release from the waste management units from reaching the drinking water source for the existing community well. The fault is located just south of the waste management units, between the units and the well. In addition, the groundwater underlying the waste management units is contained in the tertiary soil layer whereas the community well draws from the quaternary layer. We believe that migration between these two layers would be limited. (The facility submitted a detailed summary of the geologic conditions at the site. This information has been placed in the docket for this rulemaking. See ''Summary of Boron Operations Hydrogeology, Potential Groundwater Receptors and BAP Waste Management Parameters''). Finally, we note that the impoundments in question are designed with a triple liner and leachate collection system, making any significant release less likely over the active life of the units. Based on these factors, we do not believe there is a

---

[32] California Water Quality Control Plan for the Lathontan Regions, revised 1991 (p. 4.6–1)

[33] Source: California Regional Water Quality Control Board permit, board order 6–93–17.

groundwater exposure pathway from the tailings.

We also assessed the potential for air releases from the tailings ponds. Because the constituents of concern from this process are nonvolatile metals, we are not concerned with releases through volatilization. Although the surface impoundments are evaporation ponds, the facility claims that there is still some level of moisture in the ponds at all times, thereby minimizing release of particulates to the air. The particulates would not likely be subject to wind blown erosion due to the moisture level of the waste. Furthermore, the closest off-site receptors are at least two miles away from the unit. Due to dispersion, it is unlikely that any particulate releases would reach such receptors at significant levels. The facility also provided a risk assessment which assessed the air risks from the tailings ponds. Their assessment did not show any air risks from the tailings ponds even when they assumed a conservative dry down process for the unit. (The facility's air risk assessment is available in the RCRA docket for today's proposal).

In summary, there are several site specific factors that need to be taken into account when evaluating risks from this waste. This is the only facility in the country producing boric acid from ore. The facility is tied to its location because it is the source of the ore. The hydrogeology of the site is such that local groundwater is not suitable for drinking water use, and any potential releases from the unit would be unlikely to migrate to any drinking water source. Furthermore, the facility is remote with the nearest receptors two miles away. Based on all of these facts, we propose not to list the tailings from the kernite ore process for the production of boric acid.

(2) Gangue. We propose not to list the gangue generated during the boric acid process. Initially, the gangue is placed on a slab to drain. The drainage from the gangue is collected and managed with the tailings (we assessed the drainage as part of the tailings wastestream; see section (1) above for our listing recommendation). The drained gangue is trucked to on-site waste piles. The gangue is wet when transported to the waste pile but most of the moisture evaporates quickly in the dry desert environment. The same geological conditions apply to the gangue waste unit as described above for the tailings waste unit. The gangue is ultimately managed as a dry waste pile and there is virtually no precipitation to cause leaching. We assumed a greater risk to groundwater would come from the tailings because there is any liquid associated with the gangue would evaporate before leaching into the subsurface. Based on our decision regarding the tailings, we did not further evaluate the risks to groundwater from the gangue.

We did assess in more detail the potential for air releases from the waste pile. We do not expect releases of the nonvolatile metals from this waste. The moist gangue solids are trucked to on-site waste piles. The gangue contains enough sodium sulfate to cause the gangue piles to set up like cement when it dries, helping prevent erosion and air release of particulates from the pile. As a further check of potential air releases, we examined the potential for release of the constituent of most concern, arsenic. According to data provided by the facility, the total levels of arsenic in the gangue vary between 25 and 78 mg/kg. We compared these total concentrations to one of the levels calculated as part of the EPA's Air Characteristic Study (530–R–99–019b, Aug 1999, Table 4–3). The Study evaluated different waste management and receptor scenarios to determine waste concentrations that would remain below a specific target risk. Using the waste pile scenario at a receptor distance of 150 meters, the study showed that arsenic levels of 6,000 ppm did not cause exceedences of the target risk levels. The concentration levels in the gangue are well below this number. In addition, the location of the facility is remote with the closest residence two miles away, which is significantly beyond the 150 meter range. The Air Characteristics Study only evaluated direct risks from inhalation, not indirect risks. However, due to the desert environment where the facility is located, risks related to consumption of soil, plants or animals are highly unlikely to arise. Based on these factors, we believe that the arsenic levels in the gangue do not present unacceptable risks via the air pathway.

In addition to arsenic, boron and antimony are the two other constituents of concern present in the gangue. Based on data provided by the facility, antimony is found at total concentrations ranging from 36 mg/kg to 84 mg/kg in the gangue. The facility estimated the boron total concentration levels to be 25,000 ppm based on average daily sampling of the gangue. Arsenic is the most toxic of the three constituents. Because the particulate releases and exposure scenario would likely be the same for all three constituents and because, as discussed above, we do not believe arsenic poses a concern, we also believe there are no unacceptable levels of risk from the antimony and boron in the gangue. After assessing possible risks from arsenic, we compared the ratios of the waste concentrations for the three constituents to the ingestion health-based level for each constituent. This ratio for arsenic was an order of magnitude higher than the ratios for antimony and boron, indicating that the highest potential risk from ingestion would arise from the arsenic. Thus, based on the lack of significant risk for arsenic in this waste, the Agency concluded that neither antimony nor boron pose a significant air risk at this site. In addition, as mentioned above in the tailings section, the facility has conducted an air risk assessment. The document shows no significant risk from the management practices for the gangue waste pile. The facility's risk assessment is available in the docket for today's proposal. Therefore, based on all of these factors, we propose not to list the gangue from the production of boric acid using the kernite ore process.

(3) Spent filters. We propose not to list the spent filters generated during the filtration step of the boric acid production process. The spent filters are stored in a solid waste bin and then managed in an on-site industrial Subtitle D landfill. The filtration step occurs late in the process, so we expect minimal contamination. In addition, because the filters are washed weekly, the vast majority of any contaminants filtered out at this stage would be captured by the wash process and managed with the tailings (see section (1) above for listing determination on the tailings). The facility applies a daily cover at the landfill which protects against residual particulates from being released into the air. Furthermore, the quantity of spent filters is relatively small (3 MT), making it unlikely to present a significant risk in the landfill. Finally, the location of the facility is remote with the closest residence being two miles away. Therefore, we propose not to list the spent filters from the kernite ore process for the production of boric acid.

4. Cadmium Pigments

a. Summary. We propose not to list any wastes from the production of cadmium pigments. All of the non-wastewater residuals consistently exhibit the toxicity characteristic for barium, cadmium, and selenium. There is only one producer, and over the past seven years the producer has drummed and shipped with manifests all its non-wastewater residuals to an off-site Subtitle C facility for treatment to applicable LDR standards. The wastewaters are pretreated on-site in closed tanks prior to discharge to a POTW, which is regulated under the Clean Water Act. We conclude that the existing regulatory controls adequately reduce risks, and there are no exposure pathways of concern. These wastes do not pose a substantial present or potential hazard, and thus do not meet the criteria for listing set out in 40 CFR 261.11(a)(3).

b. Description of the cadmium pigments industry. One facility produced cadmium pigments in the United States in 1998 and 1999. Cadmium pigments are cadmium sulfides of variable composition, usually produced as powders but also available in other forms such as pastes and liquids. Cadmium pigments are used to provide shades of bright yellow, orange, red, and maroon. The shades depend on the ratio of cadmium and zinc to sulfides and selenium. Current uses of cadmium pigments include decorative and protective coatings for plastics, glass, ceramics, rubber and other materials. The coatings provide heat resistance to surfaces and a barrier to chemical and sunlight exposures.

Cadmium pigments are produced by digesting cadmium metal in sulfuric acid, nitric acid, and water to produce a cadmium sulfate solution (liquor). Chemical reagents are added to the liquor to selectively precipitate out metals which are present as impurities. Sodium sulfide and metals (*e.g.,* zinc, selenium) are added to the purified liquor to yield a slurry which, after filtration, is the ''greencake'', the first intermediate product from the cadmium pigments production. The greencakes are then washed, sized, and calcined. The calcined materials are ground, rewashed, filtered, dried, milled, and blended to make different shades.

The use of cadmium pigments is declining.[34] Growth in the overall demand for cadmium pigments is limited to the manufacturing areas requiring use of cadmium pigments, such as the plastics industry, where no substitute is adequate. Our RCRA Section 3007 Survey results show that six out of seven facilities ceased production of cadmium pigments in recent years. The domestic demand for cadmium pigments in the next few years is likely to remain stable. A more complete discussion of this process and the industry is provided in the ''Cadmium Pigments Listing Background Document for the Inorganic Chemical Listing Determination'' in the docket for today's proposal.

b. What kinds of wastes are generated by this process?. Using the facility's survey response, we divided the wastes into two broad categories: Wastewaters and non-wastewaters. Table III–8 summarizes the types of wastes in each category, the characteristics of each waste, waste volume, and current management practices:

TABLE III–8.—CADMIUM PIGMENT PRODUCTION WASTES

Waste category	Reported waste codes	1998 waste volume (MT)	Management practice	
Non-wastewaters				
Miscellaneous solid wastes, including materials from dust collectors, plant cleanup, filtered pigments from the presses, and from the on-site wastewater pretreatment process.	D005 D006 D010	33.5	Each waste is drummed (separately or sometimes combined) and shipped to a commercial off-site hazardous waste treatment facility to be treated and decharacterized before placing in a Subtitle D landfill. Note: D005—barium D006—cadmium D010—selenium	
Contaminated paper and cloth, including filter bags, filter cloths, filter cartridges, and dust collector bags.	D005 D006 D010	9.3		
Contaminated gaskets generated from the red and yellow calciners.	D005 D006 D010	0.3		
Iron press residue generated from digestion of cadmium metal.	D005 D006 D010	4.5		
Wastewaters				
Gas scrubber wastewater (spent caustic from scrubbing vapors generated from calcination process).		Not reported	pH adjusted, treated to remove zinc and cadmium. The resulting sludge is a part of the miscellaneous solid wastes.	All these wastewaters are then combined and further treated in on-site closed tanks for pH adjustment; 2-step filtration; monitoring for turbidity prior to discharge to a POTW.
Process wastewater from filtering the greencake		Not reported	pH adjusted, treated to recover cadmium.	
Process wastewaters from wet washing system		Not reported.		

---

[34] USGS Minerals Information, Mineral Commodity Summary, 1996 (see http://minerals.usgs.gov/minerals/pubs/commodity/cadmium/140396.txt)

c. Agency evaluation. After evaluating the characteristics and current management practices of all the waste residuals, we determined that: (1) all the non-wastewater wastes are being properly treated and managed as hazardous wastes under RCRA regulations, and (2) all the wastewaters are being treated on-site in closed tanks and discharged to a permitted POTW, where they are subject to the Clean Water Act. Therefore, we did not pursue risk assessment modeling for any of these wastes. The following are the details of our evaluation:

(1) Non-wastewaters. In its RCRA Section 3007 Survey, the facility classified all four wastes of this category as characteristic hazardous, as generated, for barium, cadmium, and selenium. The facility also provided data characterizing each non-wastewater residual for total and TCLP concentrations of eight TC metals. Except for chromium (which was detected in the TCLP leachate of one waste below its health-based level), no other hazardous constituents were reported. The total volume of these four wastes was 47.6 metric tons in 1998.

Over the past seven years the generator has managed all its non-wastewater wastes generated from the production of cadmium pigments as TC hazardous wastes. These wastes are drummed and shipped with manifests to a commercial off-site Subtitle C facility for treatment. The off-site treatment includes mixing and treating the wastes with other solid wastes and the addition of lime and fly ash to meet the current LDR treatment standards (via stabilization). The resultant mixture forms a concrete-like residue, which no longer exhibits a characteristic and is managed in a Subtitle D landfill. We believe this management, which complies with existing Subtitle C regulations, adequately protects human health and the environment.

Although we generally believe that Subtitle C regulations for characteristic wastes adequately prevent mismanagement, we have additional data that help confirm our conclusion for this waste. The landfill information and leachate data provided by the local and state governments (per our request) indicate that the landfill has a liner with a leachate collection system. The landfill leachate data[35] we have to date demonstrate that constituents detected in the landfill leachates are not attributable to the cadmium pigments production wastes. The landfill information and leachate data are provided in the ''Cadmium Pigments Listing Background Document for the Inorganic Chemical Listing Determination'' in the docket for today's proposal. We recognize that the residues from commercial treatment facilities represent the commingling of wastes from a variety of facilities and wastes. Therefore, information on the landfill leachate from treated material is of limited use. However, the data available indicate that the cadmium pigment wastes do not present a substantial hazard when disposed. Given that the generating facility has followed the reported management practice for seven years, we believe use of this or comparable treatment and disposal will continue.

What Is EPA's Listing Rationale for These Wastes?

We propose not to list any of the four wastes in this category as hazardous because they are already managed in compliance with existing hazardous waste regulations, including full compliance with the BDAT requirements for treatment prior to land disposal. We conclude that available data on the specific cadmium pigment manufacturing wastes do not support a decision to list the wastes as hazardous.

(2) Wastewaters. We propose not to list the wastewaters as hazardous because the gas scrubber and the process wastewaters are pretreated on-site in closed tanks prior to discharge to a POTW. The wastewater treatment tanks provide sufficient structural integrity to minimize potential releases to groundwater. We are unlikely to find potential air releases from these tanks as neither volatile contaminants nor airborne particulates are likely to be present in these wastewaters. During treatment, the closed tanks present no significant threat of release to the environment. After treatment, the wastewaters are subject to the Clean Water Act program. We conclude that the wastewaters do not warrant listing. We assessed solids from the on-site treatment as miscellaneous wastes discussed above in section (1).

5. Inorganic Hydrogen Cyanide

a. Summary. We propose not to list any wastes from the production of inorganic hydrogen cyanide (HCN) as hazardous under Subtitle C of RCRA. These wastes are managed in on-site wastewater treatment processes, industrial landfills, municipal landfills, hazardous waste incinerators, hazardous waste landfills, and hazardous waste injection wells. After analysis of these waste management practices and potential exposure pathways, we concluded that there are no risk pathways of concern. These wastes do not meet the criteria set out at 40 CFR 261.11(a)(3) for listing as hazardous. They do not pose a substantial present or potential hazard to human health or the environment.

b. Description of the inorganic hydrogen cyanide industry. Hydrogen cyanide (HCN) is used in the manufacture of a number of important chemicals including: adiponitrile to produce nylon, methyl methacrylate to produce clear acrylic plastics, sodium cyanide for the recovery of gold, triazines for agricultural herbicides, methionine for animal food supplements, and chelating agents for water treatment.

HCN is manufactured via two primary inorganic synthesis processes: Andrussow and Blausaure-Methan-Ammoniak (BMA). The Andrussow process involves the reaction of ammonia, methane (natural gas) and air over a platinum catalyst; the BMA process is similar except the reaction occurs in the absence of air. The reaction products are quenched with water. Excess ammonia reactant is recovered for reuse in the reaction or converted to an ammonium salt. The aqueous HCN product is purified and concentrated for use as a liquid feedstock for manufacturing of one or more of the final products mentioned above. Two of the Andrussow process manufacturers do not produce a liquid hydrogen cyanide intermediate product but immediately convert the hydrogen cyanide in the reactor gases in a sodium hydroxide contactor to produce liquid sodium cyanide.

There are ten manufacturers of hydrogen cyanide in the United States who use the Andrussow or the BMA process. Of these ten manufacturers, only one uses the BMA process. Two of the nine Andrussow manufacturers use an abbreviated version of the Andrussow process to produce sodium cyanide. Manufacture of sodium cyanide as a final product results in fewer wastes and significantly lower wastewater volumes.

The inorganic hydrogen cyanide industry subject to this rulemaking is composed only of the facilities that produce hydrogen cyanide as an intermediate product or feedstock to manufacture a variety of commercial chemicals using the Andrussow and BMA processes. This proposal specifically does not cover wastes from the manufacturing of HCN as a byproduct in the manufacture of acrylonitrile by the ammoxidation of

---

[35] Quarterly leachate monitoring data from March 95 to September 98, provided by Michigan's Department of Environment, Wayne County District Office and Local Office.

propylene (Sohio process). The Sohio process is inherently an organic chemical manufacturing process, and is not within the scope of the inorganic chemicals manufacturing industry or the consent decree. Furthermore, we have already evaluated wastes for acrylonitrile manufacturing, and the cyanide wastes associated with the Sohio process (K011, K013, and K014) are subject to Subtitle C regulation.

c. *What kinds of wastes are generated by this process?*

How Did We Categorize the Wastes?

Wastes generated from the production of hydrogen cyanide consist of various types of wastewater, various types of spent filter media, spent catalyst, biological solids from wastewater treatment, and ammonium salts. Based on an assessment of the wastes reported in the survey, the wastes were categorized as follows:

—Commingled wastewaters. This waste includes continuously generated wastewaters such as HCN purification wastewater and ammonia purification wastewater.

—Ammonia recycle cartridge and spent carbon filters. This waste consists of spent filter material and filter solids that are generated during the filtration of the recycled unreacted ammonia stream prior to being reused as process feedstock.

—Biological wastewater treatment solids. The biosolids are generated from the biological treatment of process and non-process wastewaters to remove residual cyanide and organonitrile contaminants.

—Feed gas cartridge and spent carbon filters. This waste consists of spent filter material and filter solids that are generated during the filtration of natural gas prior to being used as process feedstock.

—Process air cartridge filters. This waste consists of spent filter material and filter solids that are generated during the filtration of ambient air that is used in the reaction.

—Acid spray cartridge filters. The waste consists of spent filter cartridges and filter solids from acid spray filters used in the hydrogen cyanide stripper.

—Spent catalyst. This waste consists of metal gauze panels that contain the precious-metal catalyst used to catalyze the synthesis reaction. The catalyst activity diminishes with time and needs to be replaced with fresh catalyst periodically.

—Ammonium sulfate and ammonium phosphate. The ammonium wastes are generated from the neutralization of excess ammonia in the process using sulfuric or phosphoric acid.

—Miscellaneous wastewaters. These numerous wastewaters are generated during plant upsets or shutdowns for maintenance and are reported in detail in the ‘‘Inorganic Hydrogen Cyanide Listing Background Document for the Inorganic Chemical Listing Determination.’’

—HCN polymer and sump wastes. These wastes are generated in process vessels, tanks, and wastewater collection sumps and removed during periodic plant maintenance operations.

—Sludge from wastewater collection tank. This waste is generated from the settling of suspended solids in wastewater tanks and removed during periodic plant maintenance operations.

—HCN storage tank solids. These solids settle out of the HCN product. The solids are generated during manual tank cleaning after thorough washing.

—Wastewater filters. These are generated from the filtration of process wastewater prior to deep-well injection.

—Ammonium sulfate filters. This waste is from the filtration of the ammonium sulfate solution from the neutralization of excess ammonia by sulfuric acid. The filtered ammonium sulfate solution is then crystallized into solid form prior to sale as fertilizer.

—Spent ammonium phosphate. Ammonium phosphate solution is used to scrub the off-gas from the reactor to assist in ammonium recovery.

—Organic layer from wastewater collection tank. This is generated from the treatment of commingled HCN wastewater and predominantly non-HCN process wastewater.

In addition to these wastes, other residuals are produced by some of the facilities that are recycled back to the production process. These materials consist of process water and recovered ammonia. These residuals are reused on-site via enclosed piping systems and tanks, minimizing the potential for environmental releases. Also, we evaluated all wastes generated after these secondary materials are reinserted or reused; we do not believe that these secondary materials present significant risks. Consequently, we did not evaluate them further.

How Are These Wastes Currently Being Managed?

Table III–9 summarizes the major waste categories, waste characteristics, waste volumes, and their current management practices:

TABLE III–9.—INORGANIC HYDROGEN CYANIDE PRODUCTION WASTES

Waste Category (Number of facilities)	Reported Waste Codes [1]	1998 volume (MT)	Management practices
Commingled wastewaters (8)	D002	5,600,000	On-site wastewater treatment in tanks or surface impoundments, discharge to NPDES outfall or POTW.
Ammonia recycle cartridge and spent carbon filters (5)	none	73	Off-site municipal D landfill; off-site industrial D landfill; on-site Subtitle C landfill; on-site Subtitle C incineration.
Biological wastewater treatment solids (4)	none; F039[3].	45,397	Off-site industrial Subtitle D landfill; off-site municipal Subtitle D landfill; on-site Subtitle C landfill.
Feed gas cartridge and spent carbon filters (9)	none	9.7	Off-site municipal D landfill; off-site industrial D landfill; on-site Subtitle C landfill as non-hazardous waste; off-site recycle/reuse via return to manufacturer.
Process air cartridge filters (8)	none	7.5	Off-site municipal D landfill; off-site industrial D landfill; reclamation.

TABLE III–9.—INORGANIC HYDROGEN CYANIDE PRODUCTION WASTES—Continued

Waste Category (Number of facilities)	Reported Waste Codes[1]	1998 volume (MT)	Management practices
Acid spray cartridge filters (1)	none	1.1	On-site Subtitle C landfill as nonhazardous waste.
Spent catalyst (10)	none	4.06	Off-site reclamation.
Ammonium sulfate and ammonium phosphate (3)	none	27,425	Off-site use as fertilizer.
Miscellaneous wastewaters (4)	none	209,000	Managed with commingled wastewaters described above.
HCN polymer and sump wastes (1)	none	0.7	Off-site industrial D landfill
Sludge from wastewater collection tank (2)	D001;D018	[2]3.9	Stabilization/off-site Subtitle C landfill; off-site Subtitle C incineration.
HCN storage tank solids (1)	none	0.3	Off-site municipal D landfill
Wastewater filters (1)	none	450	Captive off-site Subtitle C incineration.
Ammonium sulfate filters (1)	none	1.1	Off-site industrial D landfill
Spent Ammonium Phosphate (1)	none	230	On-site reuse as biological treatment system nutrient source or on-site nonhazardous waste incineration
Organic layer from wastewater collection tank (1)	D001	43.3 (1993)	Off-site Subtitle C incineration

[1] D001 (ignitability), D002 (corrosivity), D018 (benzene).

[2] Includes 2.1 MT reported for 1993.

[3] One facility commingles wastewater to generate a hazardous waste derived from F039 wastewater.

d. Agency evaluation. We selected three facilities in Alabama, Tennessee, and Texas to collect record samples of wastes for the listing determination. These facilities were selected based on the survey information for the entire industry sector and collectively represent all the wastes generated and all of the waste management practices used by the manufacturing sector.

(1) Commingled wastewaters.

How Many Facilities Generate This Waste Category and How Is It Managed?

Eight of the ten facilities generated commingled wastewaters from the inorganic hydrogen cyanide process. The total volume of commingled wastewaters reported by these facilities was 5.5 million MT in 1998. Six of these eight facilities treat the commingled wastewaters using one or more of the following operations in their on-site wastewater treatment processes: (a) steam stripping to remove cyanide and ammonia, with off-gasses vented to flares, scrubbers or incinerators; (b) pH adjustment; (c) aerated or non-aerated biological treatment in tanks or lined/unlined surface impoundments; (d) ozone treatment in tanks; (e) oxychlorination in surface impoundments; (f) settling in surface impoundments; and NPDES outfalls, or POTWs. In addition to commingling of the hydrogen cyanide process wastewaters, some facilities also commingle these wastewaters with wastewaters from other non-HCN processes generated in the same chemical manufacturing complex. The remaining two facilities manage their commingled wastewaters by filtration and disposal via deepwell injection.

What Management Scenarios Were Assessed?

Based on the reported management practices, we assessed the potential for releases from tanks and surface impoundments. We decided that risks from the ultimate discharges to NPDES outfalls and POTWs are adequately controlled by the Clean Water Act. Risks from discharges to Class I injection wells with RCRA ‘‘no-migration’’ variances are adequately regulated under the Safe Drinking Water Act and RCRA (see section III.D.3).

Potential releases to groundwater. We assessed both the tank and surface impoundment scenarios for potential releases to groundwater and determined that the unlined surface impoundment scenario poses a more significant potential risk to groundwater than the tank scenario. We focused on the surface impoundment pathway because several of the reported surface impoundments are unlined, posing a potential direct release pathway to groundwater. We take the position that tanks, by the impervious nature of the construction materials (concrete, fiberglass, or steel) are not likely to result in significant releases to groundwater. We conducted sampling and analysis of these wastewaters at the three facilities located in Alabama, Tennessee, and Texas currently using surface impoundment-based wastewater treatment systems. We assessed each site individually, because we believe it is reasonable to assume that large volume wastewaters managed in impoundments in question would not be moved off-site or to different locations.

Our decision on what scenario to assess was based on review of our analytical data and the characteristics of the surface impoundments used at the three facilities. We evaluated the potential for groundwater releases to drinking water wells at the Alabama site, and potential surface water impacts at the Tennessee facility. The analytical data for the wastewater managed in the surface impoundment at the Texas facility showed that all levels of the toxicants of concern are below health-based levels, or are associated with other commingled on-site production processes and are not due to HCN production.

The Alabama facility manages wastewater in a series of surface impoundments and tanks that provide equalization, oxidation, maturation, rock-reed filtration, and mixing. In addition, the facility has an emergency holding basin which has also been used for HCN process wastewaters. The surface impoundments are equipped with double synthetic liners with leachate detection and collection systems. The oxidation basin is a concrete-lined structure with an additional synthetic liner. Our analytical data indicates that concentrations at the inlet to the impoundments would exceed the HBLs for one constituent of concern (acetonitrile). A study of existing wells near the facility indicates the presence of private water wells within a one-mile radius of the property boundary. We therefore assessed these units further for potential releases to groundwater.

The Tennessee facility manages the wastewater in unlined surface impoundments and some of the toxicants of concern were above the health-based levels and water quality criteria, thus, we assessed this facility's impoundments for potential releases to groundwater. As described below, the Tennessee facility and its surface impoundments are sited on the banks of the Loosahatchie River, with no off-site downgradient wells. However, we did assess the impact from potential releases to groundwater to the nearby river at this site.

Potential releases to air. We also examined the air exposure pathway for the wastewater treatment impoundments and tanks because of the potential release of volatile organic compounds and hydrogen cyanide from the wastewater treatment units. EPA is developing maximum achievable control technology (MACT) standards for cyanide manufacturing under the Clean Air Act (CAA), which may address these emissions. Although this rule will be technology-based, the CAA ultimately requires EPA to regulate significant risks remaining after the imposition of technology-based controls. EPA has also proposed regulations under the CAA for volatile organic compound (VOC) emissions from wastewater at Synthetic Organic Chemical Manufacturing Industry (SOCMI) facilities, which would cover the HCN manufacturers (see proposal at 60 FR 46780, September 12, 1994). Therefore, we are deferring control of any air releases to the MACT and SOCMI standards and did not assess this pathway further in today's proposal.

How Was This Waste Category Characterized?

We conducted sampling and analysis of these wastewaters at the three facilities currently using surface impoundment-based wastewater treatment systems. We collected samples at various places in the process, including prior to commingling, so that we could assess the risks of the wastestream at issue here. Today's proposal is based primarily on samples of the commingled wastewaters collected in the wastewater treatment plants.[36] For assessing the groundwater-to-drinking water pathway at the Alabama facility, we used the sample collected at the HCN wastewater collection tank where the HCN wastewaters are collected prior to mixing with other non-HCN wastewaters in the equalization impoundment. We estimated the concentration of the constituents of concern in the equalization impoundment by applying the dilution factor in the impoundment (*e.g.,* 36 to 1 total wastewaters to HCN wastewaters), and we assessed these concentrations in our modeling for this pathway. For the groundwater-to-surface water pathway at the Tennessee facility, we used the sample collected at the exit from the surface impoundments. We used the sample from wastewater exiting the unit, rather than at the inlet, because treatment occurs in the impoundment. However, the inlet data are similar, and even using the inlet data would not significantly increase the surface water screening results.

We analyzed the waste for both amenable and total cyanide, as well as a number of volatile organics and metals. We used the amenable cyanide results as our cyanide risk assessment inputs because we believe that amenable cyanide most closely represents the fraction of cyanide likely to be mobile in a groundwater scenario and the ''free cyanide'' assessed in our health-based level (HBL). However, this had no impact on our risk results, because our data show that amenable and total cyanide results for this waste are the same.

We sampled the wastewater at the Alabama facility in August, 1999. The analytical data for the commingled HCN wastewaters (DG–1–HC–07) represent waste concentrations prior to commingling with other non-HCN wastewaters. Our results for a key chemical, acetonitrile, are qualified as ''estimated'' for this sample as a result of problems during sampling and analyses at this site as described further in Waste Characterization Report, Degussa-Huls; February 25, 2000, available in the docket for today's proposal. The facility's split samples were more problematic, because the analytical instruments were not calibrated for key constituents being analyzed; thus, the split sample results appear even more uncertain. Despite the estimated nature of the results for acetonitrile in this waste sample, the data clearly indicate that acetonitrile is likely to be present in the waste. Acetonitrile, also commonly referred to as methyl cyanide, is a likely by-product from the main reaction between methane and ammonia to form hydrogen cyanide. In addition, samples we collected at the Tennessee facility show that significant levels of acetonitrile are present in the wastewater, albeit at somewhat lower levels than we found at the Alabama site.

We initially sampled at the Tennessee facility in August of 1999 (sample DM–1–HC–08). We used the analytical results for this sample as input to the risk assessment (described further below). However, because our analytical results for amenable cyanide were qualified due to holding time exceedences, we sampled at this facility a second time in October of 1999 to better understand the potential impact of this waste on the environment (DM–2–HC–08). All of the analytical data for these samples are available in ''Inorganic Hydrogen Cyanide Listing Background Document for the Inorganic Chemicals Listing Determination'' in the docket for today's proposal. The second round of sampling showed lower levels of the key constituent of potential concern than found in the first round of sampling. Due to time constraints, we did not re-run the risk assessment model for this pathway to incorporate the second round of analytical data. However, this would result in somewhat lower risks, and thus would have had not impacted our proposed decision.

The critical analytical results for the commingled wastewaters for the Tennessee and Alabama surface impoundments are presented below in Table III–10. These represent the constituents found to be present in the wastewaters at level exceeding the HBLs or AWQC. (Several other constituents were marginally above the AWQC and were not important in the surface water screening.)

---

[36] The ''Inorganic Hydrogen Cyanide Listing Background Document for the Inorganic Chemical Listing Determination,'' available in the docket for today's proposal, provides all analytical data we developed, as well as split samples collected by industry, where available.

TABLE III–10.—CHARACTERIZATION OF COMMINGLED WASTEWATERS FROM INORGANIC HCN PRODUCTION (MG/L)

Constituent of concern	Sample DM–1–HC–08	Sample DM–2–HC–08 2nd Rnd	Sample DG–1–HC–07	[1] HBL	AWQC
Amenable CN	0.638	<0.01	0.509	0.3	0.005
Nitrite as N	11.5	no analysis	<2.5	2	1
Vinyl chloride	0.029	[3] 0.0066 L	<0.001	0.0009 (0.1)	0.002
Acetonitrile	[4] 50 K	28 L	190	0.09 (0.045)	[2] N/A
Acrylonitrile	0.013	<0.001	<0.0005	0.002 (0.03)	5.9E–05

[1] HBL in parenthesis based on inhalation pathway from residential use of water (*e.g.*, showering).
[2] N/A: Not Applicable.
[3] L: Qualified result with a low bias for positive result.
[4] K: Qualified result with a high bias for positive result.

How Was the Groundwater-To-Drinking Water Risk Assessment Established?

The Alabama facility's surface impoundments are located in the center of an industrial park on the west side of Mobile Bay. The wastewater treatment impoundments are located near the eastern property boundary of the facility and approximately 4,000 feet south of the State of Alabama barge canal. We chose to assess surface water risks at the Tennessee facility, which is closer to a surface water body. However, given the use of groundwater in the area around the Alabama facility, we assessed the possible impact on drinking water wells. We selected the equalization basin as the unit for quantitative modeling. This is the first surface impoundment in the series and is likely to hold the highest level of constituents of concern. We elected not to assess the emergency holding pond, which is used primarily during high stormwater events. Due to the intermittent use of the holding pond, we expect the potential for significant groundwater releases to be greater for the equalization pond. In addition, the equalization pond is covered with a floating synthetic membrane, while the holding pond is not.[37] Our modeling of the covered equalization pond did not assume any loss of the volatile constituents of concern, thus allowing more of the constituents to infiltrate to the groundwater rather than volatilize to the air.

Based on information available in a corrective action plan related to a product spill on-site (Risk-Based Corrective Action Plan for the Sodium Cyanide Production Unit at Degussa Corporation Alabama Facility, Theodore, Alabama; March 19, 1998), the most likely direction of groundwater flow is to the low-lying areas to the north-northeast of the surface impoundments. We found there are drinking water wells located due east of the equalization surface impoundment. Although the wells are located east of the surface impoundment instead of the estimated north-northeast groundwater flow direction, they are at somewhat lower ground elevation than the surface impoundment. Given the uncertainty in the direction of the groundwater flow, we assumed that contaminated groundwater from the surface impoundment could migrate to the east and reach these wells. Based on the available land use and groundwater use information for this area, we performed risk modeling for potential releases to drinking water wells located between 3,100 and 5,280 feet east of the surface impoundment. The minimum distance of 3,100 feet is based on the distance from the impoundment to the eastern boundary of the industrial area controlled by the facility. The maximum distance of 5,280 is the distance east from the impoundment to the closest known well. This drinking water well appears to be located just inside the eastern boundary of the state property, which lies to the east of the industrial park where the facility is located. We also assumed that a future well may be placed in the same State property directly east of the facility's undeveloped tract at approximately 3,100 feet from the surface impoundment. The details of this assessment are presented in the ''Risk Assessment for the Listing Determinations for Inorganic Chemical Manufacturing Wastes'' in the docket for today's proposal. The results of the risk modeling for the only drinking water constituent of concern are presented in Table III–11 below.

TABLE III–11.—GROUNDWATER RISK RESULTS FOR COMMINGLED WASTEWATERS FROM THE PRODUCTION OF INORGANIC HYDROGEN CYANIDE

Percentile	Acetonitrile hazard quotient (HQ) [1]
90th %	0.3
95th %	0.5

[1] Risk from inhalation scenario during showering included exposure factors for both adult and child in the analysis.

How Was The Groundwater-To-Surface Water Risk Assessment Established?

The Tennessee facility and its surface impoundments are sited on the banks of the Loosahatchie River. The surface impoundments are located approximately 800 feet from the river. Based on information available in the Remedial Facility Investigation (RFI),[38] the direction of the groundwater flow is documented to be south towards the Loosahatchie River. The possibility of a public water supply well or private well being located downgradient of the Tennessee surface impoundments is unlikely because the facility boundary extends to the river to the south. Hence, based on the geologic setting of the facility as detailed above, we believe it is highly unlikely that these impoundments could impact drinking water wells via migration of a contaminated groundwater plume. Based on these facts we did not assess the groundwater-to-drinking water well pathway further at this site. We did, however, conduct a screening analysis of potential releases of groundwater to surface water and subsequent exposure via ingestion because of the proximity of the unit to the river. We calculated the concentrations in the river that would result from discharge of contaminated

---

[37] The facility reported that the cover on the equalization unit was installed to ensure compliance with expected new regulations to control volatile organic carbon emissions from wastewater sources for the Synthetic Organic Chemical Manufacturing Industry (SOCMI) (proposal, 59 FR 46780, September 9, 1994).

[38] U.S. EPA Phase II RFI Workplan, Potentiometric Surface Plan, March 3 & 4, 1999.

groundwater by estimating the infiltration rate for the unlined impoundment and diluting the resulting leachate volume into the river under various flow conditions. The results of this screening level analysis suggest that concentrations of the constituents of concern in the river would be well below the aquatic life AWQC and HBLs for drinking water. The details of the screening analysis are presented in ‘‘Risk Assessment for the Listing Determinations for Inorganic Chemical Manufacturing Wastes’’ in the docket for today's proposal.

What Is EPA's Listing Rationale for This Waste?

Our risk assessment results for the surface impoundment scenario, summarized above for drinking water in Table III–11, suggest that the only constituent of concern that required modeling (acetonitrile) does not pose a substantial present or potential hazard to human health and the environment. The HQ was below one at both the 90th and 95th percentile in the probabilistic risk distribution.

The results of our risk analysis also show that hypothetical releases to the adjacent river would not result in exceedences of risk thresholds. Our analysis was conducted at a screening level and thus is based on a number of conservative assumptions that may overstate actual risk. We did not account for dilution of the potential plume in groundwater flowing under the surface impoundment that would result in yet lower river concentrations. We did not account for the likelihood that river water would be pretreated prior to use for drinking and showering. We did not account for volatilization, biodegradation, or hydrolysis of the cyanide and other constituents prior to exposure. Even if we used the surface impoundment influent concentrations, rather than the exit concentrations, as input to the analysis, this waste would not exceed risk thresholds in the adjacent river.

For these reasons, we propose not to list this waste category as hazardous. For a more complete description of this analysis, see ‘‘Risk Assessment for the Listing Determination for Inorganic Chemical Manufacturing Wastes’’ in the docket for this proposal.

(2) Ammonia recycle cartridge and spent carbon filters.

How Many Facilities Generate This Waste Category and How Is It Managed?

Five facilities reported generating 73 MT/year of filter media and waste solids in 1998 from the removal of organonitrile polymers from the ammonia recycle stream. The management methods reported by the industry were off-site municipal Subtitle D landfill, off-site industrial Subtitle D landfill, on-site Subtitle C incineration, and on-site Subtitle C landfill.

What Management Scenarios Were Assessed?

We conducted risk assessment modeling for off-site disposal in both a municipal and an industrial landfill, using only those two waste volumes reported to be managed in off-site Subtitle D landfills; volumes managed as hazardous wastes were not included in this array. No significant volatile constituents were detected in this waste (only non-volatile metals were detected; see following section), thus volatilization from landfills to the air was not a pathway of concern.

We did not conduct risk assessment of the voluntary Subtitle C landfill and incineration practices because we assumed that listing would not significantly increase regulatory control for these wastes. Note that these on-site captive units have sufficient capacity and flexibility to accept these relatively small volume non-hazardous wastes.

How Was This Waste Category Characterized?

Two samples were collected at different facilities. We sampled again at both facilities because of problems with the cyanide analyses for the first set of analyses and elevated detection limits for certain metals in the Tennessee sample. Due to the schedule constraints of this determination, we initiated the risk analyses using the first round of samples. The risk analysis and second round of sampling and analysis were conducted in parallel. HBLs are shown in Table III–12.

TABLE III–12.—CHARACTERIZATION OF AMMONIA RECYCLE FILTERS

[mg/L]

Parameter	RH–1–HC–05 (1st data set)		RH–2–HC–05 (2nd data set)		DM–1–HC–04 (1st data set)		DM–02–HC–04 (2nd data set)		HBL
	TCLP	SPLP	TCLP	SPLP	TCLP	SPLP	TCLP	SPLP	
Antimony	[1] 0.55 J	0.59	<0.5	0.237	<0.5	<0.5	0.8	0.08	0.006
Arsenic	[2] 0.045 L	0.039	<0.5	0.0137	<0.5	<0.05	<0.5	0.0112	0.0007
Nickel	0.50 J	0.61	<0.2	0.303	<0.2	0.0654	<0.2	0.0178	0.31
Total CN	N/A	2.4 L	0.230	0.243	0.218	0.187 L	[3] 0.222	0.303	[4] 0.31

[1] J: Estimated result, due to poor field duplication.
[2] L: Qualified result with a low bias for positive result.
[3] Average of duplicate sample results.
[4] HBL for hydrogen cyanide.

How Was the Groundwater Ingestion Risk Assessment Established?

We assessed the off-site landfill scenario for the ammonia recycle filter cartridges, reflecting the types of management reported for this waste. We assessed the groundwater ingestion pathway for these landfills. Our model inputs included different hydrogeologic settings reflecting the two regions where the wastes are reported to be managed. As noted in section III.C., we used the TCLP results for the municipal landfill scenario and the SPLP for the industrial landfill scenario.

As described above, we had some initial concerns about our analytical data and determined that re-analysis would serve to demonstrate the validity of these data. Due to the time constraints of this listing determination, we could not delay the risk assessment modeling until the validated results of the second round of analyses became available, and thus used the first round of samples for the Texas facility as model input. Subsequently, having reviewed all the analytical data, we believe that the modeled data set appropriately characterizes the risks of all constituents included in the first sampling round, and that re-running the model with the second round of analytical data would not increase the predicted risk. The only additional constituent of concern found in the second analysis was cadmium. We modeled this constituent using the same two scenarios and found no significant risk.

What is EPA's Listing Rationale for This Waste?

The results of our probabilistic risk assessment are provided in Table III–13 below (we also completed deterministic risk modeling and the results were comparable; see ''Risk Assessment for the Listing Determinations for Inorganic Chemical Manufacturing Wastes'' for details). At the 90th and 95th percentile cumulative risk level, we found no cancer risk in excess of 1E–07, nor did we find any hazard quotients that exceeded one. As a matter of policy, we generally do not consider listing wastes with predicted cancer risks of less than 1E–06 or hazard quotients of less than 1.0. We see no special concerns warranting an exception to this policy. Based on these results we conclude that this waste does not pose risk to human health and the environment at levels that warrant listing. We therefore are proposing not to list ammonia recycle filters from inorganic hydrogen cyanide production.

TABLE III–13.—GROUNDWATER RISK RESULTS FOR AMMONIA RECYCLE FILTERS [1]

Percentile	Antimony		Arsenic		Cadmium	
	Adult HQ	Child HQ	Adult cancer risk	Child cancer risk	Adult HQ	Child HQ
Industrial Landfill:						
90th	7.9E–02	1.6E–01	3.8E–08	2.8E–08	3.6E–04	7.7E–04
95th	1.9E–01	3.9E–01	1.6E–07	1.2E–07	1.6E–03	3.4E–03
Municipal Landfill:						
90th	8.7E–02	1.8E–01	3.9E–08	3.1E–08	4.0E–04	8.5E–04
95th	2.0E–01	4.2E–01	1.8E–07	1.3E–07	1.7E–03	3.7E–03

[1] Modeling for two other constituents (nickel and cyanide) yielded HQs that were extremely small (<1E–16) even at the 95th%.

(3) Biological wastewater treatment solids.

How Many Facilities Generate This Waste Category and How Is It Managed?

Four facilities reported a total volume of 45,397 MT/year for this waste. The management methods reported are off-site municipal and industrial Subtitle D landfills, on-site Subtitle C landfill, and off-site use as agricultural liming agent (volume not reported).

What Management Scenarios Were Assessed?

We evaluated the Subtitle D landfill and the agricultural liming agent scenario reflecting the reported management practices. We assessed the landfill scenario using our TCLP and SPLP results for the wastes reported managed in such landfills. We assessed the agricultural use scenario by comparing total constituent concentrations to the soil screening levels (see section III.C.3).

How Was This Waste Category Characterized?

We collected two samples of this waste at two different facilities. We conducted total and leaching analyses of these samples. To evaluate the industrial landfill disposal scenario we compared the SPLP leaching results to constituent HBLs, and for the municipal landfill scenario we compared TCLP leaching results to the HBLs. In all cases the SPLP and TCLP levels corresponding to the management practice were below the HBLs.

For the agricultural liming scenario, we compared the total concentrations in the waste to the soil screening levels; no constituents exceeded these screening levels, *i.e.,* all constituents were below background or direct soil ingestion levels.

The full analyses are summarized in the ''Inorganic Hydrogen Cyanide Listing Background Document for the Inorganic Chemicals Listing Determination'' and the analytical results are reported in detail in the Waste Characterization Reports for this sector; these documents are available in the docket for today's proposal.

What Is EPA's Listing Rationale for This Waste?

We propose not to list this waste as hazardous because the levels of toxicant constituents found in the waste are below the levels of concern.

(4) Feed gas cartridge and spent carbon filters.

How Many Facilities Generate This Waste Category and How Is It Managed?

Nine facilities reported a total volume of 9.7 MT/year for this waste. The management methods reported are off-site manufacturer refurbishing for reuse, off-site municipal D landfill, off-site industrial D landfill, and on-site C hazardous landfill. The facility using the hazardous C landfill for disposal of the filters is managing the filters as nonhazardous waste in a captive on-site C landfill.

What Management Scenarios Were Assessed?

We assessed the municipal and industrial Subtitle D landfill scenarios using our TCLP and SPLP results, respectively. No volatile constituents were detected in this waste (only non-volatile metals were detected; see following section), thus volatilization from landfills to the air was not a pathway of concern. We did not assess the voluntary Subtitle C landfill scenario because we assumed that listing would not significantly increase regulatory control. Note that the on-site unit has sufficient capacity to continue to accept this small volume waste.

How Was This Waste Category Characterized?

We collected one sample of this waste. The analytical results showed that SPLP levels for all constituents are below drinking water HBLs. The TCLP results showed levels that exceeded HBLs for the constituents summarized below in Table III–14:

TABLE III–14.—CHARACTERIZATION OF FEED GAS FILTERS FROM INORGANIC HCN PRODUCTION

[mg/kg or mg/L]

Constituent	Total	TCLP	SPLP	HBL
Boron	17,900	7.4	<0.5	1.4
Lead	18.5	[1] 0.03	[1] 0.003	0.015
Nickel	91.0	0.4	<0.05	0.31
Zinc	1,060	13	<0.5	5

[1] Results are less than the typical laboratory reporting limit, but are greater than the calculated instrument detection limits.

Split sample results provided by the facility were comparable. We did not find cyanide in these wastes.

The full analytical results are summarized in the ''Inorganic Hydrogen Cyanide Listing Background Document for the Inorganic Chemicals Listing Determination'' and are reported in detail in the Waste Characterization Reports for this sector; these documents are available in the docket for today's proposal.

How Was the Groundwater Ingestion Risk Assessment Established?

We assessed the groundwater ingestion pathway for the off-site landfill scenario for this waste, reflecting the types of management reported. As noted in section III.E., we used the TCLP results for the municipal landfill scenario and the SPLP for the industrial landfill scenario. We found that the industrial Subtitle D landfill scenario screened out because all constituents in the SPLP analysis were below their respective HBLs.

The constituents of concern that exceeded their respective HBLs in the TCLP results were boron, lead, nickel, and zinc. We evaluated these constituents using the de minimis volume screening analysis, as described in section III.E.3 of today's proposal. The analysis suggests that lead, nickel and zinc are not of concern. We modeled the remaining constituent, boron, using our standard groundwater model for the municipal landfill scenario. We modeled the municipal landfill scenario, using a hydrogeologic setting reflecting the region where the waste was reported to be managed.

What Is EPA's Listing Rationale for This Waste?

As noted above, the industrial landfill scenario screened out. For the municipal landfill scenario, the results in Table III–15 show that the HQs are well below one at both the 90th and 95th% for the constituent of concern. Thus, our risk assessment results suggest that the only constituent of concern that required modeling (boron) does not pose a substantial present or potential hazard to human health and the environment. For a more complete description of this analysis, see ''Risk Assessment for the Listing Determinations for Inorganic Chemical Manufacturing Wastes' in the docket. Thus, we propose not to list this waste as hazardous.

TABLE III–15.—GROUNDWATER RISK RESULTS FOR FEED GAS FILTERS FOR BORON

Percentile	Adult HQ	Child HQ
90th	0.007	0.01
95th	0.01	0.05

(5) Process air cartridge filters.

How Many Facilities Generate This Waste Category and How Is It Managed?

Eight facilities reported a total volume of 7.5 MT/year for this waste. The management methods reported are off-site industrial D landfill, off-site manufacturer refurbishing for reuse, off-site municipal D landfill, and on-site industrial D landfill. Most facilities reported the practice of filtering the air that they feed to the reactors. Very small volumes of spent filters are generated periodically. We did not assess these wastes beyond the characterization provided in the RCRA Section 3007 Survey results because no wastes were available to sample when we conducted our sampling. The level of toxic constituents is expected to be low because the filters are only used to remove airborne solids from the ambient air used in the process.

What Is EPA's Listing Rationale for This Waste?

We propose not to list this waste as hazardous because we do not believe that the level of any toxic constituents in these small waste volumes would exceed levels of concern that would pose a risk based on management in Subtitle D landfills.

(6) Acid spray cartridge filters.

How Many Facilities Generate This Waste Category and How Is It Managed?

One facility reported a total volume of 1.1 MT/year for this waste. The management method reported was on-site Subtitle C disposal as a nonhazardous waste. The cartridge-type filter elements are used in the process to prevent clogging of spray nozzles used to inject the hydrogen cyanide intermediate product into the HCN stripper. The filters remove process particulates, including rust, from the hydrogen cyanide intermediate product. The waste is generated when the spent filter elements are replaced weekly. While this waste is classified as nonhazardous, the generator disposes of it in the facility's on-site Subtitle C landfill.

How Was This Waste Category Characterized?

No sample of this waste was collected because of unavailability during the sampling time frame and because the level of toxic constituents is expected to be low. The filters are used to remove inert impurities such as pipe scale. The facility washes the filters prior to removal of the filters from the process. We expect that any hydrogen cyanide contamination is removed during this washing. The facility reported in its RCRA Section 3007 Survey that the waste contains a total concentration of cyanide of one ppm.

What Is EPA's Listing Rationale for This Waste?

We propose not to list this waste as hazardous because the level of toxic constituents found in this waste are expected to be below levels of concern. While we do not have any leaching test data, we can conservatively estimate that any leachable level of cyanide would be at least 20-fold less than the 1 ppm total level reported, *i.e,* less than 0.05 mg/L. This is well below the HBL for amenable cyanide (0.3 mg/L). Furthermore, this small volume waste is already managed in a Subtitle C landfill.

(7) Spent catalyst. All ten facilities reported generation of this waste, with a combined total volume of 4.1 MT/year. The management method reported was off-site metals reclamation or regeneration. These catalysts gradually lose their effectiveness over time and are periodically reclaimed. Due to the

high value of these precious-metal materials, generators maintain close control over these materials. The spent material is an impermeable metal gauze that undergoes thorough cleaning and decontamination to eliminate cyanide concentrations prior to removal from the reactor. We have chosen not to evaluate these materials further because management practices for these materials prior to reuse minimize the potential for environmental releases. Therefore, we propose not to list this waste as hazardous because there are no significant known exposure pathways that would present risk.

(8) Ammonium sulfate and ammonium phosphate.

How Many Facilities Generate This Waste Category and How Is It Managed?

Three facilities reported a total volume of 27,425 MT/year for this waste. The management method reported was off-site use as fertilizer.

What Management Scenarios Were Assessed?

We assessed the agricultural end use of this waste by comparing the total constituent results to the soil screening levels. In this case we evaluated the material, because it is land applied.

How Was This Waste Category Characterized?

One sample of this by-product was collected from the Alabama site. The analytical data results show that the detected constituents of concern in the total analyses are below the soil screening levels. In addition, we compared the SPLP leaching results to the HBLs as a screen of potential groundwater exposure.[39] The detected SPLP results are below the HBLs. The analytical results showing the level of toxic constituents are included in the ''*Inorganic Hydrogen Cyanide Listing Background Document for the Inorganic Chemicals Listing Determination.*''

What Is EPA's Listing Rationale for This Waste?

We propose not to list this waste as hazardous because the levels of toxic constituents found in the waste are below levels of concern.

(9) Miscellaneous wastewaters.

How Many Facilities Generate This Waste Category and How Is It Managed?

Four facilities reported a total volume of 209,000 MT/year for this waste category; the total volume represents twenty two different miscellaneous wastestreams that are generated on an intermittent or periodic basis. The management method reported was commingling with other major process wastewater streams described above as the ''commingled wastewaters'' category.

What Management Scenarios Were Assessed?

We did not assess these numerous wastewater streams individually. The wastewaters were assessed indirectly within the commingled wastewater category discussed earlier. The volume and constituents represented by these miscellaneous wastewaters are represented in the total commingled major and miscellaneous wastewater streams.

How Was This Waste Category Characterized?

We did not collect samples of these miscellaneous wastewater streams. The levels of toxic contaminants in these wastewaters are reflected in the contaminant concentrations of the total commingled wastewater streams at each facility. See the commingled wastewater category discussed earlier in this section for a discussion on how the commingled major and miscellaneous wastewater streams were characterized. Two of the miscellaneous wastewaters were reported to contain potentially high concentrations of hydrogen cyanide when generated.

What Is EPA's Listing Rationale for This Waste Category?

We propose not to list this waste category as hazardous. There is no direct exposure pathway into the environment from these individual wastes, because they are treated and commingled with the other wastewaters generated at each facility. Although high concentrations of hydrogen cyanide in the wastewaters are possible for some of these wastes, the risk is reduced by the high dilution that occurs when these wastewaters are mixed with other large volume wastewaters in the facility-wide wastewater collection system. These miscellaneous wastewaters are generated intermittently and infrequently. Thus, any potential releases from land-based management of the wastes after dilution in with other wastewaters would be short-lived, and unlikely to result in any significant long-term risk. In addition, the hydrogen cyanide contaminant is readily and rapidly treated in the wastewater treatment systems, so that any risk is minimized. For example, the tank farm scrubber water from the Tennessee facility is treated through oxychlorination, which rapidly destroys the hydrogen cyanide. As noted earlier, potential hydrogen cyanide releases via the air pathway would be covered by the Hydrogen Cyanide MACT rule.

(10) HCN polymer and HCN sump wastes. One facility reported a total volume of 0.7 MT/year (0.3 MT/yr polymer and 0.4 MT/year sump wastes) for these two wastes. The physical description of the wastes was reported as dirt, debris and inert polymer solids. The wastes are disposed of in an off-site industrial Subtitle D landfill. Very small volumes of these wastes are generated periodically. We did not assess these wastes beyond the characterization provided in the RCRA Section 3007 Survey results because of the unavailability under the sample schedule and because of the low concentrations of toxic constituents expected to be present in this waste.

In the RCRA Section 3007 Survey, the one generator reported that total levels of cyanide were 50 mg/kg for the HCN polymer and 5 mg/kg for the sump wastes. These levels are unlikely to pose a risk in a landfill scenario for these very small waste volumes. In support of this, we note here, as we did above for the acid spray filter cartridge waste category, leaching test results would be at least 20-fold less than the total levels. This would mean any leaching from sump waste would be below the HBL for cyanide. While this 20-fold factor would leave the HCN polymer somewhat above the HBL at 2.5 ppm cyanide, we note that groundwater modeling for cyanide for the ammonia recycle filters indicates similar levels of cyanide in a larger waste volume presents very low levels of risk in a landfill scenario. Therefore, we propose not to list HCN polymer and HCN sump wastes.

(11) Sludge from wastewater collection tank. One facility reported a volume of 2.1 MT over a seven year period, or approximately 0.3 MT/year for this waste. The waste was coded as hazardous (D001), stabilized on-site and disposed of in an off-site Subtitle C landfill. The waste is generated approximately every ten years; the volume reported was for 1993 with no generation of that waste since that date. This waste results from sedimentation in a wastewater collection tank. HCN wastewaters managed in this tank only account for ten percent of throughput; the sediment thus is only marginally associated with HCN production. One other facility reported generating 1.8 MT of this waste, and also codes it as characteristically hazardous waste (in this case as D018 for benzene). This

---

[39] Note that the SPLP/HBL groundwater screen for this scenario is likely to be a worse-case screening, because the fertilizer application scenario isn ot analogous to a landfill scenario, particularly with respect to application rates.

second facility sends the waste off-site to a Subtitle C incinerator; the facility reported that the benzene was derived from other on-site processes. We propose not to list these wastes because they are very small volume wastes that are already managed as characteristically hazardous wastes in full compliance with the Subtitle C regulations. In addition, the wastes are generated from the treatment of predominantly non-HCN wastewater from unrelated petrochemical processes at the facilities.

(12) HCN storage tank solids. One facility reported a volume of 0.3 MT/year for this waste. During periodic shutdowns of this product tank for cleaning, solids are removed after rigorous washing of the tank interior to remove soluble cyanide. The waste consists of polymer and tank scale. The waste is disposed of in an off-site municipal Subtitle D landfill. A sample of this waste was not collected because of unavailability during the sampling time frame. However, the waste description provided by the facility indicates the waste is similar in composition to the ammonia recycle filters, which we have proposed not to list. Given the much smaller volume here, this waste is not expected to present significant risk. Therefore, we are proposing not to list this waste as hazardous.

(13) Wastewater filters. One facility reported a volume of 450 MT/year for this waste. The waste is managed in a captive, off-site Subtitle C incinerator as characteristically hazardous waste. The waste is spent filters from the filtration of commingled wastewaters from various on-site processes prior to on-site deepwell injection and is generated periodically. A sample of this waste was not available during the sampling time frame. However, the one generator reported that the waste is characteristically hazardous due to benzene, and the facility manages the waste as D018. The source of the benzene is the waste from other non-HCN process wastewaters at the facility. We propose not to list this waste because it is already managed as a hazardous waste in accordance with Subtitle C regulations.

(14) Ammonium sulfate filters. One facility reported a volume of 1.1 MT/year for this waste. The waste is managed in an off-site industrial landfill. The waste is generated periodically. We did not assess this waste beyond the characterization provided in the RCRA Section 3007 Survey results because of the unavailability of samples under the sample schedule. However, the facility reported concentrations of cyanide (1 mg/kg) and ammonium sulfate (5,000 mg/kg). This concentration of cyanide is considered to be very small and is not expected to be of concern (see discussion of cyanide for acid spray cartridge filters). In addition, we collected a sample of the ammonium sulfate by-product (*i.e.,* the material being filtered to generate this waste) and did not find any constituents of concern. See discussions for ammonium sulfate and ammonium phosphate. Therefore, we propose not to list this waste as hazardous because we do not believe that there are any significant levels of toxic constituents in the waste.

(15) Spent ammonium phosphate. One facility reported a volume of 230 MT/year for this waste. The waste is reused on-site as a nutrient source in the biological treatment unit or incinerated on-site in a nonhazardous waste incinerator. The waste is generated in batches one or two times per year. The waste is generated from the scrubbing of the reactor off-gas stream using aqueous monoammonium phosphate solution in the ammonia recovery process. The resulting diammonium phosphate solution is then purified to recover the ammonia and the resulting spent ammonium phosphate solution is stored in tanks prior to final management. We did not assess this waste beyond the characterization provided in the § 3007 Survey results because of the unavailability of samples under the sample schedule; the characterization indicates the presence of organonitrile compounds in the waste. However, the preferred management method is to reuse the waste as a nutrient source in the biotreatment system, with incineration only when this is not possible due to the solution becoming spent or when the concentrations of phosphate and ammonia are incompatible with the wastewater treatment system. We believe the levels of organonitrile compounds do not pose a risk under either management scenario. The wastewater treatment scenario results in the destruction of the compounds via biodegradation and the incineration scenario would also result in destruction of the volatile organonitriles. Additionally, emissions from the on-site incinerator would be regulated under the Hydrogen Cyanide MACT standards which will be proposed in 2000. Therefore, we propose not to list this waste as hazardous.

(16) Organic layer from wastewater collection tank. One facility reported a volume of 43.3 MT/year for this waste. The waste is coded as D001 and sent off-site Subtitle C incineration. This waste is generated approximately every ten years; the volume reported was for 1993 with no generation of the waste since that date. Thus, on an annualized basis the waste quantity generated would be approximately 4 MT/yr. We did not assess these wastes beyond the characterization provided in the RCRA Section 3007 Survey results because of the unavailability of samples under the sample schedule. We propose not to list this waste as hazardous because the waste is managed as characteristically hazardous in accordance with all applicable Subtitle C standards, which adequately protect against mismanagement. Further, the waste is generated from the treatment of predominantly non-HCN wastewater from other unrelated petrochemical processes at the facility. Only ten percent of the wastewater throughput in the tank generating this waste is associated with HCN production; the percentage contribution from the HCN process to this oily layer is likely to be much lower, because other petrochemical processes on-site are likely sources of the organic material.

6. Phenyl Mercuric Acetate

a. Summary. We propose not to list any wastes from the production of phenyl mercuric acetate (PMA) as hazardous under Subtitle C of RCRA. PMA currently is not manufactured in the United States, and it is extremely unlikely that it will be manufactured in the United States in the future. Therefore, there are no wastes being generated that could be subject to a listing determination.

b. Description of the phenyl mercuric acetate industry. PMA ($C_8H_8Hg\,O_2$) is an organic mercury compound, a white to creamy white odorless crystalline powder or clear solution. Prior to 1990 it was the predominant fungicide used in the latex paint industry. In 1990, EPA banned the use of PMA in interior paint (55 FR 26754, June 29, 1990) and subsequently, the paint industry ceased using PMA in paint production. PMA is still used for other limited purposes (*e.g.,* slimicide in paper mills; selective herbicide for crabgrass; fungicide for diseases of turf on golf greens and tees; fungicidal seed dressing for seed- and soil-borne diseases of cereals, sorghum, and groundnuts).

Based on our research and the results of our RCRA Section 3007 Survey, we conclude that there is no domestic production of PMA. Any domestic demand is met by imports from other countries. See the ''Phenyl Mercuric Acetate Listing Background Document for the Inorganic Chemical Listing Determination'' for details.

c. Agency evaluation. PMA is not produced within the United States and is not widely used in domestic manufacturing processes. Therefore, we have no reason to believe that wastes from the production of PMA are generated within the U.S. Given the compound's limited market within the U.S., it is highly unlikely that new production of PMA will occur within the U.S. in the future. As a result of these market conditions, there are no wastes that can be assessed for this sector. Therefore, we propose not to list any PMA production wastes as hazardous.

7. Phosphoric Acid From the Dry Process

a. Summary. We have evaluated the wastes from the production of phosphoric acid manufactured via the dry process, and propose not to list any wastes from this process as hazardous wastes. These wastestreams do not meet the criteria set out at 40 CFR 261.11(a)(3) for listing wastes as hazardous. They do not pose a substantial present or potential threat to human health or the environment. We have identified no risks of concern associated with the current management of these wastes.

b. Description of the phosphoric acid industry.

Phosphoric acid was produced by the dry process by eight facilities in the United States in 1998. The majority of phosphoric acid is consumed in the manufacture of phosphate salts. These phosphorus-containing compounds are used in detergents, animal feed supplements, dentifrices, fertilizers, metal treating, water softening, leavening agents, and flame and fire retardants.

In the dry process, elemental phosphorous is burned in excess air generating phosphorous pentoxide (P_2O_5). The resulting phosphorus pentoxide is hydrated with a spray of recycled phosphoric acid and water, forming phosphoric acid that is collected as product. Scrubbers are employed for the hydrator off-gases to absorb as much phosphoric acid mist as possible from the excess air. The strong phosphoric acid stream from the hydrator is purified with hydrogen sulfide to precipitate out arsenic trisulfide. This sludge is removed by filtration. In some cases, off-specification product is filtered and recycled into the process. The product may also be filtered after it leaves the storage tank and prior to loading in truck and railcars.

c. Description of wastes generated by the phosphoric acid process. We have identified fourteen waste categories from the production of phosphoric acid (via the dry process) that required assessment. These waste categories are described briefly and in more detail in the following subsections.[40]

—Arsenic filter cake is the result of filtering the phosphoric acid after the addition of sodium hydrosulfide or hydrogen sulfide gas and a filter aid. The precipitate consists of arsenic trisulfide and other heavy metal sulfides which are essentially insoluble in strong acid.

—Combustion chamber slag (infrequently generated) is the result of residue buildup on the walls of the chamber.

—Off-specification phosphoric acid is generated when the product does not meet color or concentration specifications.

—Spent filters (from purification) are generated from the units that are used to remove arsenic from the phosphoric acid.

—Caustic scrubber water is generated when air used to remove hydrogen sulfide gas at the acid purification step is scrubbed. This scrubbing operation controls odor and acid mist before the air is discharged to the atmosphere.

—Phosphoric acid spills occur around the process or storage tanks area. These materials are collected in contained areas and pumped to management units.

—Clean-up and washdown water from across the units is collected in a sump and discharged to the wastewater treatment system.

—Process acid leaks occur when piping and coupling break, or during equipment maintenance. These materials are collected in contained areas and pumped to management units.

—Spent mist eliminator packing (filters) are used in the scrubber system to remove gas and acid particulates from the phosphoric acid. The filter packing material is reported to consist of polyester fibers, stainless steel, steel wool or fiberglass. The filters are periodically replaced and the spent packing is washed prior to disposal.

—Rubber liners of product storage tanks are periodically replaced.

—Spent filters for product are generated when product is filtered prior to loading into tank cars and trucks to remove settled solids. The filters are changed periodically and rinsed with water prior to disposal.

—Spent activated carbon for off-specification product is generated when carbon is used to remove traces of contaminants from the off-specification product.

—Spent filters for off-specification product is generated when filters are used to remove solids from the off-specification product.

—Wastewater treatment sludges are generated when wastewaters from the phosphoric acid and other processes are treated. These sludges are only marginally derived from phosphoric acid wastewaters due to commingling with large volumes of other non-phosphoric acid wastewaters. The solids that are removed by filtration are landfilled or sold.

Three facilities reported that they collect phosphoric acid in air pollution control devices (*i.e.,* vent scrubbers, absorbers, mist eliminator). Each site reported that they then recycle these acids into the production process. This material is continuously reused in the production process. Based on our site visits, the material is piped from the generating unit to the production process, minimizing the potential for releases to the environment prior to reuse. We evaluated all wastes generated after the materials are reused and concluded that none merited listing. Consequently, we do not believe that these materials present significant threats.

At two of the facilities, the caustic scrubber water, generated from scrubbing the air to remove hydrogen sulfide gas, is returned as makeup solution to the purification process. Based on information from one of the facilities and our site visit, the material is piped from the generating unit to the production process, and there is no significant potential for exposure. Also, process acid leaks are collected in tanks at one facility and piped back to the acid process, with no significant exposure route for this material. As stated above, we evaluated all wastes generated after the materials are reused and concluded that none merited listing. Consequently, we do not believe that these materials present significant threats.

We have organized our discussion of these wastes in terms of how they are currently managed: characteristic wastes, wastewaters, and non-characteristic solid wastes.

---

[40] One facility has shut down their phosphoric acid process and reported few wastes generated in 1998. This facility's wastes therefore are not included in the following overview, but were evaluated to determine their potential threat to human health or the environment. The details of this facility's waste generation and management practices are included in the ''Phosphoric Acid Listing Background Document for the Inorganic Chemical Listing Determination''.

d. Agency evaluation. (1) Characteristic wastes. The RCRA Section 3007 Surveys show that a number of wastes are managed as RCRA characteristic wastes at all times. These wastes are hazardous wastes because they exhibit the characteristics of corrosivity or toxicity for arsenic. We believe that these wastes are managed according to the applicable RCRA Subtitle C regulations, including LDR standards. The LDR restrictions apply prior to land disposal. Furthermore, these wastes are managed or disposed in Subtitle C management units. Table III–16 summarizes our information regarding the generation and management of these wastes.

TABLE III–16.—CHARACTERISTIC WASTES FROM PHOSPHORIC ACID PRODUCTION DISPOSED IN SUBTITLE C UNITS

Waste category	Number of reported generators	1998 Volume (MT)	Reported hazard codes	Final management practices
Arsenic filter cake	7	614	D002, D004	Subtitle C landfill
Combustion chamber slag	1	0.1	D002	Subtitle C incineration
Off-specification phosphoric acid	1	0.71	D002	Subtitle C landfill
Spent filters (from purification)	2	4.6	D004	Subtitle C incineration or Subtitle C landfill

We propose not to list these four waste categories as hazardous wastes under RCRA. All generators of these wastes already report managing these materials as hazardous from the point of generation through disposal, because they exhibit one or more of the hazardous waste characteristics. We believe that the rules applying to characteristic wastes adequately protect against mismanagement.

(2) Other characteristic waste.

TABLE III–17.—OTHER CHARACTERISTIC WASTES FROM THE PRODUCTION OF PHOSPHORIC ACID

Waste category	Number of reported generators	1998 Volume (MT)	Reported hazard codes	Sequential management practices
Phosphoric acid spills	2	2.2	D002	(1) Neutralized, (2) roll-off bin, (3) Subtitle D landfill; (1) Tanks, (2) neutralized in surface impoundment, (3) NPDES

We assessed the specific management practices employed for this wastestream, as summarized in Table III–17, and determined that no exposure scenarios of concern exist. One facility reported that the wastestream is managed as hazardous (D002), neutralized, and disposed of in a Subtitle D landfill. These product spills are expected to be mostly phosphoric acid, which is hazardous because it is corrosive. The facility effectively treats and neutralizes these wastes prior to disposal. There is no significant risk expected from the disposal of the small volume (0.5 MT/yr) of treated spills to the landfill.

The second facility reported placing the untreated spills into its wastewater treatment system, which includes both tanks and impoundments. Again, we expect that this waste presents hazards because of its corrosivity, not because it contains hazardous constituents. We do not expect releases to groundwater from tanks because we assume that they function effectively. With regard to the surface impoundment, we note that the facility has estimated that these small volume spills make up less than 0.001% of the total wastewater volumes. We expect that dilution of this magnitude would effectively treat the spills rapidly. Further, the facility reported that the wastewaters in the impoundment are neutralized. Consequently, we do not anticipate that any potential releases from the surface impoundment would pose a significant threat to groundwater. Ultimately, the spills are discharged, along with the much larger volume of wastewaters generated on-site, to surface waters under a NPDES permit, which provides effective control and an exemption from RCRA regulations. We also note that we expect no release of constituents of concern to the air from either the tank or the impoundments, because the waste contains no volatile constituents.

(3) Wastewaters. Wastewaters are generated at various points in the process as a result of scrubbing operations, equipment cleanup, and management of leaks and spills. As reported by the facilities, the primary constituents of concern in these wastewaters are phosphoric acid and traces of hydrogen sulfide, which are readily treated and controlled via neutralization. Phosphoric acid, when neutralized, forms various phosphate salts, none of which are known to pose a significant risk to human health and the environment. Similarly, hydrogen sulfide is neutralized to form nonvolatile salts. All facilities report that these wastewaters comprise very small portions of the overall wastewater treatment throughput, which contains wastewaters from other unrelated on-site processes. Table III–18 summarizes our information on these wastewaters.

TABLE III–18.—WASTEWATERS FROM PHOSPHORIC ACID PRODUCTION

Waste category	Number of reported generators	1998 Volume (MT)	Reported hazard codes	Sequential management practices
Caustic scrubber water	1	36	none	(1) pretreatment in covered tanks, (2) POTW

TABLE III–18.—WASTEWATERS FROM PHOSPHORIC ACID PRODUCTION—Continued

Waste category	Number of reported generators	1998 Volume (MT)	Reported hazard codes	Sequential management practices
Cleanup water	1	small volume (volume not reported)	none	(1) pretreatment in covered tanks, (2) POTW
Process acid leaks	1	25[1]	none	(1) pretreatment in covered tanks, (2) NPDES

[1] The 25 tons include leaks from eight processes, of which one is phosphoric acid production. The individual volume of leaks from phosphoric acid production is unknown.

We have assessed the management practices employed for these wastes and determined that no exposure pathway of concern exists. We believe these wastewaters will continue to be managed in existing tank-based treatment systems. We believe the manufacturers have made a considerable investment in wastewater treatment systems using tanks and will continue to use them. Further, we assumed that wastewater treatment tanks retain sufficient structural integrity to prevent wastewater releases to the subsurface (and therefore to groundwater), and that overflow and spill controls prevent significant wastewater releases. Thus, based on the lack of any significant likelihood of release of the constituents to groundwater, we did not project significant risks to groundwater from these wastes in the tank-based wastewater treatment scenario. Furthermore, discharges to POTWs and surface waters under NPDES are regulated under the Clean Water Act and are exempt from RCRA Subtitle C regulation and thus were not assessed.

We also considered the possibility of air releases from tanks. The only potential volatile constituent of concern in these wastes is hydrogen sulfide. The treatment processes employed are designed to neutralize this compound, reducing the potential for volatilization. In addition, the facilities have installed tank covers, further reducing the likelihood of release to the air. As a result, we did not model releases to air from tanks from the production of phosphoric acid. Thus, we propose not to list these wastewaters as hazardous wastes under RCRA.

(4) Non-characteristic solid wastes. The phosphoric acid sector reported six waste categories that do not routinely exhibit any of the hazardous waste characteristics and that are often managed in Subtitle D landfills, as summarized in Table III–19:

TABLE III–19.—NON-CHARACTERISTIC SOLID WASTES

Waste category	Number of reported generators	1998 Volume (MT)	Reported hazard codes	Sequential management practices
Spent mist eliminator packing	5	28.4	None	(1) storage in containers, (2) treatment to control acid (washing, neutralization, or off-site stabilization by one facility), (3) recycling or disposal in Subtitle C or D landfills.
Rubber liners	2	19.8	None	(1) storage in containers, (2) Subtitle C incineration or neutralization before Subtitle D landfill.
Spent filters for product	1	0.5	None	(1) storage in containers, (2) off-site stabilization, (3) Subtitle D landfill.
Spent activated carbon for off-specification product.	1	[1] 3	None	(1) storage in containers, (2) off-site stabilization, (3) Subtitle D landfill.
Spent filters for off-specification product	1	0.5	None	(1) storage in containers, (2) off-site stabilization, (3) Subtitle D landfill.
Wastewater treatment sludges	3	[2] 0.005	None	(1) storage in containers, (2) Subtitle D landfill.

[1] 1996 volume; none generated in 1997 or 1998.

[2] Two facilities did not report volumes due to very small input of phosphoric acid production wastes to the WWT system; one facility estimated that 0.0001% of 4,640 MT sludge generated (or 0.005 MT) was from phosphoric acid production.

The spent mist filters collect phosphoric acid mist before arsenic trisulfide is precipitated out. The material which condenses in the filters is expected to be corrosive and may contain some arsenic. However, the material used for filter packing in the mist eliminators is typically polyester, fiberglass, or steel wool. The filter packing provides surface area for condensation, not absorption, and is not expected to accumulate waste or constituents. Thus, arsenic is not expected to adhere to the filters as condensate drops back into process. The generators treat the spent filters prior to disposal to remove or immobilize any low levels of constituents that may remain.

The rubber liners and spent filters for product are associated with food-grade products. We expect any contaminant levels to be extremely low due to purity requirements. Consequently, we believe it is unlikely that they contain any constituent at levels of concern (*i.e.,* above health-based limits for ingestion). We also note that both wastes are treated prior to disposal in landfills.

Similarly, we do not expect the spent carbon or spent filters associated with off-specification product to contain significant levels of constituents of concern. Product is classified as ‘‘off-specification’’ due to color and concentration of acid, rather than because of the presence of any contaminants. We note again that these wastes undergo treatment prior to placement in landfills. In addition, both the activated carbon, which is infrequently generated, and the off-specification filters are very low volume wastes (on an annualized basis, the spent carbon totals about 1 MT and the spent off-specification filters equal 0.5 MT).

As stated in the wastewater rationale, the wastewater contribution from the phosphoric acid process is insignificant. Therefore, the volumes of treatment sludge (and any constituents of potential concern) attributable to the phosphoric acid process are small and unlikely to present any significant risk.

We do not believe any of these materials contain significant concentrations of any contaminants of concern. Therefore, we propose not to list these wastes as listed hazardous wastes under RCRA.

8. Phosphorus Pentasulfide

a. *Summary.* We have evaluated the wastes from the production of phosphorus pentasulfide and propose not to list any wastes from this process as hazardous. These wastestreams do not meet the criteria set out at 40 CFR 261.11(a)(3) for listing a waste as hazardous. They do not pose a substantial present or potential threat to human health or the environment. We have identified no risks of concern associated with the current management of these wastes.

b. Description of the phosphorus pentasulfide industry. Phosphorus pentasulfide was produced by three facilities in the United States in 1998. Phosphorus pentasulfide is used in the manufacture of lubricating oil additives, insecticides, ore flotation agents and specialty chemicals.

The production of phosphorus pentasulfide begins by feeding liquid phosphorus and liquid sulfur into a reactor. The reaction is carefully controlled because phosphorus pentasulfide reacts violently with air forming phosphorus pentoxide and sulfur dioxide and because toxic hydrogen sulfide gas forms when phosphorus pentasulfide combines with moisture on exposure to air. To reduce this hazard, the process equipment is continuously purged with nitrogen. The phosphorus pentasulfide vapors are distilled and the liquid from the process is solidified, milled and packaged.

One facility operates its entire process under nitrogen blanket. The blanketed vessels, packaging area and tote-bin wash systems are all vented to a caustic scrubber. A second facility vents the reactor to a caustic scrubber that removes the sulfur dioxide and hydrogen sulfide and generates a blowdown wastestream. The facility has other scrubbers that remove phosphorus pentoxide from the exhaust stream and reacts it with water to produce a dilute phosphoric acid that is routed to their acid plant. The third facility fills the reactor, condenser and packaging equipment with nitrogen to prevent oxidation. This nitrogen stream is scrubbed with recirculating water to remove phosphorus pentasulfide dust. The scrubber liquor is treated and discharged.

c. Description of wastes generated by the phosphorus pentasulfide process. We have identified nine waste categories from the production of phosphorus pentasulfide that required assessment. These waste categories are described briefly and in more detail in the following subsections.

—Still residue/reactor waste is the result of impurities being left behind when the phosphorus pentasulfide is distilled to remove undesirables (high boilers). This residue consists of glassy phosphates, carbon, and iron sulfide compounds and is removed from the reactor during unit turn-around.
—Phosphorus pentasulfide scrap waste is occasionally generated during certain maintenance operations or equipment failure. This waste can also consist of commercial off-specification material and fugitive dust from the packaging operation.
—Absorbents contaminated with phosphorus pentasulfide and Therminol (benzylated ethyl benzene) are generated from cleaning up leaks during maintenance operations. The absorbent material may be in the form of floor dry (a granular material) or an absorbent pillow.
—Waste Therminol is a spent heat transfer product used for the vessels and pipes to prevent freeze up of the liquid phosphorus pentasulfide.
—Scrubber water is generated as a result of a nitrogen stream being scrubbed to remove phosphorus pentasulfide dust. The packaging equipment is filled with nitrogen to prevent oxidation.
—Caustic scrubber water is the result of the reactor, packing and tote bin wash system being vented to the scrubber to remove sulfur dioxide and residual hydrogen sulfide.
—Tote bin wash water results from cleaning the shipping containers that hold the product. The phosphorus pentasulfide residue is washed from the returned containers with water and caustic.
—Scrap sulfur is occasionally generated when making or breaking couplings to hoses where sulfur comes into the reaction.

One facility reported that they filter elemental phosphorus before feeding it to the reactor. The filter solids, called phosphorus impurities, are managed in tanks and then are piped to that facility's phosphoric acid production furnace for phosphorus reclamation. Because there is low potential for significant exposure from on-site storage prior to entry in the furnace, we did not evaluate this material further under this sector. Note that wastes generated from the production of phosphoric acid via the dry process, including this facility's phosphoric acid furnace, are addressed in section III.F.7 of today's proposal.

We have organized our discussion of these wastes in terms of how they are currently managed: characteristic wastes, wastewaters, and scrap sulfur.

d. Agency evaluation. (1) Characteristic wastes. The RCRA Section 3007 Surveys show that a number of the phosphorus pentasulfide wastes categories are managed as RCRA hazardous wastes at all times. These wastes are hazardous because they exhibit the characteristics of ignitability, reactivity or toxicity for chromium or benzene. The facility that generates the largest volume waste, phosphorus pentasulfide scrap waste, considers it to be a listed hazardous waste (U189). The surveys also show that these wastes are managed as hazardous wastes, with final disposition by incinerated in Subtitle C units. Table III–20 summarizes our information about these wastes.

TABLE III–20.—CHARACTERISTIC WASTES FROM PHOSPHORUS PENTASULFIDE PRODUCTION DISPOSED IN SUBTITLE C UNITS

Waste category	Number of reported generators	1998 volume (MT)	Reported hazard codes	Final management practices
Still residue/reactor waste	2	4.6	D003, D007	Subtitle C incineration.
Phosphorus pentasulfide scrap waste	3	67.75	D001, D003, U189.	Subtitle C incineration.
Contaminated absorbent	1	1.2 (1996)	D003	Subtitle C incineration.
Waste Therminol	1	1.4	D018	Subtitle C incineration.

We propose not to list these four waste categories as hazardous wastes under RCRA. All generators of these wastes already report managing these materials as hazardous from the point of generation through incineration because they exhibited one or more of the hazardous waste characteristics. Again, the rules applying to characteristic wastes adequately protect against mismanagement. Furthermore, ninety percent of the waste are already listed as commercial chemical product (U189). Therefore, we propose not to list these wastes.

(2) Wastewaters. Wastewaters are generated at various points in the process as a result of scrubbing operations and tote bin washing. As identified by the facilities, the primary constituents of concern in these wastewaters are phosphoric acid and hydrogen sulfide which are readily controlled via neutralization. The management practices for these wastewaters do not allow for the release of phosphoric acid and hydrogen sulfide to the environment in an undiluted or unneutralized state. Table III–21 summarizes our information on these wastewaters:

TABLE III–21.—WASTEWATERS FROM PHOSPHORUS PENTASULFIDE PRODUCTION

Waste category	Number of reported generators	1998 Volume (MT)	Reported hazard codes	Sequential management practices
Process scrubber water	1	77,377	none	(1) Sewer, (2) POTW
Caustic scrubber water	2	2,177	none	(1) Covered tanks, (2) off-site treatment, (3) NPDES; (1) Treatment in covered tanks, (2) POTW.
Tote bin wash water	2	188	(1) D003 (2) none	(1) Covered tanks, (2) off-site treatment, (3) NPDES; (1) Treatment in covered tanks, (2) POTW.

We assessed the management practices for these wastes and determined that no exposure pathway of concern exists. Thus, we propose not to list these wastes as listed hazardous wastes under RCRA. The covered tanks employed minimize potential for releases to groundwater and air. Discharges to surface waters under NPDES are exempt from RCRA regulation. Discharges to POTWs via the facility's common sewage line are excluded from RCRA (40 CFR 261.4(a)(1)(ii)).

(3) Scrap sulfur. One facility reported generation of scrap sulfur that occasionally exhibits the characteristic of TC for lead. This sulfur is managed as hazardous in a Subtitle C incinerator. The 1998 waste volume was 0.12 MT.

We do not believe this material warrants listing as hazardous waste and, therefore, propose not to list this waste as hazardous under RCRA. While this waste category was reported to periodically exhibit a characteristic, the generator always manages the waste in a Subtitle C incinerator. We believe this management practice is likely to continue because the cost to treat it as hazardous is low for such a small volume wastes, and because the waste may be TC hazardous as generated. This waste is also small volume and highly unlikely to present a significant risk.

9. Phosphorus Trichloride

a. Summary. We have evaluated the wastes from the production of phosphorus trichloride and propose not to list any wastes from this process as hazardous wastes. These wastes do not meet the criteria set out at 40 CFR 261.11(a)(3) for listing a waste as hazardous. They do not pose a substantial present or potential threat to human health or the environment. We have identified no risks of concern associated with the current management of these wastes.

b. Description of the phosphorus trichloride industry. Six facilities in the United States reported producing phosphorus trichloride in 1997 or 1998. We are assessing wastes from the five facilities that still produce this product.[41]

Phosphorus trichloride is used as an intermediate in the production of a variety of chemicals. These chemicals are used to make pesticides, herbicides, antiscaling additives, corrosion inhibitors for cooling towers and heat exchangers, surfactants, sequestrants, and textile-treating agents. Phosphorus

---

[41] One facility discontinued production as of November 1999 and has no future plans to resume production of phosphorus trichloride. This facility's wastes therefore are not included in the following overview, but were evaluated to determine their potential threat to human health or the environment. The details of this facility's waste generation and management practices are included in the ''Phosphoric Acid Listing Background Document for the Inorganic Chemical Listing Determination.''

trichloride is used as a raw material in the production of chemicals that are used extensively as lubricating oil additives to control corrosion and as antioxidants and flame retardants in plastics.

Phosphorus trichloride (PCl_3) is a clear, volatile liquid with a pungent, irritating odor. Phosphorus trichloride is produced by one basic process. Liquid phosphorus and chlorine gas are continuously introduced into a reaction vessel. The phosphorus trichloride vapor phase is purified in a packed column and then liquified in a condenser. Most raw material impurities remain in the reactor and are removed as solid waste periodically during unit turnaround. Some facilities filter the product before shipment to ensure there is no dirt or other particles in the final product.

A scrubber is used to collect materials from various points in the process. For example, hydrochloric acid and phosphorus acid (H_3PO_3), the hydrolysis products of phosphorus trichloride vapors are vented to the scrubber from the reactor. Also, phosphorus trichloride vapor generated during transfer of the product into shipping containers is collected and vented to the same scrubber. The wastewater generated from the scrubber(s) is commingled with miscellaneous wastewaters (*e.g.,* reactor washout, spent filter wash, process area wash water) and sent for treatment. Some facilities generate a wastewater treatment sludge from the cleanout of treatment tanks. All of these facilities produce a variety of other products that are outside the scope of today's rule, and they commingle the wastewaters from PCl_3 production with wastewaters from other processes.

c. What kinds of wastes are generated by this process?. We have organized our discussion of these wastes in terms of how they are currently managed: characteristic wastes, wastewaters, recycled phosphorus, and non-characteristic non-wastewaters. The wastes generated by this process include:

—Reactor cleanout sludge consists of impurities from the elemental phosphorus and chlorine raw materials, including high boiling impurities such as arsenic trichloride that are retained in the reactor. These materials are sent to Subtitle C incinerators.

—Initial washout water from reactor is generated as a result of rinsing out the reactor after sludge removal. In one case, the reactor is cleaned with hot water only and there is no initial sludge removal step. These materials are treated and discharged to an POTW and under a NPDES permit.

—Product storage tank cleanout with nonreactive phosphate ester is the rinsate generated from cleaning the storage tank or equipment. When this rinse is done, the rinsate is drummed for off-site disposal as a hazardous waste.

—Product storage tank cleanout with water is generated as a result of additional rinsing that follows phosphate ester rinsing. This potentially acidic rinse water is sent to wastewater treatment for neutralization.

—Spent filter washwater for product is generated as the result of washing the spent filters used to remove dirt and particles from the product. This wash water is mixed with other wastewaters and sent to wastewater pretreatment.

—Process area wash water consists of pad washdown/rain water and any spilled material collected in contained areas. This wash water is mixed with other wastewaters and sent to wastewater pretreatment.

—Final washout water from reactor is the rinsate from additional reactor washing after sludge removal. The one facility reporting this rinsate commingles it with other wastewaters prior to wastewater pretreatment.

—Caustic scrubber water consists of small amounts of sodium salts and residual caustic. Phosphorus trichloride, acid vapors, traces of chlorine and carbon dioxide are vented from various points of the process. The vent releases mixed with air are scrubbed before the air is released to the atmosphere. The spent scrubber charge is sent along with other wastewaters to wastewater pretreatment.

—Process scrubber water consists of a weak acidic solution from scrubbing residual gases from distillation and from various storage tank vents.

—Spent filters for product are generated due to filtering dirt and other particles from the product before shipment. The filters are washed and dried before disposal.

—Wastewater treatment sludges are generated when wastewaters from the phosphorus trichloride and other processes are biologically treated. These sludges are only marginally derived from phosphorus trichloride wastewaters due to commingling with large volumes of other non-phosphorus trichloride wastewaters. The solids that are removed by filtration are landfilled.

One facility reported recycling three secondary materials: phosphorous storage tank sediment; phosphorous transfer water; and absorber residual. The phosphorous storage tank sediment is generated periodically when the phosphorus storage tanks are cleaned. Because the material is stored in containers prior to being sent off-site for recovery of phosphorus we found low potential for significant exposure from on-site storage. The phosphorous recovery process is outside the scope of the consent decree so we did not evaluate its wastes. At this same facility, raw material phosphorous is unloaded from rail cars and conveyed through the facility using a closed pressurized piping system that uses water to push the phosphorous in the piping system. To unload the phosphorous from each rail car, water is pumped into the rail car to push the phosphorous out. Because the phosphorous/water filled rail cars are then returned to the phosphorous manufacturers, where the phosphorous is then recovered, we found no potential for significant exposure, and did not evaluate this material further. The third instance of recycling at this facility, gases vented from the product check, storage tanks, and reflux separator are collected in an absorber. The vapors from the absorber are captured in a caustic scrubber and sent to wastewater treatment (see wastewaters in section d(2) below). According to the facility, the non-vapor phosphorous trichloride residual from the absorber is collected and piped to a non-consent decree production process where the phosphorous trichloride is incorporated into the non-consent decree product. Because this material is piped from the phosphorous trichloride process to the non-consent decree process, and there is no significant potential for exposure, we did not evaluate this residual further.

d. Agency evaluation. We have organized our discussion of these wastes in terms of how they are currently managed: characteristic wastes, non-characteristic wastewaters, and non-characteristic solid wastes.

(1) Wastes that are characteristically hazardous wastes. Many of the phosphorus trichloride producers stated that a number of their wastes exhibit RCRA characteristics. These wastes are hazardous wastes because they exhibit the characteristics of ignitability, corrosivity, reactivity or toxicity. The Toxicity Characteristic was reported for arsenic, cadmium, chromium, lead, mercury, selenium or silver.

These characteristic wastes are subject to the applicable LDR standards. Furthermore, these wastes are ultimately disposed in Subtitle C management units or as discharges regulated under the Clean Water Act. We believe that the applicable Subtitle C and Clean Water Act regulations adequately protect against mismanagement.

Table III–22 summarizes our information about these wastes.

TABLE III–22.—CHARACTERISTIC WASTES FROM PHOSPHORUS TRICHLORIDE PRODUCTION

Waste category	Number of reported generators	1998 Volume (MT)	Reported hazard codes	Sequential management practices
Reactor cleanout sludge	4	[1] 66	D001–004, D006–009, D010, D011.	(1) container (2) Subtitle C incineration
Initial washout water from reactor	4	[1] 478	(1) D002, D004, D006, D007. (2) D002, D004 (3) D004, D007	(1) off-site pretreatment, (2) POTW; (1) neutralized in tanks, (2) surface impoundment, (3) biotreat in tank, (4) NPDES; (1) tank, (2) off-site biotreatment, (3) NPDES
Product storage tank cleanout with nonreactive phosphate ester.	1	10	D002, D003	(1) container (2) Subtitle C incineration
Product storage tank cleanout with water	1	15	D002	(1) neutralized in tanks, (2) NPDES
Spent filter wash for product	1	15	D002	(1) pretreatment in tanks, (2) NPDES
Process area wash water	1	1,400	D002	(1) tanks, (2) NPDES

[1] Volumes from 1996 or 1997 are included in the totals when the wastes were not generated by a facility in 1998.

For all but one of the wastes in the above table, the generators report managing these materials as hazardous from the point of generation through disposal (or the point at which they become discharges to surface water regulated under NPDES or POTW regulations). We believe these wastes are sufficiently regulated such that mismanagement is unlikely. Thus, we propose not to list these seven waste categories.

One facility appears to treat initial washout reactor water in tanks and then pass it through a nonhazardous waste surface impoundment. (All other units used to manage this waste have RCRA permits or are exempt from permitting.) While we have no analytical data on the treated waste that enters the impoundment, we do not believe this waste is likely to pose significant risk. The waste is generated infrequently (once a year) and combined with wastewaters from other processes. Based on information supplied by the facility, we estimated that the washout water would be diluted at least a hundred-fold by the daily throughput to the wastewater treatment system. Any potential releases from the impoundment after dilution with other wastewaters would be unlikely to result in any significant long-term risk. Therefore, we believe that this specific waste also does not pose significant threats to human health or the environment.

(2) Non-characteristic wastewaters. Wastewaters are generated at various points in the process as a result of scrubbing operations, equipment cleanup, and washing the process area. According to the data submitted by the facility, the primary constituents of concern in these wastewaters are hydrochloric acid and phosphorous acid, which are readily controlled via neutralization. The management practices for these wastewaters minimize opportunities for the release of hydrochloric acid or phosphorous acid to the environment in an undiluted or unneutralized state. Table III–23 summarizes our information on these wastewaters.

TABLE III–23.— WASTEWATERS FROM PHOSPHORUS TRICHLORIDE PRODUCTION

Waste category	Number of reported generators	1998 Volume (MT)	Reported hazard codes	Sequential management practices
Final washout water from reactor	1	not reported	none	(1) pretreatment in tanks, (2) POTW.
Caustic scrubber water	3	4,236 [1]	none	(1) pretreatment in tanks, (2) POTW or NPDES.
Process scrubber water	3	12,528 [1]	D002 (one facility).	(1) pretreatment or neutralized in tanks, (2) POTW or NPDES.

[1] Volumes from 1996 or 1997 are included in the totals when the wastes were not generated by a facility in 1998.

We have assessed the management practices employed for these wastes and determined that no exposure pathway of concern exists that warrants listing. We have determined that plausible management would be continued management in existing tank-based treatment systems. We believe the manufacturers have made a considerable investment in wastewater treatment systems using tanks and will continue to use them. Further, we assumed that wastewater treatment tanks retain sufficient structural integrity to prevent wastewater releases to the subsurface (and therefore to groundwater), and that overflow and spill controls prevent significant wastewater releases. Thus, based on the lack of any significant likelihood of release of the constituents to groundwater, we did not project significant risks to groundwater from these wastes in the tank-based wastewater treatment scenario. Furthermore, discharges to POTWs and surface waters under NPDES are regulated under the Clean Water Act and are exempt from RCRA Subtitle C regulation and thus were not assessed.

We also considered the possibility of air releases from tanks. For most wastes, the constituents of concern are nonvolatile metals, making volatilization a very unlikely pathway of release from tanks. In addition, the facilities have installed tank covers, further reducing the likelihood of release to the air. As a result, we did not model releases to air from tanks from the production of phosphorus trichloride. Thus, we propose not to list these wastewaters as hazardous wastes under RCRA.

(3) Non-characteristic non-wastewaters. The phosphorus trichloride sector reported two waste categories that do not routinely exhibit any characteristic and that are often managed in Subtitle D landfills; these wastes are summarized in Table III–24.

TABLE III–24.—NON-CHARACTERISTIC SOLID WASTES

Waste category	Number of reported generators	1998 Volume (MT)	Reported hazard codes	Management practices
Spent filters for product	1	0.1	none	industrial Subtitle D landfill.
Wastewater treatment sludges	4	[1] 1,100	none [2]	Subtitle D landfill or Subtitle C landfill.

[1] Volumes from 1997 are included in the totals when the wastes were not generated by a facility in 1998.

[2] One facility reported that this wastewater treatment sludge is occasionally characteristically hazardous for D028 (dichloroethane), and the waste is then sent to a Subtitle C landfill. The dichloroethane is used in a process unrelated to the phosphorus trichloride process of interest in today's proposal.

The phosphorus trichloride product is filtered to remove PCl_4 and PCl_5. These compounds produce a slime on the product and are more viscous than the product. The facility washes the filters before sending them to disposal. The contaminants are easily washed off because of their ready solubility in water. The spent filters are generated in very small volumes. We are proposing not to list them because we do not expect the washed filters to contain significant levels of contaminants of concern.

All four of the facilities that generate wastewater treatment sludges commingle wastewaters from PCl_3 production with wastewaters from other processes. The wastewater contribution from the phosphorus trichloride process is very small compared to volumes of wastewaters from the other processes. Therefore, the phosphorus trichloride process does not contribute significant amounts of constituents to this sludge.

We do not believe any of these materials warrant listing as hazardous wastes from the production of phosphorus trichloride. Therefore, we propose not to list these wastes as hazardous wastes under RCRA in this rulemaking.

10. Potassium Dichromate

a. Summary. We evaluated the wastes from the production of potassium dichromate and propose not to list any wastes from this process as hazardous wastes under RCRA. These wastes do not meet the criteria set out at 40 CFR 261.11(a)(3) for listing as hazardous. They do not pose a substantial present or potential hazard to human health or the environment.

b. Description of the potassium dichromate industry. Potassium dichromate, which has a wide variety of industrial uses, was produced by a single facility in the United States in 1998. The U.S. demand for this chemical is very limited and has mostly been replaced by sodium dichromate for industrial use. Any demand not met by the U.S. facility is met by imports to U.S. distributors. Potassium dichromate is produced by reacting chromium trioxide with potassium hydroxide. The reactants are mixed in a reactor along with a crystal modifier. The potassium dichromate is crystallized, sent through a centrifuge to remove any remaining mother liquor, dried and packaged for sale. The single waste is filtered out from the mother liquor. The mother liquor is recycled back into the process.

c. What kinds of wastes are generated by this process? There is one waste category generated from this process: filter solids and spent filter media. According to data submitted by the facility, this waste typically contains 12.5 percent chromium. The facility reports the waste as hazardous for chromium and manages it as hazardous (D007). The reported waste volume for 1998 was 0.6 MT. The waste is stored on-site in drums and is shipped off-site to a commercial Subtitle C facility for stabilization to meet the land disposal restrictions (40 CFR 268.40 and 268.48) and final disposal in a Subtitle C landfill. Because the total chromium levels are so high, we believe this waste will always exhibit the toxicity characteristic.

d. Agency evaluation. We propose not to list this waste as hazardous under Subtitle C of RCRA. This waste is currently managed as hazardous from the point of generation through ultimate disposal because it is characteristically hazardous. The composition of the waste is such that it is likely to always be characteristic for chromium. The rules applying to characteristic wastes adequately protect against mismanagement.

11. Sodium Chlorate

a. Summary. We propose not to list any wastes from the production of sodium chlorate ($NaClO_3$) as hazardous under Subtitle C of RCRA. Process sludges, spent filters, wastewaters and hydrogen gas are generated from the production of sodium chlorate. These wastes and materials are managed in a variety of ways. After analysis of the management practices and potential exposure pathways of these wastes and materials, we concluded that there are no risk pathways of concern. These wastes and materials do not meet the criteria set out at 40 CFR 261.11(a)(3) for listing as hazardous. They do not pose a substantial present or potential hazard to human health or the environment.

b. Description of the sodium chlorate industry. There were ten facilities producing sodium chlorate in 1999. This industry manufactures sodium chlorate crystals and solutions from electrolysis of a sodium chloride brine.

Sodium chlorate is the raw material used for the production of chlorine dioxide, which is replacing chlorine and sodium hypochlorite to be used as an oxidizing bleaching agent by the pulp and paper industry. The replacement of elemental chlorine with chlorine dioxide reduces effluent emissions of dioxin formed in the bleaching process of paper and pulp. Approximately ninety-eight percent of sodium chlorate is used to generate chlorine dioxide. The other important use of sodium chlorate is as an intermediate in the production of other chlorates, perchlorates, and chlorites.

All ten facilities use a similar process in producing sodium chlorate. These facilities dissolve sodium chloride salt in water to create a liquid brine. The brine is treated to remove impurities, such as calcium carbonate and magnesium hydroxide. The treated brine is filtered and pumped into electrolytic cells. In the cells, sodium chloride is converted to chlorine and sodium hydroxide which further react to form sodium chlorate and hydrogen gas. This reaction is catalyzed by sodium dichromate. Sodium chlorate is then treated with heat and urea to remove residual sodium hypochlorite. Sodium chlorate is then processed further for crystallization, centrifuging, drying, and packaging. A more complete discussion of this process and the industry can be found in ''Sodium Chlorate Listing Background Document for the Inorganic Chemical Listing Determination'' in the docket for today's proposal.

c. What kinds of wastes are generated by this process? Wastes generated from the production of sodium chlorate consist of process sludges, spent filters and wastewaters. Based on an evaluation of survey responses from the ten sodium chlorate producers, we divided the wastes further into six general waste categories based on the presence or absence of chromium and lead. The sodium chlorate industry in general characterizes wastes that have been in contact with chromium or lead as hazardous (D007 or D008). Chromium is introduced into the process by the addition of sodium dichromate into electrolytic cells to protect electrodes from corrosion and to improve product yields. The presence of lead in the wastes results from the deterioration of anodes that can be used in the electrolytic cells. The six waste categories are:

—Process sludges with chromium or lead. These include electrolytic cells sludge, product filter press sludge, and those brine treatment sludges generated from purification where brine is formed by mixing salts with chrome-laden wastewaters recycled from various steps of the process.

—Process sludges without chromium and lead. These wastes include filter press sludge or drum sludge from treatment of brine, when recycled chrome-laden wastewater is not used in the brine dissolution step.

—Spent filters with chromium or lead. The filters are generated at several points in the production process, but most are generated after the electrolysis of the brine solution when the mother liquor is filtered to remove impurities.

—Spent filters without chromium and lead. Examples include disposable cartridge and sock filters from treatment of brine, when recycled chrome-laden wastewater is not used in the brine dissolution step.

—Wastewaters with chromium that are not recycled back to the process.

—Other wastewaters that do not contain chromium or lead and are not recycled (condensate, cooling water, and ion-exchange wastewater).

In addition to these wastes, other materials are produced by all ten facilities during the production of sodium chlorate that are piped directly back to the production process. Scrubber waters and filtrates are piped to on-site sodium chlorate production units for use. Because these materials are managed prior to reuse in ways that present low potential for releases to the environment, and because we evaluated process wastes generated after they are reused, we do not believe that these secondary materials present significant threats. At all ten facilities, hydrogen gas is produced by the electrolysis units and is either piped to on-site boilers, vented, or in one case, piped to a compression plant where it is compressed and sold. Because the material is a gas produced from a production unit rather than a waste management unit and is conveyed to its destination via piping, the gas is not a solid waste. RCRA Section 1004(27) excludes non-contained gases from the definition of solid waste and thus they cannot be considered a hazardous waste. (See 54 FR 50973) Because the gaseous materials are not solid wastes when produced, we did not evaluate them further for purposes of listing.

One facility reports generating a wastewater (sulfate solution) from brine treatment. The wastewater is transported to an off-site facility and used in their black liquor pulping process. The sulfate solution is added to black liquor for use in a wood digester. The process in the digester is outside the scope of the consent decree and we have not evaluated risks from wastes that it produces. We note, however, that the reuse of black liquor is excluded from regulation (40 CFR 261.4(a)(6)). The sulfate solution is stored in tanks prior to use in the pulping process, which minimizes the potential for releases.

How Are These Wastes Currently Being Managed?

Table III–25 summarizes the six waste categories, waste characteristics, waste volumes, and their current management practices:

TABLE III–25.—WASTE FROM SODIUM CHLORATE PRODUCTION

Waste category (number of facilities)	Reported Waste Codes[1]	1998 Volume (MT)	Management practices
Process sludges with chromium or lead (10).	D001, D002, D007, D008	28,547	Nine facilities store the waste on site in containers and then send it to Subtitle C landfills or incinerators; one facility decharacterizes the waste in tanks before managing it in on-site surface impoundments. Two facilities did not report hazard codes.

TABLE III–25.—WASTE FROM SODIUM CHLORATE PRODUCTION—Continued

Waste category (number of facilities)	Reported Waste Codes[1]	1998 Volume (MT)	Management practices
Process sludges without chromium and lead (5[2]).	none reported	1,886	Three facilities store the waste on site in containers and then send it off-site to municipal Subtitle D landfills; one facility stores the waste on a concrete pad with secondary containment before applying it to an on-site land farm; one facility stores the waste on site in containers and then sends it off-site to an industrial Subtitle D landfill; one facility stores the waste on site in containers before sending it off-site for recycling.
Spent filters with chromium or lead (7)	D001, D007, D008	82.9	All seven facilities classify the waste as hazardous; six send the waste to Subtitle C landfills or incinerators; one facility decharacterizes the waste on-site in tanks, stores it in a closed compactor, then ships the waste off-site to an industrial Subtitle D landfill.
Spent filters without chromium and lead (4).	none reported	3.52	Three facilities store the waste on site in containers and send it off-site to Subtitle D landfills. One facility stores the waste with process sludge in on-site containers and then sends it off-site to a Subtitle C facility for stabilization prior to disposal in a Subtitle C landfill.
Wastewaters with chromium that are not recycled back to the process (2).	D002, D007	26,736	One facility sends the wastewater to an off-site Subtitle C facility for treatment and disposal. One facility combines and treats the wastewater with other process wastewaters in tanks prior to discharge to on-site surface impoundments.
Other wastewaters that do not contain chromium or lead and are not recycled (condensate, cooling water, ion-exchange wastewater).	none reported	10,744[3]	Discharged via NPDES permit or to a POTW.

[1] D001 (ignitability); D002 (corrosivity); D007 (chromium); D008 (lead).
[2] One facility contributes more than one residuals to this waste group.
[3] Two facilities did not report volumes of this wastewater.

d. Agency evaluation. We selected wastes from three facilities for sampling. As described in detail in ''Sodium Chlorate Listing Background Document for the Inorganic Chemical Listing Determination'' in the docket for today's proposal, we selected these facilities and wastes because based on the survey information collected, we believe that the wastes generated by these three facilities are fully representative of the wastes generated by this industry and their management practices.

We evaluated the characteristics and current management practices of each of the six waste categories. The details of our evaluation follow.

(1) Process sludge with chromium or lead.

How Is This Waste Managed?

The predominant source of process sludge with chromium or lead is from the periodic cleanout of electrolytic cells used to convert the brine solution to sodium chlorate. All ten facilities generate this waste. Seven facilities classify their wastes as characteristic and send it off-site to Subtitle C landfills or incinerators. Two facilities do not classify their wastes as characteristic but nevertheless send their wastes to Subtitle C landfills.

The tenth facility, located in Hamilton, Mississippi, reports this waste to be characteristic and treats it in tanks to reduce hexavalent chromium to the relatively stable trivalent state. The facility commingles this sludge with wastes from the production of titanium dioxide (TiO_2) in these tanks. The treated mixture is subsequently managed in a series of four surface impoundments, three of which are lined with leachate collection systems. Today's proposal separately addresses the titanium dioxide wastes that are commingled with this sodium chlorate sludge (see section III.F.14.c.(14)).

How Was This Waste Characterized?

We collected a total of six samples to assess this waste categories. Three samples of the sludge from electrolytic cells were collected at two facilities where the wastes were destined for Subtitle C treatment and disposal. These two facilities generate and manage this waste as characteristically hazardous. These samples were part of the record characterizing this waste category, but were not used for risk assessment.

We collected another three samples from the Hamilton, Mississippi facility that classifies this waste as characteristically hazardous and treats it in tanks to remove the characteristic prior to pumping the effluent to on-site surface impoundments. One sample (KM–SC–01) reflects the untreated sodium chlorate sludge collected from a dedicated sump prior to commingling with the titanium dioxide wastewaters. The second sample (KM–SI–01) is the treated combined wastes collected at the inlet to the surface impoundments. The third sample (KM–SI–04) is the treated commingled sludge collected from one of the on-site surface impoundments.

Table III–26, below, represents the analytical results for the Hamilton, Mississippi samples for total and hexavalent chromium, the primary constituent of concern. Total constituent analyses were conducted for the untreated waste. No other toxicants in the untreated wastewater sample (KM–SC–01) exceed the health-based levels. For the treated waste and the sludge collected from the impoundment, total and leaching analyses were conducted to allow us to assess potential releases to the environment. Our analytical data shows that total hexavalent chromium level in the treated sample (KM–SI–01) is below the HBL for hexavalent chromium, demonstrating the effectiveness of the treatment process. We assessed the treated commingled sludge settled in the impoundments and found that the chromium levels did not exceed the HBLs.

TABLE III–26.—ANALYTICAL DATA FOR SODIUM CHLORATE

Constituents of concern	KM–SC–01 (Untreated NaC1O$_3$ wastes only)	KM–SI–01 (Treated commingled NaC1O$_3$ and TiO$_2$ wastes)		KM–SI–04 (Treated commingled NaC1O$_3$ and TiO$_2$ sludge in impoundment)		HBL
	Total (mg/1)	Total (mg/kg)	SPLP (mg/l)	Total (mg/kg)	SPLP (mg/l)	
Chromium	0.99	31.1	<0.05	1,140	0.05	23
Hexavalent Chromium	0.85 L	<0.02	<0.02	<0.8	0.03	0.05

L: Concentration reported from analysis performed outside method recommended holding time. Value should be considered biased low.

The total chromium concentration in the treated waste is higher than the untreated waste due to commingling with other wastes from the titanium dioxide production process. There are other constituents detected in the treated commingled waste sample (KM–SI–01) that are attributable to the titanium dioxide production process; these constituents are assessed in section III.F.14.c.(14) of today's proposal.

What Is EPA's Listing Rationale for This Waste?

We propose not to list this waste category. Seven facilities consider wastes in this category to be characteristically hazardous (for D001, D002, D007 or D008) and manage the wastes under Subtitle C regulations. We believe that these regulations adequately protect against mismanagement. Two facilities do not classify their wastes as characteristic but send them to Subtitle C landfills. We also believe that this practice adequately prevents mismanagement. The remaining facility (which does not identify its sludges as characteristic hazardous wastes) treats the sludge in tanks to reduce hexavalent chromium to trivalent chromium prior to placement in on-site surface impoundments. We found that the waste did not pose risks during treatment because there are no exposure pathways of concern for the on-site treatment tanks. The wastes are treated in concrete tanks with secondary containment which minimize potential releases to groundwater. We also are not concerned with potential air releases from these tanks as neither volatile contaminants nor airborne particulates are likely to be present in the wastes. As discussed above, the primary constituent of concern in this waste is hexavalent chromium, which is treated to form relatively stable trivalent chromium. The physical form of the wastes (*i.e.,* sludge with high water content) eliminates the potential for a significant release of airborne particulates. Furthermore, our analytical data show that the waste, after treatment, does not contain any constituents of concern at levels exceeding health-based levels.

(2) Process sludge without chromium and lead.

How Is This Waste Managed?

This sludge is produced as part of the initial purification of the brine solution. Five facilities report generating this type of waste and managing it as nonhazardous. Four facilities manage the waste in an on-site land farm, off-site municipal Subtitle D landfills, and an industrial Subtitle D landfill. One facility ships their waste off-site for recycling.

We collected a total of four samples of this waste category from two facilities. Two of the four samples (HT–SN–01 and EC–SN–03) are representative of wastes that are land disposed. The other two samples (EC–SN–01 and EC–SN–02) are representative of wastes that are generally recycled and occasionally also landfilled. Table III–27 identifies the constituents of concern that we found to be present in the waste at levels exceeding their respective HBLs and/or soil screening levels.

TABLE III–27.—ANALYTICAL RESULTS FOR SODIUM CHLORATE PROCESS SLUDGE WITHOUT CHROMIUM AND LEAD (PPM)

Parameter	HT–SN–01			EC–SN–03			EC–SN–01			EC–SN–02			HBL	[1]SSL
	Total	TCLP	SPLP	Total	TCLP	SPLP	Total	TCLP	SPLP	Total	TCLP	SPLP		
Arsenic	14.3	[2]0.03	<0.05	<5	<0.005	<0.05	<5	<0.005	<0.05	<5	<0.005	<0.05	0.0007	5.2
Cadmium	27.4	<0.05	<0.05	<5	<0.05	<0.05	<5	<0.05	<0.05	<5	<0.05	<0.05	0.0078	4.3
Chromium	57.3	<0.05	<0.05	15.3	<0.05	<0.05	<5	<0.05	<0.05	10.1	<0.05	<0.05	23	37
Copper	17.2	<0.25	<0.05	15.3	<0.05	<0.05	<5	<0.25	<0.05	5.3	<0.25	<0.05	1.3	17
Lead	14.8	0.024	<0.03	139	<0.03	<0.03	19.3	0.12 E	0.001	34.9	0.05 E	0.002 E	0.015	400*
Manganese	69.2	0.08	<0.05	238	4.5	<0.05	125	0.5	<0.05	51.9	0.7	<0.05	0.73	330
Mercury	0.5 L	<0.002	<0.0002	<0.1	<0.002	<0.0002	<0.1	<0.002	<0.0002	<0.1	<0.002	<0.0002	0.0047	24*
Nickel	7.4	<0.2	<0.05	12.1	0.4	<0.05	<5	<0.2	<0.05	<5	<0.2	<0.05	0.31	13
Silver	1.1	<0.1	<0.01	<1	<0.1	<0.01	<1	<0.1	<0.01	<1	<0.1	<0.01	0.078	400*
Zinc	111	<2	<0.5	279	10.6	<0.5	<50	<2	<0.5	<50	<2	<0.5	4.7	48

[1] SSL: Soil Screening Level based on geometric mean background concentration (mg/kg) in soils in conterminous U.S. or soil ingestion HBL (marked *).

[2] Results are less than the typical laboratory reporting limit, but are greater than the calculated instrument detection limit.

E: Analysis performed outside recommended holding time. Reported value should be considered as estimated.

What Management Scenarios Did We Aassess?

We evaluated wastes managed under the four identified management scenarios: on-site land farm, municipal Subtitle D landfill, industrial Subtitle D landfill, and recycling.

Land farm scenario. One facility reports managing 37 MT/year of this waste in an on-site permitted land farm. EPA previously assessed this same land farm as part of the chlorinated aliphatics listing determinations (see proposed rule at 64 FR 46475, August 25, 1999). Today's assessment of sodium chlorate waste placed in the same unit is based on our earlier modeling of this unit for a waste from the production of chlorinated aliphatics (EDC/VCM sludges).

In assessing this management scenario, we first compared the total constituent concentrations of all four record samples to background soil concentrations. The following metals exceeded this screening criteria: arsenic, cadmium, chromium, copper, lead, mercury, silver, and zinc. We then used the metal modeling results generated from the chlorinated aliphatics listing determination to calculate the proportional sodium chlorate risk. The calculated modeling results of arsenic, cadmium, hexavalent chromium, and zinc for the same land farm are all below a hazard quotient (HQ) of 1 and 10^{-6} risk thresholds for the land treatment scenario. Finally, we compared the total concentrations of copper, lead, mercury, and silver of all samples to the soil ingestion HBL because these constituents were not assessed in the chlorinated aliphatics risk analyses. The maximum total concentrations of lead, mercury, and silver are well below the soil ingestion HBL, and the maximum total concentration of copper in this waste (*i.e.,* 17.2 mg/kg) is very close to the soil ingestion HBL (*i.e.,* 17 mg/kg). We believe that after mixing with soil in the land application unit, the copper concentration in the unit will be even lower. We do not believe this waste poses risk via volatilization to the air pathway because it does not contain any significant toxic volatile chemicals. In addition, the comparison described above for this unit, where we determined that the detected waste constituents are present in the waste at levels below or very close to the soil ingestion levels, suggests that any wind blown dust from the unit should not pose risk at levels of concern.

Based on our analysis, we conclude that the waste does not present a substantial risk to human health or the environment when land applied.

Landfill scenarios. Three facilities manage their wastes in municipal Subtitle D landfills and one facility manages its waste in an industrial Subtitle D landfill.

We used the SPLP results of all four relevant samples to evaluate the industrial Subtitle D landfill management scenario. We found that the waste poses no substantial present or potential hazard to human health and the environment when managed in an industrial Subtitle D landfill because the SPLP leachate concentration of all constituents of the four samples of this waste category are below their respective HBLs.

We used the TCLP results of all four relevant samples to assess the municipal Subtitle D landfill scenario. We modeled all three volumes reported being sent to municipal Subtitle D landfills. We focused our assessment on the geological regions in the northwestern and southeastern areas of the country because of the locations of the facilities and the landfills currently being used. The constituents we modeled are arsenic, lead, manganese, nickel, and zinc. The details regarding our modeling inputs and assumptions are provided in ''Sodium Chlorate Listing Background Document for the Inorganic Chemical Listing Determination'' and ''Risk Assessment for the Listing Determinations for Inorganic Chemical Manufacturing Wastes' in the docket for today's proposal. The results of our risk assessment are summarized below in Table III–28.

TABLE III–28.—GROUNDWATER PATHWAY RISK ASSESSMENT RESULTS FOR PROCESS SLUDGE WITHOUT CHROMIUM AND LEAD

Percentile	Arsenic		Manganese		Nickel		Zinc	
	Adult cancer risk	Child cancer risk	Adult HQ	Child HQ	Adult HQ	Child HQ	Adult HQ	Child HQ
90th	3E–08	2E–08	2E–04	4E–04	2E–06	3E–06	5E–08	1E–07
95th	2E–07	2E–07	6E–04	1E–03	2E–05	3E–05	5E–06	1E–05

Based on these risk assessment results, we conclude that process sludge without chromium and lead does not pose a substantial present or potential hazard to human health and the environment when managed in municipal Subtitle D landfills. We calculated hazard quotients for non-carcinogenic compounds (lead, manganese, nickel, and zinc), and all of these were well below a value of one. We found no adult or child cancer risk for arsenic in excess of 1E–06 at the 95th percentile. Based on these results we conclude that this waste does not pose risk to human health and the environment. For a more complete description of this analysis, see ''Risk Assessment for the Listing Determinations for Inorganic Chemical Manufacturing Wastes'' in the docket for this proposal.

Recycling scenario.—One facility ships their wastes to an off-site facility for reuse. The material is added to mined gypsum used to retard the setting of concrete. We assessed this use because it involves land placement, with higher likelihood of releases to the environment. Two samples of this waste category were collected from the facility that produces and manages this waste in such a fashion. We compared this use to a less protective landfarming scenario, which we modeled, and found no risk of concern. The volume of the waste is quite small (<1%) when compared to the volume of mined gypsum used by the off-site facility. We believe that the constituent concentrations in the final cement product would be even lower due to mixing with other materials.

What Is EPA's Listing Rationale For This Waste?

Based on our assessments of the four management scenarios (on-site land farm, municipal Subtitle D landfill, industrial Subtitle D landfill, and recycling), we found that the wastes do not present a substantial risk to human health or the environment. Therefore, we propose not to list these wastes.

(3) Spent filters with chromium or lead.

How Is This Waste Managed?

Spent filters are generated at several points in the production process but most are generated after the electrolysis of the brine solution. Seven facilities report generating this waste. Six of the seven facilities report this waste to be characteristic and ship it to off-site Subtitle C landfills or incinerators. The seventh facility generates a very small volume of D007 waste that is acid-washed and decharacterized (to meet UTS) before being landfilled at an off-site industrial Subtitle D landfill.

How Was This Waste Characterized?

We collected one sample of the spent filter that was decharacterized prior to being sent to an industrial Subtitle D landfill. We did not sample any of the six facilities that already adequately managed the waste under Subtitle C regulations. Table III–29 presents the analytical results for the total and leaching analyses of the decharacterized spent filter sample (KM–FB–01) for arsenic, lead, total chromium, and hexavalent chromium. Chromium and lead are the two primary constituents of concern in wastes of this category. The sample was not collected from the facility that uses anodes with lead coating, thus lead was not present in this sample. Arsenic was the only constituent detected in the SPLP analysis of this sample at levels exceeding the HBL.

TABLE III–29.—ANALYTICAL RESULTS FOR SPENT FILTERS WITH CHROMIUM (KM–FB–01)

Parameter	Total (mg/kg)	TCLP (mg/l)	SPLP (mg/l)	Drinking water HBLs (mg/l)
Arsenic	<0.5	<0.5	[1]0.005	0.0007
Chromium	41.0	<0.05	<0.05	20
Hexavalent Chromium	16.8	[2]NA	[2]<0.022	0.05
Lead	<5	<0.5	<0.03	0.015

[1] Results are less than the typical laboratory reporting limit, but are greater than the calculated instrument detection.

[2] NA Not applicable. Typical TCLP leaching solution is not suitable for leachable hexavalent chromium because most (or all) hexavalent chromium in TCLP waste leachates were converted to trivalent chromium. The leach test for hexavalent chromium was modified by replacing the typical (TCLP/SPLP) solution with deionized water.

What Is EPA's Listing Rationale For This Waste?

As previously noted, six of the seven generators of this waste report managing their wastes in Subtitle C facilities as characteristically hazardous from the point of generation through ultimate disposal. We did not conduct risk assessment on wastes identified as hazardous wastes and managed in Subtitle C facilities because listing would not provide any significant incremental control of wastes already managed under Subtitle C. We evaluated the small volume waste (*i.e.,* 2.3 MT/yr) generated by the seventh facility that decharacterizes its waste before landfilling in an industrial Subtitle D landfill.

Because the volume of this waste is relatively small, we used a screening analysis (described in section III.E.3) to screen the potential risk to groundwater associated with landfilling this waste. We found that the SPLP data for arsenic screens out because the volume of the waste generated by the facility is insufficient to release arsenic at levels of concern. For a more complete description of this analysis, see ‘‘Risk Assessment for the Listing Determinations for Inorganic Chemical Manufacturing Wastes’’ in the docket for this proposal.

Our analytical data demonstrate that the waste is effectively decharacterized and does not pose risks warranting listing for chromium, the primary constituent of concern in this waste. The result of the screening analysis for arsenic, the only constituent present in the waste's leachate at levels exceeding the HBL, shows that the arsenic in this waste does not pose risk to human health and the environment. Therefore, we propose not to list spent filters with chromium.

(4) Spent filters without chromium and lead.

How Is This Waste Managed?

This residual is usually generated as part of the initial brine purification steps, where impurities are removed from the brine solution, and from filtering of product during packaging. Four facilities report generating this type of waste. Two of these four facilities manage their wastes as nonhazardous in municipal Subtitle D landfills. One facility manages its waste as nonhazardous in an industrial Subtitle D landfill. One facility sends their spent filters along with process sludge off-site to a Subtitle C facility for stabilization prior to disposal in a Subtitle C landfill. These wastes are generated in very small volumes.

How Was This Waste Characterized?

We collected two samples (HT–FB–01 and HT–FB–02) from one facility. These two samples are representative of wastes in this category that are land disposed. We found that antimony, arsenic, boron, hexavalent chromium, and lead in the TCLP or SPLP waste leachates exceeded their HBLs. We also found that cadmium was not detected in the leachates at a detection level of six times higher than its HBL. The detection limit was high due to dilution to minimize sample matrix interferences. Information on constituents of concern is summarized in Table III–30.

TABLE III–30.—ANALYTICAL RESULTS FOR SPENT FILTERS WITHOUT CHROMIUM OR LEAD

Parameter	HT–FB–01			HT–FB–02			HBL (mg/l)
	Total (mg/kg)	TCLP (mg/l)	SPLP (mg/l)	Total (mg/kg)	TCLP (mg/l)	SPLP (mg/l)	
Antimony	34.1	0.018	<0.005	<5	0.012	<0.005	0.006
Arsenic	7.3	0.014	0.003	5.3	<0.005	<0.005	0.0007
Boron	<50	6.1	<0.05	<50	0.67	<0.5	1.4
Cadmium	22.5	<0.05	<0.05	<5	<0.05	<0.05	0.008
Cr, +6	<0.8	NA	<0.02	2.8 L	NA	0.19 L	0.05

TABLE III–30.—ANALYTICAL RESULTS FOR SPENT FILTERS WITHOUT CHROMIUM OR LEAD—Continued

Parameter	HT–FB–01			HT–FB–02			HBL (mg/l)
	Total (mg/kg)	TCLP (mg/l)	SPLP (mg/l)	Total (mg/kg)	TCLP (mg/l)	SPLP (mg/l)	
Lead	8.7	0.024	0.06	7.1	0.020	0.012	0.015

L: Concentration reported from analysis performed outside required holding time. Value should be considered biased low.

What Management Scenarios Were Assessed?

We modeled both the industrial (0.6 MT/year) and municipal (2.8 MT/year) landfill scenarios, based on the reported management practices.

We used the SPLP leachate concentrations to evaluate the industrial landfill scenario. The constituents of concern that exceeded their respective HBLs in the SPLP results were arsenic, hexavalent chromium, and lead. We evaluated these constituents using the de minimis volume screening analysis, as described in section III.E.3 of today's proposal. The analysis suggests that hexavalent chromium and lead are not of concern. We then modeled arsenic using our standard groundwater model for the industrial landfill scenario.

We used the TCLP leachate concentrations to evaluate the municipal landfill scenario. Using the de minimis volume analysis, we screened out boron, hexavalent chromium, and lead. We then conducted full groundwater modeling for the municipal scenario for antimony, arsenic, and cadmium.

What Are the Results of EPA's Risk Assessment for This Waste When Managed in an Industrial Subtitle D Landfill?

Our risk assessment results for the industrial landfill scenario, summarized below in Table III–31, suggest that the only constituent of concern that required modeling (arsenic) does not pose a substantial present or potential hazard to human health and the environment. We found no arsenic cancer risk in excess of 1E–08 at the 95th percentile for either adult or child exposure scenarios. Therefore, we believe that this waste when managed in industrial Subtitle D landfills clearly does not warrant listing. For a more complete description of this analysis, see ''Risk Assessment for the Listing Determinations for Inorganic Chemical Manufacturing Wastes'' in the docket for this proposal.

TABLE III–31.—RISK RESULTS FOR FILTERS WITHOUT CHROMIUM AND LEAD—INDUSTRIAL SUBTITLE D LANDFILL SCENARIO

Percentile	Arsenic	
	Adult cancer risk	Child cancer risk
90th	1E–09	8E–10
95th	5E–09	4E–09

What Are the Results of EPA's Risk Assessment for This Waste When Managed in Municipal Subtitle D Landfills?

Our risk assessment results for the municipal landfill scenario, summarized below in Table III–32, suggest that the three constituents of concern (antimony, arsenic, and cadmium) do not pose a substantial present or potential hazard to human health and the environment. The hazard quotients, for both the adult and child exposure scenarios, of antimony are less than 0.01 at the 95th percentile, and of cadmium, are less than 0.001 at the 95th percentile. We found no arsenic cancer risk in excess of 1E–08 at the 95th percentile for either adult or child exposure scenarios. Therefore, we believe that this waste when managed in municipal Subtitle D landfills does not warrant listing. For a more complete description of this analysis, see ''Risk Assessment for the Listing Determinations for Inorganic Chemical Manufacturing Wastes'' in the docket for this proposal.

TABLE III–32. RISK RESULTS FOR FILTERS WITHOUT CHROMIUM AND LEAD MUNICIPAL SUBTITLE D LANDFILL SCENARIO

Percentile	Antimony		Arsenic		Cadmium	
	Adult HQ	Child HQ	Adult cancer risk	Child cancer risk	Adult HQ	Child HQ
90th	5E–04	1E–03	5E–10	4E–10	3E–05	6E–05
95th	2E–03	4E–03	5E–09	4E–09	1E–04	3E–04

(5) Wastewaters with chromium that are not recycled back to the process.

How Is This Waste Managed and How Is It Characterized?

Two facilities report generating this wastewater and characterize it as hazardous (D002 and D007). One facility generates 11 MT per year of this wastewater from its on-site laboratory testings of the electrolyte in the electrolytic cells, the excess caustic from the hydrogen purification step, and the wastewater from the production of sodium chlorate crystals. The facility stores the wastewater on-site in closed tanks before sending it off-site to a hazardous waste facility for treatment and disposal. The other facility generates 26,725 MT per year of this wastewater from acid washing filters and anodes to remove buildup of trace metals on the surface. The facility combines the wastewaters with the wastewaters from its titanium dioxide production process and treats the commingled wastewaters in tanks. The treated wastewater is then discharged to on-site surface impoundments.

What Is EPA's Listing Rationale for This Waste?

One facility identifies the waste as hazardous and manages it in accordance with Subtitle C regulations. We believe that applicable Subtitle C regulations adequately protect against mismanagement, and we did not investigate it further.

For the other facility, in Hamilton, Mississippi, we evaluated its combined wastewaters and solids as described above in the ''process sludges with chromium or lead'' category. Today's proposal separately addresses the titanium dioxide wastes that are commingled with this sodium chlorate waste. We propose not to list these wastes.

(6) Other wastewaters that do not contain chromium or lead and are not recycled.

How Is This Waste Managed?

There are other wastewaters generated from several points of the process, including process condensate, cooling waters, and ion-exchange wastewater. Four facilities reported generating these wastewaters. Two facilities generate process condensates from condensing water vapor from their crystalizers, steam jets, or pad water evaporator. Both facilities store their process condensates in closed tanks. One facility neutralizes the condensate prior to discharging it to an NPDES permitted outfall. The other facility does not treat the condensate, but tests to ensure it meets its State Pollutant Discharge Elimination System permit prior to discharge to a river. One facility generates wastewater from regeneration of the ion-exchange unit that is used for purification of the brine. The wastewater is collected in a tank for pH neutralization before it is discharged to a POTW. One facility generates wastewater from cooling tower blowdown, chemical storage tank scrubber pad, hydrogen scrubber pad, and water demineralization area. These wastewaters are piped to its on-site NPDES facility to be processed and discharged.

What Is EPA's Listing Rationale for This Waste?

We propose not to list these wastewaters as hazardous. We evaluated these wastewaters that are stored and treated in tanks or in a NPDES permitted facility. We found that these wastewaters do not pose risks warranting regulation during treatment because there are no exposure pathways of concern. The wastewater treatment tanks and the wastewater treatment facility provide sufficient structural integrity and have secondary containment areas to minimize potential releases to groundwater. We are unlikely to find potential air releases from these tanks or the permitted facility as neither volatile contaminants nor airborne particulates are likely to be present in these wastewaters.

12. Sodium Dichromate

a. Summary. We have evaluated the wastes, waste management practices, and potential risk exposure pathways associated with the sodium dichromate production processes and propose not to list any wastes from this industry as hazardous wastes under Subtitle C of RCRA. These wastes do not meet the criteria listed under 40 CFR 261.11(a)(3) for listing a waste as hazardous. They do not pose a substantial present or potential threat to human health or the environment. We have identified no risks of concern associated with the current management of these wastes. Note that certain wastes from this sector are exempt mineral processing wastes which are not within the scope of today's listing proposal.

b. Description of the sodium dichromate industry. Two facilities in the United States produce sodium dichromate; one in North Carolina and one in Texas. Both facilities sell their product on the open market in addition to using the material as a feedstock for various manufacturing processes on-site. The majority of sodium dichromate is used as a feedstock for the production of chromic acid. It is also used in a wide variety of other uses. For more detailed information concerning this industry, *see* ''Sodium Dichromate Listing Background Document for the Inorganic Chemical Listing Determination'' in the docket for today's proposal.

The two sodium dichromate production facilities use somewhat different manufacturing processes and generate somewhat different wastes. Both facilities use imported chromite ore as their primary feedstock. They dry and grind the ore and feed it into a roasting kiln or hearth with other materials such as soda ash, lime, and sodium hydroxide. The facilities roast, then quench and leach the ore with water, producing sodium chromate solution and solid ore residues. Both facilities return the ore residues to the manufacturing process for further roasting and leaching. The facilities purify the resulting sodium chromate solution product stream by adjusting its pH, treating it with sodium carbonate, and, at the Texas facility, sodium dichromate, and filtering out the resulting solid impurities.

The two facilities' processes diverge significantly at this point. At the Texas facility, the sodium chromate solution is either crystallized and sold or processed electrolytically to convert the sodium chromate to sodium dichromate. The electrolytic cell system also produces sodium hydroxide solution which, the facility reports, they sell. The North Carolina facility converts the sodium chromate solution to sodium dichromate through acidification, and the sodium dichromate is then partially evaporated. The acidification process also produces sodium sulfate and lower purity sodium sulfate ''saltcake,'' both of which the facility sells. The sodium dichromate is then either used in liquid form or further evaporated to produce a crystalline product.

c. How does the Bevill Exclusion apply to wastes from the sodium dichromate manufacturing processes? The sodium dichromate manufacturing facilities produce two types of residuals which are eligible for the Bevill exemption once disposed: beneficiation wastes (See 40 CFR 261.4(b)(7)(i)) and mineral processing wastes referred to as treated residue from roasting/leaching of chromium ore (see 40 CFR 261.4(b)(7)(ii)(N)).

Under the Bevill exemption, any wastes generated from beneficiation of ores, such as crushing, mixing, and milling, are Bevill exempt. Both facilities beneficiate ore by drying and grinding chromite ore and mixing the ore with other ingredients prior to placement in the roasting kiln and generate air pollution control dusts from these processes. However, the residuals from these processes, which would be Bevill exempt, are not disposed of but rather captured and returned to the process from which they originated for chromium recovery.

In terms of when beneficiation stops and mineral processing starts, EPA determined in 1989 that the roasting/leaching of chromium ore to produce sodium chromate is mineral processing rather than beneficiation. 54 FR 36592 (September 1, 1989) stated:

> ''A specific exception to the above categorization system applies when the roasting/leaching sequence produces a final or intermediate product that does not undergo further beneficiation or processing steps (*e.g.,* the leach liquor serves as an input to inorganic chemical manufacturing). In this type of situation, the Agency believes that the operation is most appropriately considered a processing, rather than a beneficiation, operation. In the context of this rulemaking, one candidate Bevill waste (roast/leach ore residue from primary chrome ore processing) is affected by this distinction; EPA believes that this material is clearly a waste from

processing, rather than beneficiation, of an ore or mineral.’’

The wastes generated after mineral processing begins are not Bevill exempt unless and until they become treated residue from the roasting/leaching of chromium ore as specified in 40 CFR 261.4(b)(7)(ii)(N). The wastes eligible for the exclusion, once they are treated, are referred to later in this preamble and associated background documents as spent post-leach, spent post-neutralization ore residue, and waste heat boiler washout. These wastes are generated from roasting and leaching (including precipitation and filtration to remove the resulting impurities) of chromite ore. Both facilities generate these wastes, treat them in on-site treatment systems, and dispose of them in on-site surface impoundments. Note that in the January 23, 1990 **Federal Register**, EPA stated that the Bevill exemption applies to ‘‘only those solids which are entrained in the slurry as it leaves the treatment facility and which settle out in disposal impoundments.’’

Wastes generated following the roasting/leaching processes to produce sodium chromate for sodium dichromate production are not Bevill exempt because they are not from the roasting/leaching of chromite ore. Wastes generated at these facilities that are not Bevill exempt include sodium chromate evaporation unit wastewaters (Texas facility), sodium dichromate evaporation unit wastewaters (Texas facility), caustic filter sludge (Texas facility), and salt cake drier scrubber wastewater (North Carolina facility).

As described below, both facilities in the sodium dichromate manufacturing industry commingle wastes during the treatment process, ultimately producing a commingled treatment residue which is a mixture of Bevill exempt wastes and wastes which do not qualify for the Bevill exemption. In general, the majority of these mixtures consist of Bevill exempt wastes. Mixing Bevill exempt wastes with non-hazardous wastes does not affect the regulatory status of the Bevill wastes, but it also does not conversely extend Bevill exempt status to the non-hazardous wastes in the mixture (see 63 FR 28595). Therefore, in this rulemaking we have addressed that portion of the treatment residue mixture which derives from wastes which do not qualify for the Bevill exemption. In addition, in general, if any of the non-Bevill wastes exhibit a characteristic and is mixed with the Bevill wastes, the entire mixture may become subject to Subtitle C based on the Bevill mixture rule (See 40 CFR 261.3(a)(2)).

d. What kinds of wastes are generated by these processes? Table III–33 below briefly lists the facility-reported residuals from the sodium dichromate manufacturing industry, total industry residual volumes generated in 1998, RCRA hazard codes, and residual management practices.

TABLE III–33.—SODIUM DICHROMATE PRODUCTION RESIDUALS

Waste category	1998 volumes (MT)	Reported waste codes	Sequential management practices
North Carolina Facility			
Residuals commingled in spent ore residue treatment unit[1]:			
Spent post-neutralization ore residue (Bevill exempt after treatment).	146,937	D007	Sent on-site to tank-based spent ore residue treatment unit with NPDES permitted discharge.
Spent post-leach ore residue (Bevill exempt after treatment).	25,930	D007	Sent on-site to tank-based spent ore residue treatment unit with NPDES permitted discharge.
Saltcake drier scrubber wastewater	13,851	D007	Sent on-site to tank-based spent ore residue treatment unit with NPDES permitted discharge.
Waste heat boiler washout (Bevill exempt after treatment).	70	D007	Sent on-site to tank-based spent ore residue treatment unit with NPDES permitted discharge.
Residuals disposed of on-site:			
Reduced chromium treatment residues (commingled Bevill exempt and non-exempt residues).	129,503	None	Sent to on-site industrial Subtitle D disposal unit.
Commingled treated wastewaters (commingled Bevill exempt and non-exempt residues).	920,161	None	Passed through sand filters then discharged directly under NPDES permit or sent to on-site industrial Subtitle D disposal unit.
Residuals disposed of off-site:			
Chromium-contaminated filters, membranes, and other plant waste.	67	D007	Stored in on-site roll-off bin before off-site treatment and landfill disposal at Subtitle C facility.
Spent sand filter sands (commingled Bevill exempt and non-exempt residues).	21.7 (1997)	None	Stored in on-site drums or roll-off bins before disposal in off-site industrial Subtitle D landfill.
Texas Facility			
Residuals commingled in spent ore residue treatment unit:			
Spent post-neutralization ore residue (Bevill exempt after treatment).	60,000	D007	Sent to on-site, covered, tank-based, spent ore residue treatment unit with NPDES permitted discharge.
Caustic filter sludge	80	D002	Sent to on-site, covered, tank-based, spent ore residue treatment unit with NPDES permitted discharge.
Residuals commingled in wastewater treatment unit[2]:			
Sodium dichromate evaporation unit wastewater	~2,500	None	Sent to on-site, tank-based wastewater treatment unit with NPDES permitted discharge.
Sodium chromate evaporation unit wastewater	~300	None	Sent to on-site, tank-based wastewater treatment unit with NPDES permitted discharge.

TABLE III–33.—SODIUM DICHROMATE PRODUCTION RESIDUALS—Continued

Waste category	1998 volumes (MT)	Reported waste codes	Sequential management practices
Residuals disposed of on-site:			
Reduced chromium treatment residues from spent ore residue treatment unit (commingled Bevill exempt and non-exempt residues).	60,000	None	Sent to on-site industrial Subtitle D, double-lined surface impoundment for dewatering and disposal. Impoundment has NPDES permitted outflow.
Reduced chromium treatment residues from wastewater treatment unit (commingled Bevill exempt and non-exempt residues).	~30,000 (1999)	None	Sent to on-site industrial Subtitle D, double-lined surface impoundment for dewatering and disposal. Impoundment has NPDES permitted outflow.
Commingled treated wastewaters (commingled Bevill exempt and non-exempt residues).	186,515	None	Sent to on-site industrial Subtitle D surface impoundment, filtered through sand filters, then discharged directly under NPDES permit.
Residuals disposed of off-site:			
Process filters and membranes, baghouse bags, chromium-contaminated empty containers, and other plant wastes.	24	D007	Stored in on-site roll-off box before treatment and landfill disposal at Subtitle C facility.
Spent sand filter sands (commingled Bevill exempt and non-exempt wastes).	~2 MT once every two years.	None	Placed in on-site non-hazardous soil waste bin and then disposed of in off-site industrial Subtitle D landfill.

[1] Remediation well water, cooling tower blowdown, and stormwater are also treated in this unit. These materials are beyond the scope of this listing determination.

[2] Stormwater and remediation well water are also treated in this unit. Contaminated media are not within the scope of this listing determination.

In addition to these wastes, the sodium dichromate manufacturers produce residuals which are either piped back to the production process or sold for use in other manufacturing processes. Air pollution control devices capture materials that are returned to their units of origin or to other manufacturing process units. At the North Carolina facility, ore residue washwaters and calcium carbonate residuals are returned to the production process for chromium recovery. Chromium-bearing solution from the saltcake purification process is directly reused in the roasted ore quench, leach and filter process. At the Texas facility, chromium-containing residuals from scrubbers on the hearth and on the sodium chromate and dichromate evaporation/crystallization units are reused in the hearth kiln and quench tank units. Because these materials are reused in production units in ways that present low potential for release, and because we evaluated process wastes generated after the secondary material is reinserted into the process, we do not believe that these materials present significant risk.

The North Carolina facility also produces for sale sodium sulfate ‘‘saltcake’’ and purified sodium sulfate anhydrous from the sodium dichromate production process. The Texas facility sells hydroxide solution from their sodium dichromate production process. We found no information indicating that the facilities which purchase these materials burn them for energy recovery or incorporate them into products that are used on the land (use constituting disposal). Since these processes are outside the scope of the consent decree we did not evaluate any of these materials further. We did however, evaluate some residuals produced on-site at the North Carolina and Texas facilities during the preparation of the materials that are sold. See the discussions in the sections below of salt cake drier scrubber water and caustic filter sludge. Finally, the North Carolina facility produces some off-specification product, which it reinserts into the sodium dichromate manufacturing process. Off-specification product, when reinserted without reclamation into the process from where it originated, is not a solid waste. See the ‘‘Sodium Dichromate Listing Background Document for the Inorganic Chemical Listing Determination’’ for more details on these residuals.

e. Waste characterization and Agency evaluation. Chromium is the primary constituent of concern in the wastes from both facilities. Chromium occurs in several production wastes at high levels, in some cases exceeding the TC level (5.0 mg/L) in TCLP leachate samples. These wastes are coded as hazardous (D007). Both facilities treat some of their D007 wastes on-site and send other D007 wastes off-site for treatment and disposal at permitted Subtitle C hazardous waste facilities. Various other wastes which fall below D007 regulatory levels are either treated on-site or sent off-site for disposal. No other constituents of concern were reported to be present in the wastes at levels of concern.

We propose not to list any of the wastes from the sodium dichromate manufacturing industry. Many wastes from this industry are Bevill exempt once treated, and therefore not within the scope of the consent decree requirements. Other wastes are characteristically hazardous and are managed at permitted Subtitle C facilities off-site. Some wastes did not exhibit constituents at levels of concern for purposes of a listing given the nature of their management and disposal. The main constituent of concern, chromium, is treated on-site for many of the wastes.

Several wastes from each of the facilities are disposed of in a treated form, rather than an as-generated form. In general, we focused our evaluation on the treated form of wastes because it is ultimately only the treated wastes which are disposed.

The sections below describe how wastes are generated and managed at the two sodium dichromate manufacturing facilities, each with its own production process, and our rationale for proposing not to list the wastes. We solicit comments on the proposed listing decisions described below.

(1) North Carolina Facility.

(a) Residuals Commingled in Spent Ore Residue Treatment Unit. The North Carolina facility commingles and treats several characteristic wastes from sodium dichromate manufacturing in an on-site, tank-based treatment unit at the North Carolina facility. These four sodium dichromate manufacturing wastes are:

—Waste heat boiler washout, which are accumulated solids from the internal

components of the roasting kiln waste heat boilers (Bevill exempt after treatment)
—Spent post-leach ore residue (Bevill exempt after treatment)
—Spent post-neutralization ore residue (Bevill exempt after treatment)
—Saltcake drier scrubber wastewater

We consider the saltcake drier scrubber wastewater to be a wastestream associated with the production of sodium sulfate at the North Carolina facility, rather than a sodium dichromate manufacturing waste. Nevertheless, we chose to exercise our discretion to evaluate the risk posed by the treated and untreated form of this residue. As explained below, we did not find risks warranting listing.

All four wastes catalogued above go directly from their points of generation to the on-site spent ore residue treatment unit without intervening storage. The facility treats non-contact cooling tower blowdown, remediation well water, and stormwater in the treatment unit as well. The four manufacturing wastes comprise approximately 60–65% by volume of the wastes entering the treatment unit. The entire treatment process takes place in a series of tanks with secondary containment. Treatment consists of conversion of hexavalent chromium in the wastes to trivalent chromium with pickle liquor (ferrous chloride reducing agent). Trivalent chromium is a generally less toxic and less soluble form of chromium. Wastes containing a high percentage of solids (waste heat boiler washout, spent post-leach ore residue, and spent post-neutralization ore residue) are also neutralized with lime slurry in order to increase precipitation of trivalent chromium compounds out of solution.

The treatment sludge is then thickened in a series of clarifier tanks. Limestone is added to the thickened sludge to further stabilize chromium and other metals. All of the tanks in the treatment train have secondary containment and some are covered. Treated wastewaters, after passing through sand filters, discharge from the treatment unit under an NPDES permit or travel with the treated solid residues to the on-site industrial Subtitle D disposal unit (see section III.F.12.e(1)(b)ii below regarding the commingled treated wastewaters).

The Bevill exemption applies to the waste heat boiler washout, spent post-leach ore residue, and spent post-neutralization ore residue only after the wastes are treated. We evaluated the potential for releases from the treatment tanks. We assumed that the tanks were intact structures with minimal potential for releases to groundwater. We do not anticipate significant air releases because the wastes do not contain volatile constituents and have high moisture content. Also, some of the tanks have covers which further reduce the possibility of air releases. We are proposing not to list any of these four wastestreams undergoing treatment in this tank system.

(b) Residuals Disposed of On-Site. (i) Commingled reduced chromium treatment residues. The reduced chromium sludge from the on-site spent ore residue treatment unit is slurried and conveyed directly from the treatment unit to one of two on-site industrial Subtitle D disposal units (former limestone quarries). Of the several treatment residues contributing to the final commingled treatment residue, only one falls within the scope of today's listing proposal; residue from treatment of saltcake drier scrubber wastewater (we believe this is not within scope of the consent decree but are evaluating it in this rule making). Residues from the treatment of waste heat boiler washout, spent post-leach ore residue, and spent post-neutralization ore residue are Bevill exempt mineral processing wastes beyond the scope of today's listing proposal (see Section III.F.12(c)). Stormwater and remediation well water are contaminated media whose treatment residues we also consider to be beyond the scope of the consent decree (see section III.B of today's proposal). Therefore, we do not consider the risks posed by these treatment residues.

According to information the facility submitted in their RCRA Section 3007 Survey response, the only potential constituent of concern in the untreated saltcake drier scrubber wastewater is chromium, detected at a level of 6 mg/L. Therefore, chromium is the only constituent we considered when assessing the level of risk from saltcake drier scrubber wastewater treatment residues.

Of the total mass of chromium found in the commingled reduced chromium treatment residues, the saltcake drier scrubber wastewater contributes approximately 0.001%. This estimate is based on calculations using information the North Carolina facility provided to us on chromium contents and tonnages of waste exiting the spent ore residue treatment unit. Both the information and the calculations are further detailed in the ''Sodium Dichromate Listing Background Document for the Inorganic Chemical Listing Determination.''

We found the treatment residues from saltcake drier scrubber solution to pose no significant risks to groundwater. After treatment for hexavalent chromium, the commingled reduced chromium treatment residues from 1998 showed weekly TCLP analysis levels of leachable chromium in the range of 0.01–1.00 mg/L for composite samples and <0.01–0.76 mg/L for grab samples. Assuming that the saltcake drier scrubber wastewater's percent contribution to total chromium in the commingled residues is equal to its percent contribution to total chromium leaching from the commingled residues (0.001%), the saltcake scrubber solution was responsible for TCLP leaching levels of 1×10^{-7} to 1×10^{-5} mg/L for composite samples and $<3 \times 10^{-7}$ to 2.28×10^{-5} mg/L for grab samples. The HBL for ingestion of hexavalent chromium is 0.047 mg/L and 23 mg/L for trivalent chromium. The AWQC for hexavalent chromium is 0.011 mg/L and 0.74 mg/L for trivalent chromium. Even at a maximum leaching level of 1×10^{-5} mg/L, the leachable chromium contribution of the saltcake drier scrubber wastewater indicates a very low level of risk to groundwater.

The treated wastes are disposed in an uncovered disposal unit that resembles a surface impoundment. However, given the inorganic, nonvolatile nature of the treated wastes, we do not believe they pose a risk through airborne pathways. Given the low level of chromium leaching attributable to the one treatment residue within the scope of today's listing proposal and the lack of volatile constituents of concern, we propose not to list residues deriving from the treatment of saltcake drier scrubber wastewater.

(ii) Commingled treated wastewaters. The spent ore residue treatment unit described in the sections above has clarifier units which discharge a wastewater stream to tank-based sand filters. After passing through sand filters, the treated wastewaters discharge through an NPDES-permitted outfall. These wastewaters are a mixture of non-Bevill exempt and Bevill exempt treatment residues, and other treatment residues beyond the scope of the consent decree. The solids suspended in the wastewaters are a mixture of Bevill exempt and non-Bevill exempt treatment residues. The liquid portion, the majority of this wastestream, is a mixture of non-Bevill exempt residues, some of which are within the scope of this listing determination, and some of which derive from treatment of contaminated media and are therefore not with the scope of this listing determination. We did not find any significant potential for releases from the tanks. (We assess spent filter media from the sand filters separately in section III.F.12.e(1)(c)ii below.) We concluded that the NPDES discharge is exempt from RCRA regulation.

A portion of the commingled treated wastewaters remains with the commingled reduced chromium treatment residues discharged for disposal to the facility's on-site industrial Subtitle D disposal units. The facility also adds water to this mixture from either the nearby Northeast Cape Fear River or the quarry in order to help slurry and convey the residues to the disposal units.

The liquids which separate from the settled treatment residues in the facility's disposal units are not Bevill exempt wastes (see Section III.F.12.c). Because these liquids derive from the same treatment unit from which the NPDES-discharged wastewaters discussed above derive, we are assuming their chemical composition is very similar to that of the wastewaters discharged under the facility's NPDES permit. We used NPDES permit discharge data, available to the public from the EPA's Envirofacts database,[42] as a surrogate for characterization of this wastewater (see discussion of SPLP filtrate in Section III.E.3). The exposure pathway of concern is the groundwater underlying the facility's disposal units and consumption of the groundwater as drinking water.

According to the North Carolina facility's NPDES permit, the facility is allowed to discharge 0.31 pounds per day of hexavalent chromium to the Northeast Cape Fear River. Given the amount of treated wastewater reported to be discharged in 1998 and using the permit loading as an upperbound value, we estimate that the facility produced an NPDES effluent with an average hexavalent chromium concentration of 0.056 mg/L. This concentration is less than twice the HBL for hexavalent chromium (0.047 mg/L).[43] However, according to NPDES compliance monitoring data for the facility, no hexavalent chromium was detected in the facility's NPDES effluent in 1998. Therefore, it is likely that the actual concentration of hexavalent chromium in the facility's commingled treated wastewaters is less than the concentration the facility is permitted to release.

According to the North Carolina facility's NPDES permit, the facility is also permitted to discharge 2.72 pounds of combined hexavalent and trivalent chromium per day. Making the conservative assumption that all 2.72 pounds of chromium are trivalent chromium and given the amount of treated wastewater discharged in 1998, we estimated that the facility produced an NPDES effluent with an average chromium concentration of 0.49 mg/L, which is less than 23 mg/L, the HBL for trivalent chromium. Actual reported levels of total chromium release were well below the permit limit.

Given that the levels of chromium present in the on-site disposal unit liquids are less than or within a factor of two of the HBLs, we do not believe they pose a risk to human health or the environment through groundwater underlying the disposal unit that supports listing these wastewaters as a hazardous waste.

(c) Residuals Disposed of Off-Site. (i) Chromium-contaminated filters, membranes, and other plant wastes. This waste category from the North Carolina facility includes spent filters, membranes, and various other plant wastes which exceed the TC level for chromium. The wastes are stored in a closed roll-off bin on-site before being sent off-site to a permitted Subtitle C facility for treatment and disposal in a landfill. We feel that applicable Subtitle C regulations adequately prevent mismanagement and therefore propose not to list these wastes.

(ii) Spent sand filter sands. The North Carolina facility generates waste sand material from the spent ore residue treatment unit sand filters which filter treated wastewaters prior to their NPDES-permitted discharge. The purpose of the sand filters is to remove any residual solids which the treatment unit clarifiers fail to remove upstream in the treatment process. Since the clarifiers capture the majority of the solids, the sand filters capture smaller amounts of treatment residue. The most recent disposal of sand from the filters took place in 1997. The facility stores the spent sand in closed drums or roll-off bins on-site before disposing of them in an off-site industrial Subtitle D solid waste landfill.

According to information submitted to EPA by the North Carolina facility, this residue does not exhibit any constituent above the TC level according to TCLP leachate analysis. The only detected constituent of potential concern was chromium, at a level of 0.2 mg/L. Residue from treatment of saltcake drier scrubber wastewater is the only residue contributing to the chromium levels in the spent sand filters which also falls within the scope of today's listing proposal. All other wastes are either Bevill exempt wastes or treatment residues from contaminated media or non-contact cooling water, none of which falls within the scope of the consent decree.

As discussed in section III.F.12.e(1)(b), the saltcake drier scrubber solution contributes approximately 0.001% of the total chromium exiting the spent ore residue treatment unit. Assuming that a waste's percent contribution to total chromium exiting the treatment unit is equal to its percent contribution to total chromium leaching from waste exiting the unit, the figures above indicate a TCLP leaching level of 2×10^{-6} mg/L due to the contributions of the saltcake drier scrubber wastewater.

The HBL for hexavalent chromium is 0.047 mg/L and 23 mg/L for trivalent chromium. The AWQC for hexavalent chromium is 0.011 mg/L and 0.74 mg/L for trivalent chromium. At a level of 2×10^{-6} mg/L, the leachable chromium contribution of the saltcake drier scrubber wastewater presents a very low level of risk.

The waste is inorganic in nature and therefore we do not expect it to contain volatile constituents of concern. In addition, the waste is stored before disposal in a closed container. We do not believe, therefore, that this waste poses a risk via airborne pathways. Given the low level of risk posed by the saltcake drier scrubber wastewater treatment residue contribution to leachable chromium levels in the spent sand filters and its nonvolatile nature, we propose not to list this waste.

(2) Texas Facility. (a) Residuals Commingled in On-Site Treatment Units. At the Texas facility, commingling and treatment of four untreated wastes takes place in two different on-site, tank-based treatment units. The treatment residues from the two treatment units are then co-disposed in an on-site, Subtitle D treatment surface impoundment. The first treatment unit, the spent ore residue treatment unit, treats the following two sodium dichromate manufacturing wastestreams:

—spent post-neutralization ore residue (Bevill exempt after treatment)
—caustic filter sludge from filtration of sodium hydroxide

We consider caustic filter sludge to be a wastestream associated with the production of sodium hydroxide rather than a sodium dichromate manufacturing waste. Nevertheless, we chose to exercise our discretion to

---

[42] http://www.epa.gov/enviro/index_java.html.

[43] As described in Section III.E.3, we used engineering judgment to screen out constituents with concentrations within a factor of two of the HBL.

evaluate the risk posed by the treated and untreated forms of this residue.

The spent ore residue treatment unit treatment tanks have both secondary containment and covers. Treatment consists of converting the hexavalent chromium in the units to trivalent chromium. Trivalent chromium is typically a less soluble and less toxic form of chromium. Ore residue wastes are not Bevill exempt and therefore beyond the scope of the consent decree until treatment occurs. Therefore, we have evaluated the potential for releases from these treatment tanks. We assume the tanks are intact structures with minimal potential for releases to groundwater. We believe the covers on the tanks reduce the potential for air releases. Also, the wastes do not contain volatile constituents.

The second treatment unit, the wastewater treatment unit, treats the following two sodium dichromate manufacturing wastestreams:

—sodium chromate evaporation unit wastewaters
—sodium dichromate evaporation unit wastewaters

The wastewater treatment unit also treats remediation well water and stormwater, two types of contaminated media which are outside the scope of the consent decree. The two wastewaters within the scope of the consent decree make up approximately 9% of the total volume of the wastes entering the treatment unit. The facility converts hexavalent chromium to less toxic trivalent chromium during this treatment process. The tanks do not have covers.

We evaluated the tanks for potential releases to the environment. We assumed the tank structures were intact and therefore posed minimal potential for releases to groundwater. Since the wastewaters contain no volatile constituents, we found no significant potential for air releases. We are proposing not to list the wastes in these treatment tanks.

The facility disposes the treatment materials from the two tank systems described above in an on-site surface impoundment. We describe that surface impoundment in the next section.

(b) Residuals Disposed of On-Site. (i) Commingled reduced chromium treatment residues. The treatment residues from the two treatment tank systems described in the section above are piped directly to the facility's on-site, double-lined, Subtitle D surface impoundment for co-disposal and dewatering. Of the several treatment residues contributing to the mass of reduced chromium treatment residue disposed of in the Subtitle D surface impoundment at the Texas facility, only three fall within the scope of today's listing proposal: residue from treatment of caustic filter sludge, residue from treatment of sodium chromate evaporation unit wastewaters, and residue from treatment of sodium dichromate evaporation unit wastewaters. Residues from the treatment of post-neutralization spent ore residue are Bevill exempt mineral processing wastes beyond the scope of today's listing proposal (see section III.F.12.c). Stormwater and remediation well water are contaminated media whose treatment residues we also consider to be beyond the scope of the consent decree (see section III.B). Therefore, we do not consider the risks posed by these residues.

According to information the facility submitted in their RCRA Section 3007 Survey response, the only potential constituent of concern in the untreated sodium dichromate evaporation unit wastewater, sodium dichromate evaporation unit wastewaters, and the caustic filter sludge is chromium, measured at a level of 0.5 mg/L, 0.5 mg/L and 20 mg/kg, respectively. Therefore, chromium is the only constituent we considered when assessing the level of risk from sodium dichromate evaporation unit wastewater, sodium chromate evaporation unit wastewater, and caustic filter sludge treatment residues.

Of the total chromium contributed to the co-disposed reduced chromium treatment residue by all incoming wastes, the sodium dichromate evaporation unit wastewater, sodium chromate evaporation unit wastewater, and the caustic filter sludge contribute 5×10^{-5} percent by weight. This estimate is based on calculations using information the Texas facility provided to us on chromium contents and tonnages of wastes entering the spent ore residue treatment unit and the wastewater treatment unit on-site. Both the information and the calculations are described further in the "Sodium Dichromate Listing Background Document for the Inorganic Chemical Listing Determination."

The facility did not provide us with TCLP, SPLP, or total constituent analyses for the co-disposed reduced chromium treatment residues. However, the facility did report to us that reduced chromium treatment residues do not exceed the TC level of 5.0 mg/L according to TCLP analysis. In addition, the facility reported that for the time period between October 1, 1998 and December 31, 1998, weekly samples of reduced chromium treatment residues from the spent ore residue treatment unit analyzed with a facility-modified version of the TCLP ranged between 0.16 and 1.75 mg/L chromium (see "Sodium Dichromate Listing Background Document for the Inorganic Chemical Listing Determination" for details). Therefore, conservatively assuming a maximum TCLP chromium leaching level of 4.9 mg/L and assuming that the percent contribution by the three wastes to total chromium entering the treatment units is equal to their percent contribution to total chromium leaching from treatment residues exiting the treatment units, the caustic filter sludge, sodium chromate evaporation unit wastewaters, and sodium dichromate evaporation unit wastewaters were responsible for TCLP chromium leaching levels of 2.45×10^{-6} mg/L.

The HBL for hexavalent chromium is 0.047 mg/L and 23 mg/L for trivalent chromium. The AWQC for hexavalent chromium is 0.011 mg/L and 0.74 mg/L for trivalent chromium. At a leaching level of 2.45×10^{-6} mg/L, the leachable chromium contribution of the caustic filter sludge, sodium chromate evaporation unit wastewaters, and the sodium dichromate evaporation unit wastewaters indicates a very low level of risk to groundwater from potential releases from the surface impoundment.

The waste is metallic and inorganic in nature and therefore we do not expect it to contain volatile constituents of concern. We do not believe, therefore, that this waste poses a risk via airborne pathways. Given the low level of chromium leachate deriving from the three treatment residues within the scope of today's listing proposal and placed into the surface impoundments, we propose not to list residues deriving from the treatment of caustic filter sludge, sodium chromate evaporation unit wastewater, and sodium dichromate evaporation unit wastewater.

(ii) Commingled treated wastewaters. Treated wastewaters commingled with the commingled reduced chromium treatment residues separate from these solid residues in the Texas facility's surface impoundment disposal unit. These liquids are not Bevill exempt wastes (see Section III.F.12.3). The solids suspended in the wastewaters are a mixture of Bevill exempt and non-Bevill exempt treatment residues. The liquid portion, the majority of this wastestream, is a mixture of non-Bevill exempt residues, some of which are within the scope of this listing determination, and some of which derive from treatment of contaminated media and are therefore not within the scope of this listing determination.

The commingled treated wastewaters discharge from the surface impoundment through an NPDES-permitted outfall after passing through sand filters to remove residual solids (see discussion below in Section III.F.12.e(2)(c)(ii). We therefore assume that the chemical composition of the treated wastewaters in the surface impoundment is very similar to that of the NPDES permitted discharge. We used NPDES permit discharge data, available to the public from the EPA's Envirofacts database,[44] as a surrogate for characterization of this wastewater (see discussion of SPLP filtrate in Section III.E.3). The exposure pathway of concern is the groundwater underlying the facility's disposal units and consumption of the groundwater as drinking water.

According to the Texas facility's 1998 NPDES monitoring data, the facility discharged an average of 0.018 pounds of hexavalent chromium each day through their internal NPDES outfall. Given the amount of treated wastewater the facility reported as discharge from the surface impoundment in 1998, we estimate that the facility produced an NPDES effluent with an average hexavalent chromium concentration of 0.016 mg/L. This concentration is less than the HBL for hexavalent chromium (0.047 mg/L).

According to the Texas facility's NPDES monitoring data for 1998, the facility released an average of 0.46 pounds of combined hexavalent and trivalent chromium per day. Making the conservative assumption that all 0.46 pounds of chromium are trivalent chromium and given the amount of treated wastewater discharged in 1998, we estimated that the facility produced an NPDES effluent with an average chromium concentration of 0.41 mg/L, which is less than 23 mg/L, the HBL for trivalent chromium.

Wastes in the surface impoundment dewater and the resulting wastewaters pass out of the surface impoundment and through tank-based sand filters. From the sand filters, the treated wastewaters then discharge through an NPDES-permitted outfall. These wastewaters are a mixture of non-Bevill exempt and Bevill exempt treatment residues, and other treatment residues beyond the scope of the consent decree. We did not find any significant potential for releases from the sand filter tanks. (We assess spent filter media from the sand filters separately in Section III.F.12.e(2)(c)(ii) We concluded that the NPDES discharge is exempt from RCRA regulation.

(c) Residuals Disposed of Off-Site. (i) Process filters and membranes, baghouse bags, chromium-contaminated empty containers, and other plant wastes. The Texas facility reports in their RCRA Section 3007 Survey response that process filters and membranes and baghouse bags from their facility exceed the TC level for chromium and are coded D007. The facility also reports that they produce empty containers and other plant wastes contaminated with chromium which are also coded D007. The facility stores these hazardous wastes in a closed rolloff bin on-site before sending them off-site to a permitted Subtitle C hazardous waste facility for treatment and landfill disposal. These wastes are sufficiently managed under current RCRA Subtitle C regulations and therefore we propose not to list these wastes.

(ii) Spent sand filter sands. The Texas facility generates waste sand material from the sand filters which filter treated wastewaters prior to their NPDES permitted discharge from the facility's on-site surface impoundment. The purpose of the sand filters is to remove any residual solids which fail to settle in the surface impoundment. Since the majority of the solids settle in the surface impoundment, the sand filters captures smaller amounts of reduced chromium treatment residue. Approximately 2 MT of spent sand filter sand is disposed of every two years. The facility stores the spent sand in non-hazardous soil bins on-site before disposing of it at an off-site Subtitle D industrial landfill.

According to the Texas facility, this residue does not exhibit any constituent above the TC level according to TCLP leachate analysis. Residues from treatment of caustic filter sludge, sodium chromate evaporation unit wastewaters, and sodium dichromate evaporation unit wastewaters are the only residues contributing to the potential constituent of concern levels in the spent sand filters which also fall within the scope of today's listing proposal. All other wastes are either Bevill exempt wastes or treatment residues from contaminated media, neither of which falls within the scope of the consent decree.

Chromium was the only potential constituent of concern detected in the sodium chromate evaporation unit wastewaters, sodium dichromate evaporation unit wastewaters and the caustic filter sludge, and is therefore the only potential constituent of concern we considered in the spent sand filter sands. As discussed in the section on commingled reduced chromium treatment residues, the residues contribute 5×10^{-5} percent of the total chromium mass entering the spent ore residue treatment unit. Assuming a maximum TCLP chromium leaching level of 4.9 mg/L, and assuming that the percent contribution to total chromium by the three wastes entering the treatment units is equal to their percent contribution to total chromium leaching from treatment residues exiting the treatment units, the caustic filter sludge, sodium chromate evaporation wastewaters, and sodium dichromate evaporation unit wastewaters were responsible for TCLP chromium leaching levels of 2.4×10^{-6} mg/L.

The HBL for hexavalent chromium is 0.047 mg/L and 23 mg/L for trivalent chromium. The AWQC for hexavalent chromium is 0.011 mg/L and 0.74 mg/L for trivalent chromium. At a level of 2.4×10^{-6} mg/L, the leachable chromium contribution of the sodium dichromate evaporation unit wastewater, the sodium chromate evaporation wastewaters, and the caustic filter sludge presents a very low level of risk.

The waste is metallic and inorganic in nature, and therefore we do not expect it to contain volatile constituents of concern. We do not believe, therefore, that this waste poses a risk via airborne pathways. Given the low level of risk posed by the contribution of constituents in the spent filter sands attributable to caustic filter sludge, sodium chromate evaporation unit wastewaters, and sodium dichromate evaporation unit wastewater treatment residue, the absence of volatile constituents of concern, and the relatively small volume of the total waste, we propose not to list this waste.

13. Sodium Phosphate From Wet Process Phosphoric Acid

a. Summary. We propose not to list any wastes from the production of sodium phosphate from wet process phosphoric acid as hazardous under subtitle C of RCRA. Many of these secondary materials are piped back into the production process; other wastes are discharged to a permitted publicly-owned treatment works (POTW). Other materials are sent to Subtitle D industrial landfills. After an analysis of waste management practices and potential exposure pathways, we conclude that there are no risk pathways of concern. These wastes do not meet the criteria set out at 40 CFR 261.11(a)(3) for listing as hazardous.

b. Description of the sodium phosphate industry. Sodium phosphate is the more general chemical name for

---

[44] http://www.epa.gov/enviro/index_java.html

a wide variety of salts produced from the neutralization of phosphoric acid. Some of the salts produced by the facilities in this industry are monosodium dihydrogen phosphate (H_2NaPO_4), disodium monohydrogen phosphate (HNa_2PO_4), trisodium phosphate (Na_3PO_4), sodium hexametaphosphate ($Na_4P_4O_{12}$), and sodium tripolyphosphate ($Na_5P_3O_{10}$).

The various phosphate salts produced are used for a wide variety of purposes, ranging from a water soluble solid acid and pH buffer for acidic cleaners to products manufactured for the food industry[45]. Sodium phosphate is produced from wet process phosphoric acid by two manufacturing companies at four locations in the United States. For more detailed information concerning this industry, see ‘‘Sodium Phosphate Listing Background Document for the Inorganic Chemical Listing Determination’’ in the docket for today's proposal.

The processes for monosodium dihydrogen phosphate, disodium monohydrogen phosphate, and trisodium phosphate are similar except for the ratio of phosphoric acid to soda ash at the reactor stage and the type, size and construction of the crystallizing and drying equipment. The raw materials are water, phosphoric acid, soda ash, and caustic. The purified phosphoric acid is manufactured elsewhere through the wet-acid purification method and is food grade. The process starts with a reaction between phosphoric acid, soda ash, and caustic. The solution is used to make the monosodium dihydrogen phosphate, which passes through a polishing filter before shipment to customers. The sodium to phosphorus ratio of the solution is adjusted with caustic to make disodium monohydrogen phosphate and trisodium phosphate. These solutions are filtered and then crystallized. The crystals from each process pass through dryers. The finished product is packaged or shipped in bulk.

Sodium hexametaphosphate and sodium tripolyphosphate are also produced from food-grade phosphoric acid and soda ash. Both processes start with a reaction between phosphoric acid and soda ash. For the sodium hexametaphosphate process, the product is fed to a furnace which melts the mix and converts it to sodium hexametaphosphate. For the sodium tripolyphosphate process, the reaction discharge is dried and heat treated in a converter to convert it to sodium tripolyphosphate. In both processes, the product is cooled, sized, stored, and packaged for shipment.

c. What kinds of wastes are generated by these processes? A brief description of the waste categories, how they are generated, their volumes across the industry, and how they are managed is presented in Table III–34:

TABLE III–34.—SODIUM PHOSPHATE PRODUCTION WASTES

Waste category	1998 Volume (MT)	Source	Management practices
Filter press cakes	120	Product polishing	Recycled or Subtitle D landfill.
Mix area filters	0.009	Product polishing	Subtitle D landfill.
Dust collector filter bags	2.1	Drying and grinding processes	Subtitle D landfill.
Scrubber waters and effluents	32	Process vapor scrubbers	POTW or recycled.
Product dust collected	Not reported	Drying and grinding processes	Recycled or Subtitle D landfill.
Off-specification product	771	Off-specification grinding or customer returns.	Recycled or Subtitle D landfill.

For those scenarios where secondary materials (filter press cakes, product dust, off-specification product, and scrubber water) are piped back to the production process, we could identify no potential route for significant exposure prior to reuse. In addition, we evaluated all wastes generated after reinsertion of these materials into the process and we do not believe that these secondary materials present significant threats. Also, off-specification product, when reinserted without reclamation into the process from where it originated, is not a solid waste. For those scenarios where wastes are discharged via the facility's common sewage line to permitted publicly-owned treatment works (POTWs), these wastes are excluded from RCRA (40 CFR 261.4(a)(1)(ii)). For those scenarios where wastes are sent to industrial subtitle D landfills, we performed a risk assessment to help us determine whether these risks warranted listing.

d. Agency evaluation. (1) Filter press cake and mix area filters.

How Was This Waste Characterized?

We collected two samples of this residual at one facility. Based on our assessment of the raw materials and production processes used across the industry, we believe these samples are representative of the range of waste characteristics at the other three sodium phosphate production facilities. Constituents detected above their HBLs are summarized in Table III–35.

TABLE III–35.—CHARACTERIZATION OF FILTER PRESS CAKES FROM SODIUM PHOSPHATE PRODUCTION

Parameter	Total (mg/kg)	TCLP (mg/l)	SPLP (mg/l)	HBL (mg/l)
Primary filter press cake (Sample RCH–1–SP–01):				
Antimony	0.5	<0.5	0.0298	0.006
Thallium	<2	<2	0.0055	0.001

---

[45] In this preamble, we often refer to sodium phosphate produced for the food industry as ‘‘food grade.’’ The Food and Drug Administration (FDA), Department of Health and Human Services, refers to the various sodium phosphates used in the food industry as ‘‘substances generally recognized as safe’’ (GRAS). The FDA states that: ‘‘This substance is generally recognized as safe when used as in accordance with good manufacturing practice.’’ (See, for example, 21 CFR 182.1778, 182.6290, 182.6778, and 182.8778.) In deciding whether a food additive should be approved, the FDA considers the composition and properties of the substance, the amount likely to be consumed, its probable long-term effects and various safety factors.

TABLE III–35.—CHARACTERIZATION OF FILTER PRESS CAKES FROM SODIUM PHOSPHATE PRODUCTION—Continued

Parameter	Total (mg/kg)	TCLP (mg/l)	SPLP (mg/l)	HBL (mg/l)
Tray filter cake (Sample RCH–1–SP–02):				
Antimony	<0.5	<0.5	<0.025	0.006
Thallium	<2	<2	0.0079	0.001

What Management Scenarios Were Assessed and How Was the Risk Assessment Established?

These wastes go to industrial subtitle D landfills and we therefore determined that we would model the scenario of off-site disposal in an industrial D landfill. We assessed the off-site landfill scenario using the hydrogeologic properties associated with the geographic areas where the landfills reported in the survey are located.

We gave the SPLP results primary consideration as there is no reported management in municipal landfills (where the TCLP results would be relevant). Based on the sampling results summarized above, we decided that modeling was necessary for two constituents of concern: antimony and thallium. For antimony, we used one-half of the detection limit as a model input for sample RCH–1–SP–02. We used the probabilistic approach for an off-site industrial Subtitle D landfill described in section III.E of today's proposal.

What Is EPA's Listing Rationale for This Waste?

From the results of the risk assessment, summarized below in Table III–36, neither antimony nor thallium (the constituents of concern) pose a substantial present or potential hazard to human health and the environment. The hazard quotients for both constituents, for both the adult and child exposure scenarios, are less than 0.008 at the 95th percentile. As a matter of policy, EPA generally does not consider listing wastes with predicted hazard quotients of less than 1.0. We see no special concerns warranting an exception to this policy. Therefore, we believe that these wastes do not warrant listing.

For the mix area filters, the location of these filters indicates that any contaminants found would be similar to those of the filter press cake. Given that our evaluation of the much larger volume filter press cake yielded no significant risk, we are also proposing not to list the very small volume mix area filters.

For a more complete description of these analyses, see ''Risk Assessment for the Listing Determinations for Inorganic Chemical Manufacturing Wastes'' in the docket for this proposed rulemaking.

TABLE III–36.—PROBABILISTIC RISK RESULTS FOR FILTER PRESS CAKES

Percentile	Antimony		Thallium	
	Adult HQ	Child HQ	Adult HQ	Child HQ
Industrial landfill:				
90th	0.001	0.003	0.002	0.003
95th	0.004	0.008	0.004	0.008

(2) Dust collector filter bags.

How Was This Waste Characterized?

We collected one sample of this residual. Based on our assessment of the raw materials and production processes used across the industry, we believe this sample is representative of similar wastes at the other three sodium phosphate production facilities. The waste constituents detected at levels above their HBLs are summarized in Table III–37:

TABLE III–37.—CHARACTERIZATION OF DUST COLLECTOR FILTER BAG FROM SODIUM PHOSPHATE PRODUCTION

[Sample RCH–1–SP–03]

Parameter	Total (mg/kg)	TCLP (mg/l)	SPLP (mg/l)	HBL (mg/l)
Antimony	48.8	<0.5	0.309	0.006
Arsenic	<0.5	<0.5	0.0064	0.0007

What Management Scenarios Were Assessed and How Was the Risk Assessment Established?

Industry reported that this waste is managed in off-site industrial D landfills. We assessed this scenario. Antimony and arsenic are the constituents of concern.

Because the volume of this waste is relatively small, we first used the de minimis waste quantity screening analysis (described in section III.E.3) to screen the potential risk to groundwater associated with landfilling this waste. We found that the SPLP data for arsenic screens out because the waste volume is insufficient to release arsenic at levels of concern. For a more complete description of this analysis, see ''Risk Assessment for the Listing Determinations for Inorganic Chemical Manufacturing Wastes'' in the docket for this proposed rulemaking.

The detected SPLP levels for antimony did not screen out using the *de minimis* volume analysis. We conducted full groundwater modeling for the industrial landfill scenario for this constituent. We assessed the off-site landfill scenario using the probabilistic approach for off-site landfills described in section III.E.

What Is EPA's Listing Rationale for This Waste?

From the results of the risk assessment, summarized below in Table III–38, antimony (the constituent of concern) does not pose a substantial present or potential hazard to human health and the environment. The hazard quotients for antimony, for both the adult and child exposure scenarios, are less than 0.007 at the 95th percentile. As a matter of policy, EPA generally does not consider listing wastes with predicted hazard quotients of less than 1.0. We see no special concerns warranting an exception to this policy. Therefore, we believe that this waste does not warrant listing. For a more complete description of this analysis, see ''Risk Assessment for the Listing Determinations for Inorganic Chemical Manufacturing Wastes'' in the docket for this proposed rulemaking.

TABLE III–38.—PROBABILISTIC RISK RESULTS FOR DUST COLLECTOR BAGS

Percentile	Antimony	
	Adult HQ	Child HQ
Industrial landfill:		
90th	0.001	0.002
95th	0.003	0.003

(3) Scrubber waters and effluents. We did not evaluate scenarios where these secondary materials are piped back into the production process because there is no potential for exposure. For those scenarios where wastes are managed in a tank, the impervious nature of the construction materials (concrete,

fiberglass, or steel) of tanks are unlikely to result in releases to groundwater in all but the most catastrophic scenarios. We also are not concerned with potential air releases from these tanks as neither volatile contaminants nor airborne particulates are likely to be present in these aqueous wastes. For those scenarios where wastes are discharged via the facility's common sewage line to POTWs, these wastes are excluded from RCRA (40 CFR 261.4(a)(1)(ii)). Furthermore, these discharges are regulated by the Clean Water Act pretreatment standards. They do not warrant listing. We propose not to list this waste.

(4) Product dust collected. All collected dust that can be recycled is recycled back into the production process. Due to production constraints, some portion of this collected product dust cannot be recycled back to the process and is instead sent to an industrial Subtitle D landfill. However, this landfilled product is still food-grade product. Because this ''waste'' is, in fact, food-grade product, we believe it unlikely that it contains any constituent exceeding health-based limits based on ingestion. Therefore, we propose not to list this waste.

(5) Off-specification product. Much of this material is reused in the production process with no potential for exposure. However, because of production constraints, they cannot always work all of this material back into the process, and it must be disposed in an industrial subtitle D landfill. In all cases, product is rejected by a customer because of physical property problems—i.e., particle size—rather than chemical problems or contaminants. Because this ''waste'' is, in fact, food-grade product, we believe it unlikely that it contains any constituent exceeding health-based limits based on ingestion. Therefore, we propose not to list this waste.

14. Titanium Dioxide

a. Summary. We evaluated wastes from the production of titanium dioxide and propose to list one waste and not to list all of the others. Certain wastes from titanium dioxide production are exempt mineral processing wastes and were not assessed as part of today's listing determination because they are outside the scope of the consent decree. We are proposing to list nonwastewaters from the chloride ilmenite process (unless otherwise exempted).

K178 Nonwastewaters from the production of titanium dioxide by the chloride-ilmenite process. (T) [This listing does not apply to chloride process waste solids from titanium tetrachloride production exempt under section 261.4(b)(7)]

We propose not to list the remainder of the wastes generated by this sector. We do not believe these wastes pose threats to human health or the environment that warrant listing. We have not identified risks of concern associated with the current management of these wastes that support a listing determination. Our findings, however, do not change the applicability of existing standards and regulations, such as the hazardous waste characteristics, to these wastes and this industry.

b. Description of the titanium dioxide industry. There are nine facilities producing titanium dioxide. There are three distinct processes currently in use: the chloride process, the sulfate process, and the chloride-ilmenite process. Six facilities use the chloride process. Two of these six facilities also produce titanium dioxide via the sulfate process. Three separate facilities use only the chloride-ilmenite process.

Chloride Process. In the chloride process, rutile or high-grade ilmenite is converted to titanium tetrachloride ($TiCl_4$). The conversion takes place in a chlorinator in the presence of chlorine gas with petroleum coke added as a reductant. All U.S. producers of $TiCl_4$ use fluidized bed chlorinators. Vent gases from the chlorinator are scrubbed prior to venting to the atmosphere. Non-volatile metal chlorides and unreacted coke and ore solids are removed from the gaseous product stream. The facilities also generate waste acid, which they mingle with coke and ore solids before treatment. Vent gases from the chlorinator are scrubbed prior to venting to the atmosphere. The volatile $TiCl_4$ and other volatile metal compounds such as vanadium oxychloride, exit the chlorinator as overhead vapor. The gaseous product stream is purified to separate the titanium tetrachloride from other metal chloride impurities using processes such as partial condensation and chemical treatment. Finally, vanadium compounds, which have boiling points close to that of $TiCl_4$, are removed from the titanium tetrachloride by complexing with mineral oil and reducing with hydrogen sulfide, or by complexing with copper. The purified $TiCl_4$ is then oxidized to TiO_2, driving off chlorine gas, which is recycled to the chlorinator. The pure TiO_2 is slurried and sent to the finishing process which includes milling, addition of inorganic and organic surface treatments, and/or spray drying of the product TiO_2. The product can be sold as a packaged dry solid or a water-based slurry.

Sulfate Process. In the sulfate process, ilmenite ore or slag with high TiO_2 content is digested with sulfuric acid, forming a porous cake; this cake is further dissolved by dilute acid to form titanyl sulfate ($TiOSO_4$). Iron may be added to the digestion process to ensure that iron impurities remain in the ferrous (Fe^{2+}) state so that the eventual TiO_2 product can be easily washed. The titanyl sulfate solution is then clarified, yielding a waste sulfate digestion sludge, and then concentrated through vacuum evaporation. The filtered titanyl sulfate solution is vacuum-evaporated a second time and hydrolyzed to precipitate hydrated titania ($TiO(OH)_2$). The titania hydrate is then filtered and washed, yielding filtrate waste and wastewater, respectively, before being calcined at 1,000°C to produce the TiO_2 product.

Chloride-Ilmenite Process. In the chloride-ilmenite process, ilmenite ore is converted to titanium tetrachloride. As in the chloride process, the chloride-ilmenite process takes place in a chlorinator in which the ore is chlorinated in the presence of coke as a reducing agent. Vent gases from the chlorinator are scrubbed prior to venting to the atmosphere. Non-volatile metal chlorides and unreacted coke and ore solids are removed from the gaseous product stream. The gaseous product stream then is purified further to separate the titanium tetrachloride from other volatile metal chloride impurities, including ferric chloride ($FeCl_3$) which is present in higher concentrations than the chloride process due to the high iron content in the ore. The separation is done via condensation and chemical treatment. The process for converting the purified $TiCl_4$ product stream to TiO_2 is similar to that used in the chloride process, as described above.

c. What kind of wastes are generated by these processes?. The wastes generated by the titanium dioxide sector are described in overview below, organized by process. Additional detail on these wastes is provided in the background document for this sector.

The wastes generated by the chloride process include:

—Commingled wastewaters, including process and non-process wastewaters from chlorinator coke and ore solids recovery, reaction and chemical tank storage scrubbers, product finishing operations, wastewater treatment and chlorinator solids decantation, and on-site landfill leachate.

—Chloride process waste solids from titanium tetrachloride production (exempt as mineral processing wastes, see 40 CFR 261.4(b)(7)).

—Wastewater treatment sludges generated by facilities that have chloride-only processes (exempt mineral processing wastes at those facilities with no contribution of solids from oxidation and finishing)
—Waste sands from finishing (milling) of the titanium dioxide product and scouring of oxidation process units.
—Vanadium wastes generated in the purification process.

The wastes generated by the sulfate process (used at two plants that also use the chloride process) include:

—Primary and secondary gypsum, which is produced when the waste sulfuric acid generated from the filtering of titanium dioxide hydrate solution is neutralized with calcium carbonate.
—Digestion sludge from the clarification of the titanyl sulfate liquor that is produced during the acid digester step.
—Wastewaters from the sulfuric acid digestion scrubber which removes acidic components and entrained solids from reaction gases, evaporator condensate from the precipitation unit, the calciner scrubber, the sulfate waste sludge settling pond supernatant, and the primary and secondary gypsum precipitation units. These wastewaters are commingled with wastewaters from the chloride process.
—Wastewater treatment sludges. These wastewater treatment sludges are generated from commingled chloride process and sulfate process wastewaters by facilities that have both processes. The wastewater treatment consists of elementary neutralization and precipitation or filtration.
—Acids from intermediate titanium product filtration/bleaching units and product calciner overhead scrubbers.
—Product milling sand from finishing operations.

The wastes generated by the chloride-ilmenite process include:

—Coke and ore solids (exempt as mineral processing wastes, see 40 CFR 261.4(b)(7)) that are not consumed by the chlorination process. These solids are conveyed through the process as part of various wastestreams.
—Waste acid (metal chloride) solution, usually called ferric or iron chloride, that is separated from the gaseous titanium tetrachloride product stream and acidified.
—Process and non-process wastewaters from reaction and oxidation scrubbers, reactant and treatment chemical storage scrubbers, product finishing, HCl storage vent scrubber, oxidation unit tank and equipment vents, supernatant or filtrate from coke and ore solids management and wastewater treatment disposal impoundments. The wastewaters are commingled prior to being introduced into the wastewater treatment system.
—Other spent scrubber waters from the reaction fume disposal system. The wastewaters are pretreated and are subsequently commingled with other wastewaters prior to being introduced to the wastewater treatment system.
—Non-exempt non-wastewaters, including the portion of wastewater treatment solids derived from the neutralization of process and non-process wastewaters from oxidation and finishing, and solids from ferric chloride filtration.
—HCl from the reaction scrubber.
—Additive feeder vent filter solids generated in the oxidation process.
—Vanadium waste generated in the purification process.
—Off-specification titanium dioxide product.
—Rail car product washout wastewater.
—Waste sand removed from a reactor purge stream (coke and ore solids)

Table III–39, below, summarizes our information about the wastes generated rom the production of titanium dioxide.

TABLE III–39.—TITANIUM DIOXIDE WASTES

Waste category	Number of generators	1998 volumes (MT)	Reported hazard codes	Management practices
Commingled chloride process wastewaters	4	7,614,358	D002, D007	Neutralization, solids settling, NPDES discharge.
Chloride process solids (Bevill exempt)	6	1,200,000	none	On-site impoundments, on-site Subtitle D landfills.
Waste sands from oxidation, milling and scouring.	3	9,485	none	On-site industrial Subtitle D landfill; off-site industrial Subtitle D landfill.
Gypsum from sulfate process	2	[46] 69,500	none	On-site waste pile storage; on-site industrial Subtitle D landfill; sold for various uses.
Digestion scrubber water	2	2,000,333		Neutralization in dedicated impoundment; commingled with other wastewaters.
Digestion sludge from sulfate process	2	41,494	D002	Unlined impoundment, dewatering, on-site industrial Subtitle D landfill.
Commingled wastewaters from the chloride and sulfate process.	2	16,184,031	none	Neutralization, solids settling in unlined surface impoundments, NPDES discharge.
Wastewater treatment sludges from commingled chloride and sulfate process (partially Bevill exempt).	2	159,121	none	Dewatering, on-site industrial Subtitle D landfill.
Waste acid (ferric chloride) from chloride-ilmenite process.	3	1,883,000	D002, D007, D008.	On-site hazardous waste underground injection; reuse as raw material in sodium chloride production; storage in tanks and unlined impoundment prior to sale as water and wastewater treatment reagent.
Chloride ilmenite process solids (Bevill exempt).	3	not reported	none	On-site dewatering; on-site Subtitle D industrial landfill; on-site unlined impoundment; various reuses.
Non-exempt nonwastewaters from the chloride-ilmenite process.	3	14,600	none	On-site dewatering; on-site Subtitle D industrial landfill; on-site unlined impoundment; various reuses.
HCl from reaction scrubber, chloride-ilmenite process.	3	not reported	D002	On-site wastewater treatment, on-site reuse.
Commingled wastewaters from the chloride-ilmenite process.	3	13,556,000	none	On-site neutralization, solids settling, NPDES discharge.

TABLE III–39.—TITANIUM DIOXIDE WASTES—Continued

Waste category	Number of generators	1998 volumes (MT)	Reported hazard codes	Management practices
Additive vent filter solids from chloride-ilmenite process.	1	< 1	none	Off-site Subtitle D industrial landfill.
Vanadium waste from the chloride-ilmenite and chloride process.	4	not reported	none	Returned to reaction area for $TiCl_4$ recovery, remaining vanadium wastes are incorporated in solids streams.
Off-spec titanium dioxide product	2	563	none	Off-site Subtitle D industrial landfill.
Railcar/trailer product washout	1	<10,000	none	On-site storage in unlined surface impoundment, on-site wastewater treatment.

[46] Additional volumes are used as products.

The manufacturers also produce materials that are reused in other processes that are outside the scope of the consent decree. With one exception described below, we did not evaluate these materials, or wastes generated during co-product production for the purposes of today's listing determinations, because they were outside the scope of the consent decree.

One facility produces sulfur from the treatment of off-gases. Because the off-gas is produced from a production unit rather than a waste management unit and is conveyed to its destination via piping, the gas is not a solid waste. RCRA Section 1004(27) excludes non-contained gases from the definition of solid waste and thus they cannot be considered a hazardous waste. (See 54 FR 50973) Because this gas is not a solid waste when produced, we did not evaluate it further for purposes of listing.

d. What wastes from these processes are exempt mineral processing wastes? In July of 1988, the U.S. Court of Appeals, for the D.C. Circuit in *Environmental Defense Fund* v. *EPA (EDF II)*, 852 F.2d 1316 (D.C. Cir. 1988), *cert. denied,* 489 U.S. 1011(1989), ordered EPA to restrict the scope of the Bevill mining waste exclusion, as it applied to mineral processing wastes. In response, EPA promulgated rules on September 1, 1989 (54 FR 36592) and on January 23, 1990 (55 FR 2322), issued a Report to Congress on Wastes from Mineral Processing on July 31, 1990, and published a regulatory determination published on June 13, 1991 (56 FR 27300). The list of Bevill exempt wastes is set out at 40 CFR 261.4(b)(7). We relied on these Bevill rulemakings to determine the Bevill status of waste streams in the titanium dioxide sector.

The production of titanium dioxide results in the generation of 2 categories of exempt waste: beneficiation wastes and exempt mineral processing wastes. These categories are described below.

The industry reported a number of wastes generated from the storage and handling of various raw materials which are exempt because they are associated with beneficiation. Solid wastes from the extraction/beneficiation of ores and minerals are Bevill exempt solid wastes (see 51 FR 24496, July 3, 1986 and 54 FR 36592, September 1, 1989). These wastes are described in the background document for this sector. We have not assessed these wastes because they are exempt under 40 CFR 261.4(b)(7).

The only relevant mineral processing waste exemption consists of ''chloride process waste solids from titanium tetrachloride production'' (see 40 CFR 261.4(b)(7)(ii)(S)). The consent decree mandating today's proposal states in paragraph 1.g that Bevill exempt wastes are not within the scope of the consent decree as it applies to the inorganic chemical listing determinations, and specifically that ''chloride process waste solids'' need not be assessed within the titanium dioxide sector. Titanium tetrachloride production occurs in both the chloride and chloride-ilmenite processes.[47]

The chloride process waste solids are generated during the chlorination reaction of the titanium ore in the reducing presence of coke at elevated temperatures, and are generated from both the chloride process and the chloride-ilmenite process. The majority of these solids are removed from the reaction area as a mass and are quenched, neutralized, settled and disposed as exempt materials. Additional solids from the reactor are carried overhead with the TiCl4 product gas stream and are subsequently removed in various scrubbing units. Although EPA has not previously discussed these solids, we believe that they also fall within the exemption. While they are removed from the product stream and various other wastes at points other than where the majority of the solids are separated from the TiCl4 gas stream, they are similarly composed of unreacted ore and coke solids from the chlorination reactor. They fit within the plain language of the exemption.

Solids also are generated from the oxidation and finishing stages of titanium dioxide production. These solids are non-exempt solid wastes (not covered by the exemption). Most titanium dioxide producers commingle wastewaters from titanium tetrachloride production with wastewaters from oxidation and finishing. To the extent that the resultant sludges contain non-exempt solids, we have assessed that portion of those solids.

Due to process variations, each facility using the chloride or chloride-ilmenite process generates its exempt solids in slightly different ways. The general principles that we used to determine the Bevill status of these wastes include the following:

—Extraction and beneficiation ends just before chlorination occurs. Wastes generated prior to this point are Bevill exempt, outside the scope of the consent decree and therefore not addressed in this rulemaking. The chlorinator marks the beginning of mineral processing because the ore undergoes a physical/chemical change (see 54 FR 36619, September 1, 1989). 54 FR 36621 further notes, ''Likewise, EPA considered titanium tetrachloride produced during the titanium chloride [sic] process to be a saleable product; any further processing subsequent to its production is considered to be chemical manufacturing.''

—Mineral processing ends when titanium dioxide is produced in the oxidation unit. Further steps are chemical manufacturing. The Agency defines the beginning of oxidation as the beginning of chemical manufacturing because the facility is using a saleable mineral product, titanium tetrachloride, to produce titanium dioxide (see 54 FR 366211).

---

[47] All sulfate process waste solids and liquids are non-exempt mineral processing wastes (see 55 FR 2322, January 23, 1990). 55 FR 2392 noted that all sulfate process waste solids and wastewaters from the production of titanium dioxide do not meet the high volume/low hazard criteria established in the September 1, 1989 Bevill rule and therefore were not eligible for continued coverage under the Bevill exclusion (see 54 FR 36592).

—The mineral processing exemption only covers *solids* from the production of titanium tetrachloride. These solids, therefore, are outside of the consent decree. At least six streams of solid-bearing material leave the chlorination reaction area. The status of these streams is as follows:

(1) *Titanium tetrachloride going on for further production.* All wastes formed during further processing of this gaseous product stream are chemical manufacturing wastes that are outside the scope of the Bevill exemption.

(2) *Solids removed from the gaseous titanium tetrachloride stream.* These solids are associated with the production of titanium tetrachloride. These solids are typically slurried to impoundments for storage or disposal and are Bevill-exempt (with one exception described below).

(3) *Waste acids.* In 1990 and 1998 rulemakings for LDR Phase IV (see 63 FR 28601), EPA took the position that the waste acids do not meet the high-volume, low-toxicity test and thus are not exempt mineral processing wastes.

(4) *Gases going to scrubbers.* Offgases from the chlorinators pass through various air pollution control systems which generate scrubber waters. In 1998, EPA stated that scrubber waters and sludges from scrubber waters were not Bevill-exempt. However, as a result of the information collection activities associated with today's proposal, it is now clear to EPA that gases from the chlorinator contain some solids from the chlorinator. We are interpreting the exemption today to cover these particles when they drop out of scrubber waters to form sludges. (Gas streams and wastewaters are not Bevill exempt, even when they are carrying solid particles from chlorinator.)

(5) *Solids purged from the reactor.* A purge stream from the reactor may be taken to reduce silica levels in the reactor. This stream is Bevill exempt.

(6) *Recovered solids from the reaction area.* Housekeeping results in the collection of coke and ore solids from the vicinity of the reaction area. These wastes are Bevill exempt.

In one case, the facility conducts some processing of their ferric chloride waste acid (which is subsequently sold as a water and wastewater reagent), and generates a solids stream. We consider the processing that this facility conducts to be either an ancillary process or chemical manufacturing, and thus the subsequent solids stream is not generated from mineral processing and therefore is not exempt.

What Is The Status of the Mineral Processing Exemption for ‘‘Chloride Waste Solids From Titanium Tetrachloride Production’?

As part of our waste characterization of the titanium dioxide sector, we conducted analyses for chlorinated dibenzo-p-dioxins (CDDs) and dibenzo-p-furans (CDFs). We were concerned that these compounds might be present in the wastes as a result of the chlorination step which occurs in the presence of coke, and in fact we found measurable levels of these compounds in wastes from the chloride and chloride-ilmenite processes. These data are presented in the Titanium Dioxide Listing Background Document and associated analytical data reports in the docket for today's notice. As explained in this background document, we believe that these compounds are formed in the chlorinator, and are predominantly associated with the exempt mineral processing solids (additional details regarding this conclusion are provided in the referenced background document). These compounds were not assessed, however, as part of the rulemakings which established the mineral processing exemptions, and so these results could present new issues for these wastes if such compounds were found to pose unacceptable risks. During the development of the mineral processing exemption, EPA anticipated certain conditions might suggest the appropriateness of re-opening these exemptions.[48] We are considering whether we should re-assess the status of these wastes as exempt mineral processing wastes. Any reassessment of these wastes would involve a separate analysis and opportunity for notice and comment.

How Did EPA Assess Mixtures of Exempt and Non-Exempt Wastes From the Production of Titanium Dioxide?

There are a number of wastes from the titanium dioxide sector that remain partially within the scope of the consent decree because they are composed of both exempt and non-exempt solids. Because they are not ‘‘100 percent exempt’’ in composition, we have assessed their potential impacts on the environment, and attempted to isolate the risks associated with the non-exempt solids and wastewaters. Any assessment of the CDD and CDF loading in exempt wastes will involve a separate analysis and opportunity for notice and comment.

Finally, we are assessing one non-exempt waste generated at the Delaware facility, non-exempt non-wastewaters from the chloride-ilmenite process, which contains some CDDs and CDFs at levels exceeding our initial screening criteria. We did not, as part of today's listing determination, conduct sufficient risk assessment to fully evaluate the potential for risks. See section III.F.14.e(10) below.

5. Agency Evaluation

(1) Commingled wastewaters from the chloride process, including wastewaters from coke and ore recovery, scrubber water, finishing wastewaters and sludge supernatants.

How Many Facilities Generate This Waste Category and How Is It Managed?

Four facilities generated commingled wastewaters from the chloride process. (As will be discussed further in III.F.14.e(7), two additional facilities generate the same wastewaters and commingle them with wastewaters from the sulfate process.) Three of the four ‘‘chloride only’’ facilities treat their wastewaters in surface impoundment-based treatment systems; the fourth facility uses a tank-based wastewater treatment system. Each of the impoundment systems include unlined units. These large volume wastes are generated in excess of 29 million metric tons per year. These wastewaters are not Bevill-exempt (but convey exempt solids into the wastewater treatment system where those solids are removed to form sludges that are comprised of exempt solids and non-exempt solids, depending on the specific piping of the plants).

Many facilities commingle waste hydrochloric acids (generated as scrubber water) with their combined wastewaters. Three other facilities, however, return waste acids on site or sell the acids for reuse. Because these materials have no exposure route of concern, we did not further evaluate risk scenarios associated with reuse of this material.

What Management Scenarios Were Assessed?

For this rulemaking, we determined that the surface impoundment scenario poses a more significant potential risk than the tank scenario, and thus assessed the groundwater pathway for surface impoundments. We assessed potential groundwater releases to both surface water and drinking water wells. We concluded that the air pathway does not present significant risks for these wastes because the wastes do not contain volatile organics or other constituents that pose risk due to air releases.

How Was This Waste Category Characterized?

One of the four facilities, located in Hamilton, Mississippi, was selected for sampling and analysis. This facility's

---

[48] ‘‘If EPA finds that this exemption is not protective of human health and the environment and if an examination of titanium tetrachloride waste management shows any continuing or new problems, the Agency will reconsider this subtitle D determination for chloride process waste solids from titanium tetrachloride production.’’ 56 FR 273000, June 13, 1991.

waste is representative of the four chloride-only facilities. The sample was collected at the inlet to this facility's surface impoundment train.[49] This sample contained a high level of solids, reflecting the facility's practice of managing all waste solids (including Bevill-exempt solids) and process wastewaters in the same units which serve as settling ponds. To isolate the impact of the wastewater on the environment from that of the sludge, we conducted the SPLP on the waste matrix, and separately analyzed the filtrate and the leachate generated from the leaching step. We are proposing to use the filtrate analysis as representative of the wastewater portion of the commingled waste matrix (see III.E.2 and 3 for further discussion on the use of SPLP filtrate). The analytical results for the constituents found to be present in the filtrate at levels exceeding HBLs and/or AWQC are presented below in Table III–40 (the Titanium Dioxide Listing Background Document contains the full set of analytical results).

TABLE III–40.—CHARACTERIZATION OF COMMINGLED WASTEWATERS FROM CHLORIDE PROCESS, TITANIUM DIOXIDE

Constituent of concern	Detected levels in Sample KM–SI–01 (mg/L)		HBL	AWQC
	Total	SPLP Filtrate		
Antimony	<0.05	0.044	0.006	0.014
Arsenic	0.04	0.001	0.0007	0.000018
Manganese	25.9	0.46	0.73	0.05
Molybdenum	0.53	0.23	0.078	NA
Thallium	0.086	[1] <0.005	0.001	0.0017

[1] Thallium is identified as a potential constituent of concern because it was detected in the totals analysis at levels exceeding the HBL and AWQC, and the SPLP filtrate analysis detection limit was too high to confirm that mobile levels of thallium do not exceed these standards. One half the detection limit was used as input to the risk assessment (see III.E.3).

How Was the Groundwater-to-Surface Water Risk Assessment Established?

We assumed that surface impoundments present greater risks to the environment than tanks. Therefore we focused on the 3 facilities that manage wastewaters in impoundments. We selected the sampled facility for modeling because (1) its management practices (*i.e.,* treatment in surface impoundments) are representative of 3 of the 4 chloride-only facilities, (2) the analytical data for this waste were obtained from this site, and (3) its setting is similar to the other 2 facilities that use surface impoundments. The facility selected for modeling is bounded on two sides by a river, tributary creeks, and swamps. The RCRA Facility Assessment[50] for this site provides maps showing distances to these potential receptors and groundwater flow directions in the vicinity of the surface impoundments and plant-wide flow directions, with the overall flow being toward the river. We calculated infiltration rates for the unlined impoundment, and divided this flow rate into the flow rate of the river to determine potential concentrations of the five metals of concern in the river as a result of recharge with contaminated groundwater. The results of this screening (see ''Risk Assessment Support to the Inorganic Chemical Industry Listing: Background Information Document'') demonstrate that concentrations of the constituents of concern are likely to be well below risk thresholds for both human health and aquatic life in surface water.

How Was the Groundwater Ingestion Risk Assessment Established?

We were able to collect specific information regarding the physical setting of the modeled facility, and thus used primarily site-specific data as input to the risk assessment. We chose this site for modeling because the amount of available information best supported our data requirements for modeling and because we believe this facility is representative of other generators of this waste category in terms of hydrogeological setting and waste characterization. Based on information presented in the RFA for the facility of concern, as well as from the U.S. Geological Survey Groundwater Site Inventory, there are groundwater wells north of the plant. The RFA also indicates that groundwater flow direction in the localized vicinity of the surface impoundments is to the northwest. We modeled the potential impact of the unlined portion of the surface impoundment train on drinking water wells located within 2,000–5,000 feet (based on well locations and the closest facility property lines). The resultant concentrations are presented below in Table III–41.

TABLE III–41.—GROUNDWATER PATHWAY RISK ASSESSMENT RESULTS FOR COMMINGLED WASTEWATERS FROM CHLORIDE PROCESS, TITANIUM DIOXIDE

Constituent of concern	Risk or hazard quotient			
	90th%		95th%	
	Adult	Child	Adult	Child
Antimony HQ	0.1	0.2	0.2	0.5
Arsenic cancer risk	2E–08	2E–08	8E–08	6E–08
Molybdenum HQ	0.03	0.07	0.06	0.1

---

[49] This facility also commingles wastewaters from sodium clorate production, which account for approximately 1.7 percent of the total 4aste volume.

[50] U.S. EPA RCRA Facility Assessment of Kerr McGee Chemical Corporation; Hamilton, MS. June 16, 1995.

TABLE III–41.—GROUNDWATER PATHWAY RISK ASSESSMENT RESULTS FOR COMMINGLED WASTEWATERS FROM CHLORIDE PROCESS, TITANIUM DIOXIDE—Continued

Constituent of concern	Risk or hazard quotient			
	90th%		95th%	
	Adult	Child	Adult	Child
Thallium HQ	0.02	0.03	0.03	0.07

What Is EPA's Listing Rationale for This Waste?

We propose not to list commingled wastewaters from the production of titanium dioxide via the chloride process. The results of our risk assessment show that this waste category does not pose significant risk to human health and the environment. Our assessment of the air and surface water exposure pathways shows no risk of concern. Our assessment of the groundwater exposure pathway similarly shows no risk of concern for the constituents of concern.

(2) Chloride process solids (Bevill exempt). Six facilities generate waste solids from the chloride process. As previously discussed, the Agency determined at 56 FR 27312 (June 13, 1991) that chloride process waste solids from titanium tetrachloride production are Bevill exempt mineral processing wastes (40 CFR 261.4(b)(7)(ii)(S)). Five of the six facilities generate their solids in surface impoundments; the sixth, located in Louisiana, uses tank-based settling to segregate the solids from their wastewaters. All six facilities dispose of their solids in their surface impoundments or on-site landfills. Approximately 1.2 million MT of this waste was generated in 1998.[51] The waste solids at each of these sites contains contributions from Bevill exempt solids ranging from 100% to 40%, as discussed further below.

At the two facilities located in Georgia and Louisiana, coke and ore solids are generated as entirely segregated wastes that are not commingled with non-exempt solids; these exempt wastes are clearly outside the scope of the consent decree dictating today's proposal and have not been assessed further.

At three other facilities, the facilities conduct some commingling of their wastewaters, resulting in small potential contributions of non-exempt solids to their waste solids. Two of these facilities, both located in Ohio, commingle wastewaters from oxidation and finishing (*i.e.,* generated after the production of titanium tetrachloride and therefore potentially bearing non-exempt solids) with the wastewaters from titanium tetrachloride production that bear exempt solids. Neither facility reported any solids in their oxidation and finishing wastewaters, although data from similar wastewaters from the chloride-ilmenite process indicate that very low levels of solids can be present in similar wastewaters. (We assess solids from the chloride-ilmenite process in section III.F.14.e(10) of this proposal.) At the third facility (located in Mississippi), which operates a slightly different process, there were no reported wastewaters or solids from oxidation and finishing. Note that the wastewaters bearing the exempt solids at this facility are commingled with comparatively small volumes of wastewaters from sodium chlorate production (described in section III.F.11 of today's proposal).[52] We believe that the contribution of any non-exempt solids to the volume of exempt solids from these three facilities would be very small. Thus, we have chosen not to attribute any risks to the nonexempt portion of these commingled solids.

Two of the six facilities generating chloride process waste solids also operate sulfate-based titanium dioxide production lines. These plants are sited in Georgia and Maryland. Wastewaters from the chloride process and sulfate processes are commingled and results in commingled wastewater treatment solids that are partially composed of exempt solids. The non-exempt wastewater treatment solids are described separately in section III.F.14.e(8). They contain significant volumes of non-exempt solids (>35%).

(3) Various sands from oxidation, milling and scouring.

How Many Facilities Generate This Waste Category and How Is It Managed?

Two facilities using the chloride process reported disposal of 250 MT of milling sand in off-site and dedicated on-site Subtitle D landfills. One facility also reported landfilling over 2,300 MT of scouring sand. One facility reported 6,935 MT/yr of waste oxidation sand that is managed in an on-site industrial Subtitle D landfill. All of these sands are similar and are associated with titanium dioxide finishing operations. All of these sands are produced after the beginning of chemical manufacturing and therefore are not exempt.

What Management Scenarios Were Assessed?

We assessed the off-site industrial landfill scenario for milling sand and a dedicated on-site landfill for scouring sand, reflecting the types of management reported for these wastes. We assessed the groundwater ingestion pathway for these landfills. The on-site landfill scenario for scouring sand screened out when we compared the SPLP results for this waste directly to the HBLs.

How Was This Waste Category Characterized?

We collected samples of both the milling sand and the scouring sand. We conducted total, TCLP and SPLP analyses on the waste matrix. We used the SPLP results (rather than the TCLP) to assess potential releases to groundwater because there is no contact with municipal landfill leachate in the reported management practices, and no indication that other practices are likely. The SPLP analytical results of concern for the milling sand are presented below in Table III–42.

---

[51] This waste volume includes the non-exempt sulfate solids generated at one of the 2 facilities that commingle wastes from the chloride and sulfate processes.

[52] The sodium chlorate wastewaters account for only 1.7% of the total volume of managed wastewater, and for only 4.4% of the solids generated. The predominant potential constituent of concern in the sodium chlorate solids is chromium; analytical data for the commingled solids (KM–SI–04) show that the SPLP concentration is <0.05 mg/L and not of concern. See section III.F.11 for further discussion of this facility's sludge.

TABLE III–42.—CHARACTERIZATION OF MILLING SAND FROM TITANIUM DIOXIDE PRODUCTION

Constituent of concern	Detected SPLP levels in KP–SO–05 (mg/L)	HBL (mg/L)
Antimony	0.024	0006

How Was the Groundwater Ingestion Risk Assessment Established?

As described in Section III.D.4. we used our standard distance-to-well assumptions for an off-site landfill, and assumed hydrogeologic conditions would be comparable to those for the reported off-site landfill. As shown in Table III–43, the resultant risks were calculated.

TABLE III–43.—GROUNDWATER PATHWAY RISK ASSESSMENT RESULTS FOR MILLING SAND FROM TITANIUM DIOXIDE PRODUCTION

Percentile	Antimony HQ Adult risk	Child risk
90th	0.003	0.006
95th	0.008	0.02

What is EPA's Listing Rationale for This Waste?

We propose not to list this waste because the modeled and screening risk for antimony, the sole constituent of concern, is well below a hazard quotient of unity.

(4) Gypsum from the sulfate process.

How Many Facilities Generate This Waste Category and How Is It Managed?

The Maryland and Georgia facilities generate this waste. Both sites pipe their acid directly to their gypsum plants where it is neutralized to form gypsum. We found no significant potential for release of this acid waste prior to its treatment in the gypsum plant. The two facilities reported production of 69,500 MT/yr of gypsum that is landfilled.[53] We chose to look further at this material because it is disposed of in a landfill and used in a manner constituting disposal (*i.e.*, as fertilizer), and because the generators conduct on-site land placement (piles). Specifically, the Georgia facility places their gypsum in piles prior to sale for use in agricultural chemicals, cement, chemical products, and wall board. The Maryland facility generates primary and secondary gypsum, both of which are also placed in piles prior to use in wall board manufacture or disposal in an on-site landfill. As described above, the gypsum is not an exempt mineral processing waste because this sulfate process wastestream did not meet the high volume/low toxicity criteria noted in 54 FR 36592 (September 1, 1989).

What Management Scenarios Were Assessed?

We assessed each of the reported management scenarios that involve land placement: agricultural chemicals, cement, piles and landfills. We evaluated potential releases to both air and groundwater. Samples were collected at both facilities, and included both primary and secondary gypsum samples at the Maryland site. The management scenarios were assessed using the appropriate sample for the type of gypsum reported for that scenario. All pathways screened out except for the landfill scenario at the Maryland site. For the Maryland landfill we found constituent concentrations at levels of potential concern for the groundwater and surface water pathways. The primary gypsum contained lower levels of leachable metals than the secondary gypsum; we focused our modeling efforts on the higher volume secondary gypsum as it was more likely to show risk when modeled and the management scenarios are identical (they are placed in the same on-site industrial landfill). The screening results are discussed further in the ''Titanium Dioxide Listing Background Document for the Inorganic Chemical Listing Determination,'' available in the docket for today's notice.

We assessed the landfill scenario for potential impacts to both surface water and drinking water wells. The facility selected for modeling is bounded to the north and east by the Patapsco River, which is an estuary. The expected groundwater flow, while not characterized definitively, is expected to be eastward, toward the river.[54]

How Was This Waste Category Characterized?

We collected three samples of this waste for analysis. We conducted total, TCLP and SPLP analyses on the waste matrices. We used the SPLP results (rather than TCLP) to assess potential releases to groundwater and surface water because there is no contact with municipal landfill leachate in the reported management practices. We used total results to assess potential air releases, and this pathway screened out. The SPLP analytical results for the secondary gypsum that we used to assess groundwater releases from landfilling are presented below in Table III–44.

TABLE III–44.—CHARACTERIZATION OF SECONDARY GYPSUM FROM SULFATE PROCESS, TITANIUM DIOXIDE

Constituent of concern	Detected SPLP levels in MI–SO–03 (mg/L)	HBL (mg/L)	AWQC (mg/L)
Antimony	0.055	0.006	0.014
Arsenic	<0.0035	0.0007	0.000018
Manganese	3.1	0.73	0.05

---

[53] Additional volumes are used as products.

[54] See ''Update of the Hazardous Waste Groundwater Task Force'', April 1998. Maryland Department of the Environment. RCRA Operation and Maintenance Inspection of SCM Chemicals (now Millennium Inorganic Chemicals, Inc.); Hawkins Point Plant; Baltimore, MD. October 1994.

How Was the Groundwater-to-Surface Water Risk Assessment Established?

We calculated infiltration rates for the unlined landfill, and divided this flow rate into the flow rate of the river to determine potential concentrations of the three metals of concern (see Table III–44) in the river as a result of recharge with contaminated groundwater. The results of this screening (available in the Risk Assessment Background Document) demonstrate that concentrations of the constituents of concern are expected to be well below risk thresholds for human health and aquatic life in surface water.

How Was the Groundwater Ingestion Risk Assessment Established?

While we are not aware of any actual drinking water wells in the vicinity of the Maryland facility, we were unable to determine definitively that there are not private wells in use in the residential area to the south of the facility, or that potentially contaminated groundwater would not reach this neighborhood. We thus decided to model potential exposure at this neighborhood. We modeled the potential impact of the unlined landfill on drinking water wells located within 2,500–5,000 feet (based on distances to the nearest residential area). The resultant risks were calculated and are summarized in Table III–45.

TABLE III–45.—GROUNDWATER PATHWAY RISK ASSESSMENT RESULTS FOR SECONDARY GYPSUM FROM SULFATE PROCESS, TITANIUM DIOXIDE

	Antimony HQ		Arsenic—cancer risk		Manganese HQ	
	Adult risk	Child risk	Adult risk	Child risk	Adult risk	Child risk
90th	0.23	0.49	6.E–07	4.E–07	0.1	0.2
95th	0.35	0.75	1.E–06	1.E–06	0.1	0.3

What is EPA's Listing Rationale for This Waste?

We propose not to list gypsum from the sulfate process. The results of our risk assessment demonstrate that there is no significant risk associated with this material, and that it does not warrant control as a listed hazardous waste. At the 95th percentile, the risks for antimony (HQ=0.75) and arsenic ($1E^{-6}$), approach levels at which EPA considers listing wastes (HQ=1.0 and cancer risk>10^{-6}, respectively). We believe that our modeled exposure scenario, while plausible, contains a number of conservative assumptions that likely overstate these marginal risks. In particular, our assumptions regarding groundwater flow direction (*i.e.,* that a contaminated plume from the landfill would flow to the south toward the nearest residences, rather than due west toward the river) and the use of groundwater for drinking water at these residences (records indicate this community uses public water) may overstate actual risks.

(5) Digestion scrubber water from the sulfate process.

How Many Facilities Generate This Waste Category and How Is It Managed?

The Maryland and Georgia facilities reported generation of digestion scrubber water from the sulfate process. The Maryland facility manages this wastewater in a dedicated surface impoundment after neutralization. The other facility commingles this wastewater with other wastewaters from their chloride and sulfate processes. As described above, the gypsum is not an exempt mineral processing waste because this sulfate process wastestream did not meet the high volume/low toxicity criteria noted in 54 FR 36592 (September 1, 1989). (See 40 CFR 261.4(b)(7)(ii).)

What Management Scenarios Were Assessed?

We assessed the waste in its commingled form as managed by the Maryland facility, as described below in section III.F.14.e(7). We also modeled the dedicated surface impoundment scenario using the physical parameters describing the dedicated Georgia impoundment. This impoundment is placed directly on the banks of a river, and thus we were primarily concerned with potential releases to surface water. We did not model a drinking water well scenario because there are no constituents of concern in this wastewater at levels exceeding HBLs.

How Was This Waste Category Characterized?

We collected one sample of this waste for analysis. We conducted total analyses (leaching was not conducted given the low levels of percent solids in this waste), which are summarized below in Table III–46 for the constituents of potential concern.

TABLE III–46.—CHARACTERIZATION OF DIGESTION SCRUBBER WATER FROM SULFATE PROCESS, TITANIUM DIOXIDE

Constituent of concern	Detected levels in MI–WW–03 (mg/L)	HBL (mg/L)	AWQC (mg/L)
Aluminum	0.58	16	0.087
Manganese	0.58	0.73	0.05
Mercury	0.0032	0.005	0.000050

How Was the Groundwater-to-Surface Water Risk Assessment Established?

We calculated infiltration rates for the unlined surface impoundment, and divided this flow rate into the flow rate of the river to determine potential concentrations of the three metals of concern (see Table III–46) in the river as a result of recharge with contaminated groundwater. The results of this screening (available in the Risk Assessment Background Document) demonstrate that concentrations of the constituents of concern are likely to be well below risk thresholds for human health and aquatic life in surface water.

What is EPA's Listing Rationale for This Waste?

We propose not to list digestion scrubber water from the production of titanium dioxide via the sulfate process. The results of our risk assessment show that this waste category does not warrant listing as a hazardous waste.

(6) Sulfate process digestion sludges.

How Many Facilities Generate This Waste Category and How Is It Managed?

The Maryland and Georgia facilities generate this sludge. The Georgia facility manages it in a dedicated surface impoundment and the Maryland facility places it in an on-site landfill. As described above, the waste is not an exempt mineral processing waste because this sulfate process wastestream did not meet the high volume/low toxicity criteria noted in 54 FR 36592 (September 1, 1989). (See 40 CFR 261.4(b)(7)(ii).)

What Management Scenarios Were Assessed?

We assessed both management scenarios using the respective samples collected at each facility. The surface impoundment scenario screened out; the levels of constituents in the wastewater were below HBLs and AWQC. We modeled the landfill scenario for potential releases to both groundwater drinking wells and surface water.

How Was This Waste Category Characterized?

We collected one sample of this waste for analysis at the Maryland facility. We conducted total, TCLP, and SPLP analyses. We used the SPLP results as inputs to the on-site landfill, which are summarized below in Table III–47 for the constituents of potential concern.

TABLE III–47.—CHARACTERIZATION OF DIGESTION SLUDGE FROM SULFATE PROCESS, TITANIUM DIOXIDE

Constituent of concern	Detected SPLP Levels in MI–SO–02 (mg/L)	HBL (mg/L)	AWQC (mg/L)
Aluminum	2.0	16	0.087
Antimony	0.023	0.006	0.014
Copper	0.37	1.3	0.0031
Iron	12.0	5	1
Lead	[1] 0.004	0.015	0.0025
Manganese	0.36	0.73	0.05
Vanadium	0.42	0.14	
Zinc	0.30	4.7	0.12

[1] Results are less than the typical laboratory reporting limit, but are greater than the calculated instrument detection limits.

How Was the Groundwater-to-Surface Water Risk Assessment Established?

We calculated infiltration rates for the landfill, and divided this flow rate into the flow rate of the river to determine potential concentrations of the three metals of concern (see preceding table) in the river as a result of recharge with contaminated groundwater. Note that this is the same Maryland landfill described elsewhere in III.F.14.e(4) and (8). The results of this screening (available in the Risk Assessment Background Document) demonstrate that concentrations of the constituents of concern are likely to be well below risk thresholds for human health and aquatic life in surface water.

How Was the Groundwater Ingestion Risk Assessment Established?

See the comparable discussion for the gypsum (III.F.14.e(4)). The groundwater ingestion scenario was assessed for antimony and vanadium because the detected SPLP concentrations exceeded their respective HBLs. We did not assess the iron HBL exceedence because the HBL is at or above the solubility limit in ground water under most conditions. The resultant risks were calculated and are summarized in Table III–48.

TABLE III–48.—GROUNDWATER PATHWAY RISK ASSESSMENT RESULTS FOR DIGESTION SLUDGE FROM SULFATE PROCESS, TITANIUM DIOXIDE

	Antimony HQ		Vanadium HQ	
	Adult risk	Child risk	Adult risk	Child risk
90th	0.13	0.27	0.02	0.03
95th	0.18	0.39	0.03	0.07

What Is EPA's Listing Rationale for This Waste?

We propose not to list this waste. The results of our risk assessment modeling show that this waste does not contain mobile metals that are likely to pose risk to human health and the environment due to transport through the subsurface.

(7) Commingled wastewaters from the chloride and sulfate process.

How Many Facilities Generate This Waste Category and How Is It Managed?

The Maryland and Georgia facilities generate this waste category. Both facilities neutralized their commingled wastewaters and manage them in surface impoundments prior to NPDES discharge (but convey exempt solids into the wastewater treatment system where those solids are removed to form sludges that are comprised of exempt solids and non-exempt solids, depending on the specific piping of the plants).

What Management Scenarios Were Assessed?

We collected samples at both facilities at the influent to their surface impoundment trains. We screened the risk at both facilities using the analytical data describing their respective wastes. We concluded that the Georgia facility was not a modeling candidate because none of the constituents detected in its waste exceeded our health-based levels or the ambient water quality criteria. At the Maryland facility, we modeled the surface impoundment scenario using the physical parameters describing their unlined impoundment. We assessed both the surface water and drinking water well scenario.

How Was This Waste Category Characterized?

The sample contained a high level of solids, reflecting the facility's practice of managing all waste solids and process wastewaters in the same unit. To isolate the impact of the wastewater on the environment from that of the sludge, we conducted the SPLP on the waste matrix, and separately analyzed the filtrate and the leachate generated from the leaching step. We are proposing to use the filtrate analysis as representative of the wastewater portion of the commingled waste matrix. The analytical results for the constituents found to be present in the filtrate at levels exceeding HBLs and/or AWQC are presented below in Table III–49.

TABLE III–49.—CHARACTERIZATION OF COMMINGLED WASTEWATERS FROM CHLORIDE AND SULFATE PROCESS, TITANIUM DIOXIDE

[mg/L]

Constituent of concern	Detected levels in sample MI–WW–04		HBL	AWQC
	Total	SPLP Filtrate		
Arsenic	0.022	<0.005 (1)	0.0007	0.000018
Manganese	119	9.95	0.73	0.05
Thallium	0.005	0.004	0.001	0.0017

(1) 1/2 the detection limit was used as input to the risk assessment.

How Was the Groundwater-to-Surface Water Risk Assessment Established?

We calculated infiltration rates for the surface impoundment, and divided this flow rate into the flow rate of the river to determine potential concentrations of the two metals of concern (see preceding table) in the river as a result of recharge with contaminated groundwater. The results of this screening (available in the Risk Assessment Background Document) demonstrate that concentrations of the constituents of concern are likely to be well below risk thresholds for human health and aquatic life in surface water.

How Was the Groundwater Ingestion Risk Assessment Established?

See the comparable discussion for the gypsum (III.F.14.e(4)). The resultant risks were calculated and are summarized in Table III–50.

TABLE III–50.—GROUNDWATER PATHWAY RISK ASSESSMENT RESULTS FOR COMMINGLED WASTEWATERS FROM CHLORIDE AND SULFATE PROCESSES, TITANIUM DIOXIDE

Constituent of concern	90th percentile		95th percentile	
	Adult	Child	Adult	Child
Arsenic cancer risk	5E–08	3E–08	2E–07	1E–07
Manganese HQ	0.009	0.02	0.02	0.04

What Is EPA's Listing Rationale for This Waste?

We propose not to list commingled wastewaters from the production of titanium dioxide from the chloride and sulfate processes. The results of our risk assessment demonstrate that this waste category does not pose risks warranting listing as hazardous waste. Arsenic levels at the receptor result in cancer risks well below 1E–06, and manganese levels at the receptor are similarly well below a hazard quotient of one.

(8) Wastewater treatment sludges from commingled chloride-and sulfate-process wastewaters.

How Many Facilities Generate This Waste Category and How Is It Managed?

Two facilities, sited in Georgia and Maryland, generate this waste category, and after de-watering, place their sludges in on-site landfills. Over 159,000 MT of this waste was generated in 1998.

What Is the Bevill Exemption Status of This Waste Category?

As discussed above, the chloride process waste solids are exempt mineral processing wastes, to the extent that they are associated with the titanium tetrachloride process. Data provided by these two facilities, however, show that these waste contain at least 35% non-exempt solids. Our quantitative assessment of the potential risk associated with these non-exempt solids is provided here.

The wastewater treatment solids at the Maryland site are derived from at least four primary sources. Two residuals from the chloride process contribute exempt solids (*i.e.*, solids slurry and scrubber water from the reaction area) as identified in 261.4(b)(7)(ii)(S) and discussed above in III.F.14.e(2). Two scrubber waters from the calcination[55] and finishing portion of the sulfate process contribute non-exempt solids to the wastewater treatment solids (sulfate process wastes

---

[55] Although wastes from calcining are generally treated as Bevill exempt extraction/beneficiation wastes, wastes from titanium dioxide calcination are post-mineral processing, chemical manufacturing wastes. The Agency noted at 54 FR 36619, ''As discussed in the April NPRM, the Agency considers any operations following the initial [mineral] processing operation to be [mineral] processing operations, regardless of whether the activity was included on the list of RTC beneficiation activities or has traditionally been considered beneficiation.'' Therefore, since mineral processing ends and chemical manufacturing starts at the beginning of oxidation, and the calcining step occurs after oxidation, all wastes generated from the calcining step are non-exempt wastes.

are not exempt because, as described above, the sulfate process wastestreams did not meet the high volume/low toxicity criteria noted in 54 FR 36592 (September 1, 1989)). Additional potential sources of minor amounts of solids are other wastewaters that are treated in this facility's wastewater treatment system, including cooling water, stormwater, drainage water and landfill leachate. Based on the information reported in this facility's § 3007 survey response, we estimate that their wastewater treatment solids are more than 35% non-exempt.

The wastewater treatment solids at the Georgia site are derived from at least six sources. Two residuals from the chloride process contribute exempt solids (*i.e.*, waste acid from the chloride reaction area and supernatant from the chloride solids impoundment) (261.4(b)(7)(ii)(S)). Finishing wastewaters from the chloride process contribute non-exempt solids (these wastewaters are generated from the chemical manufacturing end of the production process). At least three wastewaters from the sulfate process contribute non-exempt solids. Based on the information reported in this facility's § 3007 survey response, we estimate that their wastewater treatment solids are significantly more than 35% non-exempt.

What Management Scenarios Were Assessed?

We collected samples of both facilities' wastes and therefore assessed the management practices at the two sites individually. The Maryland facility treats its wastewater in surface impoundments; the sludge is generated from a filter press, and the facility then places the sludge in an on-site landfill. We assessed potential groundwater releases to both surface water and drinking water wells from this landfill. The Georgia facility dredges its sludge from its surface impoundments, filter presses the solids, places the filter solids in piles for further drainage and air drying, and then places the filter solids in an industrial on-site landfill. We assessed the groundwater pathways for the landfill and pile, and the air pathway for the pile. (Note that we elsewhere assess the groundwater impact of the Maryland surface impoundments using sampling data for the wastewater in that unit. See III.F.14.e(7)). All pathways for the Georgia facility screened out and are not discussed further in this notice (see the ''Titanium Dioxide Listing Background Document for the Inorganic Chemical Listing Determination'' for details of this screening).

How Was This Waste Category Characterized?

Both facilities were selected for sampling and analysis. Both samples were collected from filter cake discharge of the filter press. We conducted total, TCLP and SPLP analyses on the waste matrix. We used the SPLP results (rather than the TCLP) to assess potential releases to groundwater and surface water because there is no potential for contact with municipal landfill leachate in the reported management practices for these two facilities. Given the large waste quantities reported for this category, we believe it would be prohibitively expensive for off-site disposal to occur. We used total results to assess potential air releases from the piles, and found no significant risks. The SPLP analytical results used to assess groundwater releases at the Maryland facility that generates commingled chloride/sulfate wastewater treatment sludge (as described in the previous paragraph) are presented below in Table III–51.

TABLE III–51.—CHARACTERIZATION OF COMMINGLED WASTEWATER TREATMENT SLUDGES FROM CHLORIDE AND SULFATE PROCESSES, TITANIUM DIOXIDE

Constituent of concern	Detected SPLP levels in MI–SO–01 (mg/L)	HBL (mg/L)	AWQC (mg/L)
Aluminum	0.24	16	0.087
Arsenic	[1] 0.00005	0.0007	0.000018
Manganese	2.63	0.73	0.05
Thallium	[1] 0.003	0.001	0.0017

[1] Estimated results are less than the typical laboratory reporting limit, but are greater than the calculated instrument detection limits.

In addition to the metals described above, our analytical data show that this waste contains polychlorinated dioxins and furans (PCDD/F). These data are provided in the background document for the titanium dioxide sector. As discussed previously (III.F.14.d), we believe that these contaminants are clearly associated with the exempt solids contained in this waste, and thus we did not assess them. Samples collected at these two facilities bear out this association with the exempt solids. The Maryland facility, which does not segregate any of its exempt solids from other wastewater treatment solids, has significantly higher PCDD/F levels than the Georgia facility (*i.e.*, several orders of magnitude), which segregates the majority of its exempts solids from its wastewater treatment solids.

How Was the Groundwater-to-Surface Water Risk Assessment Established?

The Maryland facility selected for modeling this scenario was also modeled for several other wastes, and is described further in section III.F.14.e(5) above. We calculated infiltration rates for the unlined landfill, and divided this flow rate into the flow rate of the river to determine potential concentrations of the four metals of concern (see preceding table) in the river as a result of recharge with contaminated groundwater. The results of this screening (available in the Risk Assessment Background Document) demonstrate that concentrations of the constituents of concern are likely to be well below risk thresholds in surface water.

How Was the Groundwater Ingestion Risk Assessment Established?

The facility selected for modeling this scenario was also modeled for several other wastes, and is described further in section III.F.14.e(4) above. The resultant risks were calculated and are summarized in Table III–52.

TABLE III–52.—GROUNDWATER PATHWAY RISK ASSESSMENT RESULTS FOR COMMINGLED WASTEWATER TREATMENT SLUDGES FROM CHLORIDE AND SULFATE PROCESSES, TITANIUM DIOXIDE

	Manganese HQ		Thallium HQ	
	Adult risk	Child risk	Adult risk	Child Risk
90th	0.1	0.3	0.1	0.3
95th	0.2	0.5	0.2	0.4

What Is EPA's Listing Rationale for This Waste?

We are proposing not to list commingled wastewater treatment sludges from chloride and sulfate processes because our modeling of potential groundwater releases shows no risk at levels which warrant listing this waste as hazardous. No scenario modeled (groundwater-to-surface water and groundwater-to-drinking water wells) showed risk at levels of regulatory concern.

(9) Waste acid (ferric chloride) from the chloride-ilmenite process.

How Many Facilities Generate This Waste Category and How Is It Managed?

All three facilities that utilize the chloride-ilmenite process generate this waste category. The DeLisle, Mississippi facility identifies the waste as characteristic for corrosivity, chromium and lead and disposes of its waste in an on-site underground injection well. The Tennessee facility pipes its ferric chloride to an on-site sodium chloride plant. Both the Mississippi and Tennessee facilities generate the majority of their exempt-mineral processing solids from the filtration of this waste acid. The Delaware facility's process is slightly different in that the majority of their exempt solids are generated prior to the generation of the waste acid, and only a relatively small portion of their solids are generated from the removal of solids from this waste. The Delaware facility adds a processing chemical to their waste acid, removes solids, stores the acid in tanks (as well as an on-site surface impoundment when their tank capacity is exceeded), and sells the acid to a broker for resale as a wastewater and drinking water treatment reagent. However, EPA is not at this time assessing whether the ferric chloride is a legitimate product. We did not attempt to address this complex and site-specific issue in this proposal. We note that the Delaware facility uses a surface impoundment to store a portion of the ferric chloride prior to its sale as a water and wastewater treatment reagent. EPA has often considered land-based units, and impoundments in particular, to be associated with the discard of wastes, rather than the storage of products, because of their potential for releases to the environment.[56] In addition, we sampled the ferric chloride at the Delaware facility and found that it contains a variety of metals, as well as some chlorinated dioxins and furans. (See the background document for this sector for more details on this sampling and analysis). These factors may lead to concerns about the legitimacy of the use of this material as a drinking water and wastewater treatment reagent. However, as explained below, we do not need to resolve this issue to make a decision about listing ferric chloride.

This waste routinely exhibits the characteristic of corrosivity and the toxicity characteristic for chromium and lead. All three generators of the ferric chloride waste acid acknowledge the hazardous nature of this waste. Each generator reported pH levels at 1 or less, and the one facility that disposes of this waste via deep well injection assigns three separate characteristic codes to this material. EPA sampled the ferric chloride at the Delaware facility, and both EPA and the facility analyzed the waste. The results showed that this material exhibits the characteristics of D001, D007, and D008.

What Is the Bevill Status of This Waste?

Ferric chloride waste acid is a liquid mineral processing waste that did not meet the high volume/low toxicity criteria for determining eligibility for the Bevill exemption and therefore is not Bevill-exempt (see 63 FR 28601).

What Is the Bevill Status of Solids Removed From This Waste?

Prior to disposal or reuse of their waste acids, both the Mississippi and Tennessee plants filter their waste acid to remove the exempt solids. At the Delaware site, however, the waste acid is processed via the addition of a chemical prior to solids removal. The purpose of the chemical addition is to modify the properties of the waste acid to enhance its value as a saleable potable water and wastewater treatment reagent.

The addition of this chemical at the Delaware plant marks the end of titanium tetrachloride production (*i.e.*, mineral processing) and the beginning of ferric chloride production (assuming ferric chloride is a legitimate product). Ferric chloride production can be considered either chemical manufacturing[57] or an ancillary process.[58] Consequently, as explained below in section III.F.14.e(10), solids removed from the ferric chloride at the Delaware plant are not Bevill-exempt.

What Is EPA's Listing Rationale for This Waste?

We are proposing to not list this waste and rely instead on the existing regulatory controls provided by the hazardous waste characteristics. Data from all three facilities clearly demonstrates that this waste exhibits several of the characteristics. At this time we have not determined whether any of the facilities are out of compliance. State and EPA authorities are examining these sites in detail for compliance with the existing regulations. Listing would not serve to better establish this jurisdiction.

The Mississippi facility that injects this waste identifies the waste as hazardous and manages it as a hazardous waste under Subtitle C regulations. Within the context of this consent decree, we did not investigate in depth the Tennessee facility's use of this material in production of sodium

---

[56] Surface impoundments pose essentially inherent risks of groundwater contamination due to the hydraulic pressure created by the contained liquids. Chemical Waste Management v. EPA, 919 F.2d 158, 166 (D.C. Cir. 1992). Material that is placed in a surface impoundment, where it is capable of posing a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported or disposed of or otherwise managed, ''by leaching into the ground, is 'discarded material' and hence a solid waste.'' (AMC II, 907 F.2d) Although secondary materials may have value and be reused, their value does not protect them from being considered solid wastes for the purposes of RCRA regulation if they are discarded prior to use (API, 906 F.2d at 741 n.16).

[57] 54 FR 36616, September 1, 1989.

[58] All wastes from ancillary activities are not uniquely associated with extraction/beneficiation and processing of ores and minerals (see 45 FR 76619, November 19, 1980, and 63 FR 28590, May 26, 1998).

chloride (an inorganic chemical not identified as one of the 14 products of concern in the consent decree) because there was no known exposure route associated with the management of the material prior to inserting it into a non-consent decree production process. As discussed previously, the Delaware facility stores the material in a surface impoundment. EPA can address concerns, if appropriate, by the use of enforcement, based on the existing characteristics associated with this material. In addition, the questions framed above about the potential legitimacy of this facility's use of ferric chloride as a product and its storage in a surface impoundment are equally relevant whether the ferric chloride is listed as a hazardous waste or is known to exhibit the characteristics of hazardous waste. Therefore we have decided to not list this waste as a hazardous waste and rely on the hazardous characteristics of the material for any necessary control.

(10) Non-exempt nonwastewaters from the chloride-ilmenite process.

How Many Facilities Generate This Waste Category and How Is It Managed?

All three chloride-ilmenite facilities generate wastes that contain commingled exempt and non-exempt components. Depending on the specific configuration of the individual plants, these wastes are composed to different degrees of exempt and non-exempt solids, as described further below.

Solids are generated in several places in the chloride ilmenite process:

—Coke and ore solids are removed from the gaseous titanium tetrachloride product stream, quenched and neutralized. While the Agency believes this stream is largely exempt, we note that any contributions to this stream from the disposal of the vanadium waste is non-exempt.

—Solids are generated during wastewater treatment and are non-exempt to the extent they are generated from oxidation and finishing wastewaters.

—Coke and ore solids can also be generated from the removal of solids from waste acid. These residuals may contain a non-exempt portion if they are partially comprised of vanadium waste. These solids cannot be exempt if they are removed from the waste acid after the initiation of chemical manufacturing and/or ancillary operations.

We assessed these various sources of non-exempt materials as one waste category because of the expected similarities among these materials and the commingled management practices used by these facilities. The total non-exempt portion of this waste category is approximately 10% with variations among the three sites. The specific sources of non-exempt materials for each of the three chloride-ilmenite facilities is described below.

All three facilities generate non-exempt vanadium waste when they separate vanadium compounds from titanium tetrachloride. The facilities reinsert these materials into the reaction area. Titanium tetrachloride is recovered and maybe reused; however, the remainder of this waste is not reused and is incorporated into the unreacted coke and ore solids stream from the reaction area, the solids separated from the ferric chloride, or the ferric chloride. This vanadium waste is not exempt because it is not a solid. However we were not able to determine the volume contribution of this vanadium waste to the various wastes into which it is ultimately incorporated. Hence, the estimates of total exempt solids provided below are likely to be underestimated. (This waste is also discussed in III.F.14.e(14) below.)

The Delaware facility combines and neutralizes three sources of solids (reactor solids, solids removed from ferric chloride waste acid, and solids from wastewater treatment), and markets the resulting material as ‘‘Iron Rich’’ material. As asserted by the company, uses of Iron Rich include structural fill, landfill caps and covers, and construction of dikes for containment of dredged spoils on the Delaware River. The facility may also stabilize some portion of the Iron Rich with fly ash prior to sale. Each component of the Delaware commingled residuals is described in the following paragraphs.

The majority of the commingled Delaware solids are unreacted coke and ore materials that are removed from the gaseous titanium tetrachloride product stream after the reactor. These ‘‘reactor solids’’ make up more than 80% of the volume of commingled ‘‘Iron Rich’’ at this facility. This stream is comprised of exempt chloride process solids and non-exempt vanadium waste.

The Delaware facility also removes solids from its ferric chloride. This solids removal step takes place after the facility incorporates a chemical additive into the ferric chloride. We have concluded that the use of this chemical constitutes chemical processing that is outside the scope of the Bevill exemption (see 54 FR 36592, September 1, 1989 and previous waste acid discussion in III.F.14(e)(9)). In addition, this stream is partially derived from the Delaware facility's non-exempt vanadium waste. These ferric chloride solids are not exempt. They make up approximately 10% of the commingled ‘‘Iron Rich’’.

The Delaware facility also uses scrubbers at various points in its process. Some solids make their way into scrubber waters. When the facility treats these wastewaters, the solids precipitate and the resultant wastewater treatment solids are added to the two wastes described above to form ‘‘Iron Rich’’. Solids from the scrubber used to treat gasses from the titanium tetrachloride reactor are Bevill-exempt. Solids from scrubbers associated with oxidation and finishing (steps that take place after the formation of titanium tetrachloride) are not exempt. Based on facility data, we estimate that approximately 1.5% of the total volume of ‘‘Iron Rich’’ consists of non-exempt solids from wastewater treatment.

The Tennessee facility generates solids from ferric chloride filtration and from wastewater treatment. The filter solids are exempt (261.4(b)(7)(ii)(S)) because such filtration simply removes exempt solids. Unlike the processing that occurs at the Delaware plant, no chemical manufacturing is taking place at this step at the Tennessee plant. The facility landfills these ferric chloride solids as a discrete wastestream; we do not assess this exempt waste further in this rule. This facility commingles wastewaters from both the titanium tetrachloride and titanium dioxide sides of the process, and the resultant wastewater treatment sludge is thus comprised of exempt and non-exempt sources. The Tennessee facility reported estimated percent solids data for most of their wastewaters. We reviewed these data and determined that a significant portion (74%) of the resultant sludge would be nonexempt (see Titanium Dioxide Listing Background Document for calculations). These nonexempt solids are within the scope of today's proposal. We sampled the commingled exempt and nonexempt waste and describe our assessment of this material in this section.

The Mississippi facility also generates exempt solids from filtering ferric chloride prior to deep well injection. No chemical manufacturing occurs. These solids are placed in a dedicated on-site landfill, and are not assessed further in this rule. The facility also operates a wastewater treatment system which is similar to the Tennessee facility in that it commingles wastewaters from condensation and purification (associated with the titanium tetrachloride production process), as well as oxidation and finishing (associated with the titanium dioxide production process). The commingled wastewaters are managed in on-site surface impoundments and the dredged solids from these units (comprised of exempt and nonexempt materials) are placed in an on-site landfill. The facility provided detailed information regarding the amounts of solids present in each of the wastewaters managed in this system, demonstrating that there is a small contribution (~3%) of non-exempt solids (*i.e.*, solids in wastewaters from oxidation and finishing) in the wastewater treatment sludge. We did not select this facility for site visits and thus did not sample this waste. We believe our sampling and modeling of the Tennessee and Delaware sites is an appropriate surrogate for this waste given the similar nature of the processes at the three facilities (with particular similarities between the wastewater treatment facilities at Mississippi and Tennessee). Furthermore, the percentages of non-exempt solids in the commingled wastes at the Tennessee and Delaware sites are higher than at the Mississippi site.

What Management Scenarios Were Assessed?

The Delaware facility asserts that there are a variety of end uses for the Iron Rich. The predominant recent use has been for the construction of dikes to contain dredged river sediments at U.S. Army Corp of Engineer disposal sites in the vicinity of the titanium dioxide plant. We assessed this scenario as comparable to an industrial D landfill scenario. The Iron Rich has also been used as daily cover at a municipal landfill (demonstration project) and as final cover for a closed on-site landfill. These uses clearly constitute disposal. Other proposed uses include use as subsidence fill at a closed municipal landfill, structural fill by the local Port Authority, surcharge for road bed compaction, and construction of a wildlife refuge at the site of the closed on-site industrial landfill. These uses all involve placement on the ground and also appear to also be uses that constitute disposal (see 40 CFR 266.20). We chose to model risks for disposal in an off-site industrial D landfill because this seemed to fit the largest number of the varied potential disposal or land-based use scenarios. We believe the municipal landfill scenario is also relevant. Our assessment addresses the municipal scenario qualitatively. These scenarios were assessed for potential releases to drinking water wells and air releases. In addition, we modeled the on-site landfill at the Tennessee facility for potential releases to surface water.

How Was This Waste Category Characterized?

We collected samples of this waste at the Tennessee and Delaware facilities. For the Tennessee facility, we collected the sample directly from a holding/dewatering pond where the dredged wastewater treatment solids are dewatered prior to landfilling on site. We collected the sample from the Delaware facility directly from the Iron Rich dewatering unit press; this sample consisted of commingled chlorinator solids, ferric chloride solids, and wastewater treatment solids. This material is sometimes mixed with fly ash prior to use; our sample was collected prior to fly ash addition. Both samples were analyzed for total, TCLP and SPLP constituent analyses. These data are summarized below in Table III–54 for the constituents of concern that were present in the wastes at levels exceeding the health-based levels and/or ambient water quality criteria.

TABLE III–54.—CHARACTERIZATION OF WASTEWATER TREATMENT SOLIDS FROM THE CHLORIDE-ILMENITE PROCESS, TITANIUM DIOXIDE

Constituent of concern	Detected levels, Delaware site			Detected levels, Tennessee site		HBL (mg/L)	AWQC (mg/L)		Soil screening levels (mg/kg)[1]
	Total (mg/kg)	TCLP (mg/L)	SPLP (mg/L)	Total (mg/kg)	SPLP (mg/L)		Human health	Aquatic life	
Antimony	0.9	[2] 0.021	0.02	0.7	0.021	0.006	0.014	n/a	32
Arsenic	2.2	<0.0035	[2] 0.001	2.8	[3] <0.0035	0.0007	1.8E–05	0.15	4.7
Barium	178	[2] 2.4	0.92	49.6	0.12	1.1	n/a	n/a	5600
Boron	30	1.7	0.61	24.5	0.45	1.4	n/a	n/a	7,200
Lead	309	[2] 0.032	[2] 0.0032	42.4	[2] 0.002	0.015	....	0.0025	400
Manganese	10,600	252	16.3	2,890	1.5	0.7	0.05	n/a	[4] 3,800
Nickel	91.8	0.5	<0.005	59.8	0.007	0.31	0.61	0.052	1,600
Thallium	3.7	0.28	0.012	7.2	<0.0022	0.001	0.0017	n/a	6.4
Vanadium	240	[2] 0.0003	<0.005	1,060	<0.005	0.14	n/a	n/a	720

n/a: not applicable.

[1] Soil ingestion health-based levels.

[2] Results are less than the typical laboratory reporting limit, but are greater than the calculated instrument detection limits.

[3] One half the detection limit was used as model input.

[4] The air characteristic level is 3,000 mg/kg at 25m and drops to 30,000 at 150m.

In addition, our analytical data show that chlorinated dioxins and furans are present in these wastes. As discussed previously, we believe these compounds are associated with the exempt solids. However, the Delaware waste contains the ferric chloride solids; these solids have lost their exempt status because of the facility's chemical manufacturing/ancillary activities necessary for the production of ferric chloride for sale as a water and wastewater treatment reagent. As a result, we have considered the chlorinated dioxin and furan content of the waste as part of today's listing determination. The PCDD/PCDF analytical results for the Delaware site are summarized below (detected homologs only) in Table III–55.

TABLE III–55.—CHARACTERIZATION OF WASTEWATER TREATMENT SOLIDS FROM THE CHLORIDE-ILMENITE PROCESS, TITANIUM DIOXIDE CHLORINATED DIBENZO-P-DIOXINS (CDD) AND FURANS (CDF)

Constituent of concern	Total Detected levels in Delaware waste (ng/kg, wet basis)
2378-TetraCDF	12.2
12378-PentaCDF	21.8
23478-PentaCDF	48.1
123478-HexaCDF	237
123678-HexaCDF	8.1
234678-HexaCDF	2.5
123789-HexaCDF	5.6
1234678-HeptaCDF	189
1234789-HeptaCDF	126
OctaCDF	24,000
OctaCDD	22.2
2378–TetraCDD Equivalent[1]	57.2

[1] 12378–TetraCDD equivalent calculated using the World Health Organization Toxic Equivalency Factors (WHO–TEF). Van den Berg, et al. 1998. Toxic Equivalency Factors (TEFs) for PCBs, PCDDs, PCDFs for Human and Wildlife. Environmental Health Perspectives, v.106, n.12, pp. 775–792. December.

How Was the Groundwater-to-Surface Water Risk Assessment Established?

The Tennessee facility is bounded to the west by the Tennessee River. The facility indicated that the overall groundwater flow is toward the river. There have been several projects to determine placement of down gradient monitoring wells for individual on-site landfill units. These borings indicate that the groundwater elevation declines to the northwest towards the river. In addition, a contract geologist familiar with the local hydrogeology has indicated that shallow groundwater flow will generally follow the natural topography. A ridgeline running north and south is located just east of the facility boundary. This ridge is approximately 200 feet higher in elevation than the elevation at the facility. Based on this topography, we expect that the groundwater flow direction is to the west towards the river. We calculated the concentrations in the river that would result from discharge of contaminated ground water by estimating the infiltration rate for the unlined landfill, and (given the area of the landfill) diluting the resulting leachate volume into the river under various design flow conditions. The results of this screening level analysis (available in the Risk Assessment Background Document) demonstrate that concentrations of the constituents of concern in the river are likely to be well below the national AWQC for human health and aquatic life for these constituents.

How Was the Groundwater Ingestion Risk Assessment Established?

The Delaware facility reported actual or contemplated use of the Iron Rich at a variety of landfills and land placement usages in the general vicinity of the plant. We used our usual distance-to-well assumptions for an off-site landfill, and assumed hydrogeologic conditions that are representative of the principal soil and aquifer types present regionally (within a 100 mile radius) of the facility. The resultant risk assessment results are presented below in Table III–56.

TABLE III–56.—GROUNDWATER PATHWAY RISK ASSESSMENT RESULTS FOR NON-WASTEWATERS FROM CHLORIDE-ILMENITE PROCESS, TITANIUM DIOXIDE

Constituents of concern	Hazard quotient or cancer risk			
	90th% adult	90th% child	95th% adult	95th% child
Antimony	0.2	0.5	0.4	0.8
Arsenic (cancer risk)	3E–07	2E–07	1E–06	9E–07
Manganese	0.8	1.6	1.6	3.3
Thallium	0.7	1.4	1.1	2.4

What Is EPA's Listing Rationale for This Waste?

We propose to list as hazardous the non-exempt portion of the solid wastes generated from the production of titanium dioxide via the chloride-ilmenite process. This listing covers the non-exempt portions of the wastewater treatment solids generated at all three facilities, any non-exempt portions of the chlorinator solids (*e.g.,* any mass derived from the vanadium wastes), and ferric chloride solids generated at the Delaware facility. To the extent that these listed materials remain commingled with solids that would otherwise be exempt, the entire commingled mass is subject to the listing (see § 261.3(b)(2)). Our risk results indicate that metals in these materials leach at levels that may pose a risk to human health and the environment. Specifically, in the commingled wastes, the risks exceed an HQ of one for both manganese (3.3) and thallium (2.4) at the 95th percentile; the risks similarly exceed an HQ of one for both manganese (1.6) and thallium (1.4) at the 90th percentile.

In addition, the management practices reported for this waste, particularly as reported for the Delaware site, are expected to provide less control than the scenario modeled (*i.e.,* an industrial landfill). Potential future management practices include use at municipal landfills for interim and final cover, as well as subsidence fill at a closed municipal landfill. These scenarios, particularly the interim cover scenario, indicate that the waste may come in contact with municipal landfill leachate in the future, if not listed. The TCLP results for this waste indicate even higher mobility of metals than those modeled for the industrial landfill scenario using the SPLP. The TCLP concentrations of manganese and thallium exceed the SPLP levels by factors of 15-fold and 23-fold, respectively. We expect, therefore, that HQs resulting from disposal in a landfill with municipal waste would likely be higher by an order of magnitude than the industrial landfill scenario we modeled.

The modeling presented above uses the entire waste volume reported for the Delaware facility's Iron Rich. We used this volume because it corresponds to the sample that we collected of this material, and there is considerable uncertainty on the portion of the waste that would be Bevill exempt. (This uncertainty is related to the estimated nature of the solids contributions provided by the facilities and the variability reported between the facilities.) We conducted a supplemental analysis to determine how sensitive our modeling results are to changes in volume, in recognition that we are only proposing at this time to list approximately 10% of the current Iron Rich volume (the balance of the Delaware site's waste being exempt and outside the scope of today's listing determination). These results, presented below in Table III–57, show that the risks are somewhat sensitive to the volume modeled, but the risks are not reduced below EPA's HQ threshold of one for noncarcinogens. In other words, if the facility were to segregate all exempt solids from the materials being proposed for listing prior to disposal, the remaining volume could still pose risk to human health and the environment. Further, as noted above, based on the TCLP results, the manganese and thallium HQs would be an order of magnitude higher in a municipal landfill scenario.

TABLE III–57.—REDUCED VOLUME ANALYSIS; GROUNDWATER PATHWAY RISK ASSESSMENT RESULTS FOR NON-WASTEWATERS FROM CHLORIDE-ILMENITE PROCESS, TITANIUM DIOXIDE

Constituents of concern	Hazard quotient or cancer risk			
	90th % adult	90th % child	95th % adult	95th % child
Antimony	0.1	0.2	0.2	0.4
Arsenic	not modeled			
Manganese	0.5	1.0	1.0	2.2
Thallium	0.4	0.9	0.8	1.6

This waste also contains 57 ppt TCDD equivalents. This concentration exceeds the background level in soils (8 ppt) and the soil ingestion HBL of 45 ppt[59]. We were not able to compare this concentration with a screening level from the Air Characteristics Study because the study did not establish levels for TCDD. While we did not conduct a risk assessment of the detected TCDD TEQ, the presence of TCDD equivalents in the wastes is an additional factor that supports a listing determination, particularly in light of the fact that the management practices reported by the facility were varied and, in many cases, would constitute releases to the circulating environment with a greater potential for a variety of exposure pathways than would occur from a well managed landfill.

The proposed listing address all non-wastewaters that are not covered by the mineral processing waste exemption, and is not limited to non-exempt wastewater treatment solids. The listing therefore would cover non-exempt non-wastewaters from the removal of vanadium wastes from the product titanium tetrachloride stream that are currently returned to the reaction area and ultimately commingled with the exempt reactor solids or ferric chloride (these solids were part of the Iron Rich sample collected by EPA to support this listing determination). Similarly, at the Delaware facility, solids that collect in the ferric chloride product storage tanks and impoundments would be covered by the listing as these solids are ineligible for the mineral processing exemption (because they are generated after the initiation of chemical manufacturing and/or ancillary operations), they are comparable to the ferric chloride solids that are commingled in the Iron Rich, and they are derived to some degree from non-exempt vanadium materials. The proposed listing, therefore, reads:

K178 Non-wastewaters from the production of titanium dioxide by the chloride-ilmenite process. (T) [This listing does not apply to chloride process waste solids from titanium tetrachloride production exempt under section 261.4(b)(7)]

We are also proposing to add manganese and thallium to Appendix VII to Part 261, which designates the hazardous constituents for which K178 would be listed. In addition, we are proposing to add manganese to the list of hazardous constituents in Appendix VIII to Part 261. We believe the available studies clearly show that manganese has toxic effects on humans and other life forms.[60]

(11) HCl from reaction scrubber, chloride-ilmenite process. All three chloride-ilmenite facilities reported generating HCl from scrubbing reactor off-gasses. These wastes are stored in covered tanks with vent scrubbers and are re-used on site, predominantly as pH control in wastewater treatment systems. We assessed this waste as part of the following category, ''Commingled wastewaters from chloride-ilmenite process''.

(12) Commingled wastewaters from the chloride-ilmenite process.

How Many Facilities Generate This Waste Category and How Is It Managed?

All three chloride-ilmenite facilities commingle their wastewaters and treat them on-site. The Delaware facility utilizes a tank-based system, with final NPDES discharge through an unlined cooling pond to the adjacent river. Both the Tennessee and Mississippi facilities utilized surface impoundment based wastewater treatment systems. These wastewaters are not Bevill-exempt (but convey exempt solids into the wastewater treatment system where those solids are removed to form sludges that are comprised of exempt solids and non-exempt solids, depending on the specific piping of the plants).

---

[59] EPA is currently evaluating the health risks from 2,3,7,8-TCDD and once the review process is completed, EPA may re-examine the soil ingestion HBL. See *http://www.epa.gov.ncea.dioxin.htm* for additional information.

[60] See information in EPA's IRIS database, which may be found at *http://www.epa.gov/iris,* and ''Risk Assessment Support to the Listing Determinations for the Inorganic Chemical Manufacturing Wastes'' (August 2000) in the docket for today's rule.

What Management Scenarios Were Assessed?

We modeled the surface impoundment scenarios at both the Tennessee and Mississippi sites. (We assumed any releases from the unlined cooling pond at the Delaware facility would be intercepted by the river, and would be comparable in concentration, but much less volume than the actual NPDES discharge point.)

At the Tennessee site, we assessed the potential releases from the impoundment system to the adjacent river. We do not believe any drinking water wells could possibly be impacted by these impoundments given their placement on the river banks and within the facility property. We sampled at this facility at the headworks to the impoundment train.

We assessed the Mississippi facility's impact on both surface water and potential drinking water wells. The RFI[61] for this site indicates that the local groundwater flow is generally toward the south and east. It is unclear what the patterns are off site and how these patterns might change seasonally, but the groundwater elevation maps included in the RFI indicated that the direction of groundwater flow does vary seasonally and that a shift to a more westerly direction may occur under some conditions. Information from the U.S. Geological Survey's Ground-water Site Inventory, available in the docket for today's proposal, shows numerous drinking water wells in the vicinity of the plant, both to the east and southwest. The facility also reported wells on their property which they believe are cross-gradient and, in some cases, unused. We chose to model the groundwater scenario because of potential impacts on these known wells. We also assessed the potential impact of the Mississippi facility's surface impoundments on surface water because the facility is bounded to the south by the Bay of St. Louis.

We did not conduct sampling and analysis at the Mississippi facility. Our risk assessment inputs for this facility used the combined analytical data set for the Delaware and Tennessee facilities, which are sister plants of the Mississippi plant. We used the physical parameters for the Mississippi site to describe wastewater flows, surface impoundment sizes, and distances to potential receptors for this modeling.

How Was This Waste Category Characterized?

The analytical results for the constituents found to be present in the wastewaters at levels exceeding HBLs and/or AWQC are presented below in Table III–58.

TABLE III–58.—CHARACTERIZATION OF COMMINGLED WASTEWATERS FROM CHLORIDE-ILMENITE PROCESS, TITANIUM DIOXIDE

Constituent of concern	Detected levels in Delaware sample (mg/L)	Detected levels in Tennessee sample (mg/L)	HBL (mg/L)	AWQC—Aquatic life (mg/L)
Aluminum	0.65	3.1	16	0.087
Copper	0.03	0.007	1.3	0.0031
Lead	<0.003	0.005B	0.015	0.0025
Manganese	3.3	3.34	0.73	N/A
Nickel	0.013	0.020	0.3	0.052
Thallium	<0.005	0.013	0.001	N/A
Vanadium	0.018	0.63	0.14	N/A

B: also detected in blank
N/A: not available

How Was the Groundwater-to-Surface Water Risk Assessment Established?

The Tennessee facility is bounded to the west by a river. As noted above, the facility indicated that the overall groundwater flow is toward the river. The Mississippi facility is bounded to the south by the Bay of St. Louis, which is fed by 2 rivers to the east and west of the plant. Additional details are available in the docket. We calculated the concentration in the river that would result from discharge of contaminated groundwater by estimating the infiltration rate for the unlined surface impoundment, and (given the area of the impoundment) diluting the resulting leachate volume into the river under various design flow conditions. The results of this screening level analysis (available in Risk Assessment Support to the Inorganic Chemical Industry Listing: Background Information Document'') demonstrate that concentrations of the constituents of concern in the river are likely to be well below the human health and aquatic life AWQC for these constituents.

How Was the Groundwater Ingestion Risk Assessment Established?

Based on information presented in the RFI for the Mississippi facility, as well as from the U.S. Geological Survey Ground-water Site Inventory, there are groundwater wells to the east and southwest of the plant within 2,000–5,000 feet. We modeled the potential impact of the unlined surface impoundment train on drinking water wells located within this range. The results are presented below in Table III–59.

---

[61] Draft RCRA Facility Investigation Report; DuPont DeLisle, NS. December 7, 1999.

TABLE III–59.—GROUNDWATER PATHWAY RISK ASSESSMENT RESULTS FOR COMMINGLED WASTEWATERS FROM CHLORIDE-ILMENITE PROCESS, TITANIUM DIOXIDE

Constituent of concern	Hazard quotient			
	90th % adult	90th % child	95th % adult	95th % child
Manganese	0.0002	0.0003	0.0003	0.0007
Thallium	0.002	0.004	0.004	0.009
Vanadium	0.00009	0.0002	0.0003	0.0006

What Is EPA's Listing Rationale for This Waste?

We propose not to list commingled wastewaters from the production of titanium dioxide via the chloride-ilmenite process. The results of our risk assessment demonstrate that this waste category poses no risks that warrant listing as hazardous waste. The concentrations of the constituents of concern at the modeled exposure points are well below an HQ of one.

(13) Additive vent filter solids from the chloride-ilmenite process. One facility reported production of vent filter solids from additive handling. This material is placed in an off-site industrial D landfill. Small amounts of this waste are generated (<1 MT). This material is not Bevill exempt. Handling of this additive is an ancillary activity. All wastes from ancillary activities are not uniquely associated with extraction/beneficiation and processing of ores and minerals (see 45 FR 76619, November 19, 1980, and 63 FR 28590, May 26, 1998).

Information from the facility indicates that a constituent of concern in this material is aluminum. The drinking water HBL for aluminum is higher than the solubility limit in ground water and, therefore, contamination of ground water is not likely to pose a significant risk to human health. Based on this fact, and the very small volume generated by one facility, we propose not to list this material as a hazardous waste.

(14) Vanadium waste from the chloride-ilmenite and chloride process. Vanadium containing material is generated from the production of titanium dioxide via the chloride and the chloride-ilmenite processes. This is not an exempt mineral processing waste because it is not a solid (see also 63 FR 28602). This waste is generally returned to the reaction area where titanium tetrachloride is recovered and the remainder of the vanadium waste is incorporated into the mass of the unreacted coke and ore solids (i.e., the exempt solids) and/or the waste acid. There is no potential for exposure prior to mixing with the exempt waste or waste acid. We assessed the mixtures of exempt and non-exempt wastes as discussed above in III.D.14.e(8) and (10). Specifically, we assessed the wastewater treatment solids at the Maryland facility, the Iron Rich material at the Delaware facility, and the waste acid.

(15) Off-specification titanium dioxide product.

How Many Facilities Generate This Waste Category and How is it Managed?

Two facilities reported generating this waste, although we believe that all titanium dioxide manufacturers may generate this waste at some time. The two reporting facilities both describe off-site Subtitle D landfills that accept both municipal and industrial wastes as the final management practice for this waste. As noted in the September 1, 1989 Bevill rulemaking, off-specification commercial product wastes are non-exempt solid wastes.

What Management Scenarios Were Assessed?

We modeled the off-site municipal D landfill scenario using the regional locations of the reported landfills.

How Was This Waste Category Characterized?

We collected one sample of this waste and conducted totals, TCLP, and SPLP analyses. The analytical results for the one constituent found to be present in the waste TCLP sample at a level exceeding its HBL are presented below in Table III–60 (no constituent exceeded HBLs in the SPLP).

TABLE III–60.—CHARACTERIZATION OF OFF-SPECIFICATION TITANIUM DIOXIDE PRODUCT

Constituent of concern	Detected levels in sample DPN–SO–02 (mg/L)		HBL (mg/L)
	Total	TCLP	
Lead	0.6	[1] 0.06	0.015

[1] Results are less than the typical laboratory reporting limit, but are greater than the calculated instrument detection limits.

How Was the Groundwater Ingestion Risk Assessment Established?

The facilities reported use of landfills in the vicinity of their plant. We used our usual distance-to-well assumptions for an off-site landfill, and assumed hydrogeologic conditions that are representative of the principal soil and aquifer types present regionally (within a 100 mile radius) for the particular landfill sites that were reported for these wastes. The resultant groundwater concentrations were very low and are presented below in Table III–61.

TABLE III–61.—GROUNDWATER PATHWAY RISK ASSESSMENT RESULTS FOR OFF-SPECIFICATION TITANIUM DIOXIDE

Constituent of concern	Predicted well concentrations (mg/L)		HBL (mg/L)
	90th%	95th%	
Lead	2.5E–08	1.1E–06	0.015

The modeled levels of lead were so far below the HBL that we determined it was unnecessary to further assess the risks from lead. Clearly those risks would be well below an HQ of one.

What Is EPA's Listing Rationale for This Waste?

We propose not to list off-specification titanium dioxide as a hazardous waste. Our risk analysis shows that this waste does not pose risks that warrant listing.

(16) Railcar/trailer product washout. One facility reported generation of this residual (<10,000 MT). The washwater, containing titanium dioxide, is placed in a surface impoundment. This waste is not Bevill exempt because it is a liquid and it is associated with the chemical manufacturing part of the process. The water from this pond is subsequently sent to wastewater treatment where it is commingled with all other chloride-ilmenite wastewaters (assessed in III.D.14.e(12)). The titanium dioxide product that settles to the bottom of this pond is mechanically recovered and returned to the production process. We assessed the potential impact of this impoundment via the SPLP analytical data collected for off-specification product (previously discussed in III.D.14.e(15)). These data are available in the background document for this sector, and show no constituents of concern. We chose the SPLP to assess this management scenario because there is no potential for contact with municipal landfill leachate. We therefore do not propose to list this waste.

G. What Is the Status of Landfill Leachate From Previously Disposed Wastes?

Leachate derived from the treatment, storage, or disposal of listed hazardous wastes is classified as a hazardous waste by virtue of the ''derived-from'' rule in 40 CFR 261.3(c)(2). The Agency has been clear in the past that hazardous waste listings apply to wastes disposed of prior to the effective date of a listing, even if the landfill ceases disposal of the waste when the waste becomes hazardous. (See 53 FR 31147, August 17, 1988). We also have a well-established interpretation that listings apply to leachate derived from the disposal of listed hazardous wastes, including leachate derived from wastes meeting the listing description that were disposed before the effective date of a listing. We are not reopening any of these issues with this proposed rulemaking.

Of course, as set out in detail in the August 1988 notice, this does not mean that landfills holding wastes that are listed now as hazardous become subject to Subtitle C regulation. However, previously disposed wastes now meeting a listing description, including residues such as leachate that are derived from such wastes, and that are managed actively do become subject to Subtitle C regulation. See 53 FR at 31149, August 17, 1988. In many, indeed most, circumstances, active management of leachate would be exempt from Subtitle C regulation because the usual pattern of management is discharge either to POTWs via the sewer system, where leachate mixes with domestic sewage and is excluded from RCRA jurisdiction (see RCRA Section 1004(27) and 40 CFR 261.4(a)(1)), or to navigable waters, also excluded from RCRA jurisdiction (see RCRA Section 1004(27) and 40 CFR 261.4(a)(2)). In addition, management of leachate in wastewater treatment tanks prior to discharge under the CWA is exempt from RCRA regulation (40 CFR 264.1(g)(6)).

If actively managed, landfill leachate and gas condensate derived from the newly-listed wastes proposed for listing in today's proposal could be classified as K176, K177, or K178. In such circumstances, we would be concerned about the potential disruption in current leachate management that could occur, and the possibility of redundant regulation. This issue was raised to the Agency in the context of the petroleum refinery waste listings (see 63 FR 42173, August 6, 1998). A commenter expressed concern that, because some of the commenter's non-hazardous waste landfills received newly-listed petroleum wastes prior to the effective date of the listing decision, the leachate that is collected and managed from these landfills would be classified as hazardous. The commenter argued that this could lead to vastly increased treatment and disposal costs without necessarily any environmental benefit. After examining and seeking comment on this issue, we published a final rule that temporarily defers regulation of landfill leachate and gas condensate derived from certain listed petroleum refining wastes (K169-K172) that were disposed before, but not after, the new listings became effective, provided certain conditions are met. See 64 FR 6806, February 11, 1999. Since then, we have published proposed rules for wastes from the dye and pigment industries (64 FR 40192, July 23, 1999) and the chlorinated aliphatics industry (64 FR 46476, August 25, 1998) that also propose deferrals for similar wastes derived from landfills.

At the time this issue was brought to the Agency's attention in the context of the petroleum refinery waste listings, EPA's Office of Water had recently proposed national effluent limitations guidelines and pretreatment standards for wastewater discharges—most notably, leachate—from certain types of landfills. See 63 FR 6426, February 6, 1998. In support of this proposal, EPA conducted a study of the volume and chemical composition of wastewaters generated by both subtitle C (hazardous waste) and subtitle D (non-hazardous waste) landfills, including treatment technologies and management practices currently in use. Most pertinent to finalizing the temporary deferral for the petroleum refining wastes, EPA did not propose (or subsequently finalize) pretreatment standards for subtitle D landfill wastewaters sent to POTWs because the Agency's information indicated that such standards were not required (see 65 FR 3008, January 19, 2000).

The conditions included in the temporary deferral we published on February 11, 1999 are that the leachate is subject to regulation under the Clean Water Act, and the leachate cannot be stored in surface impoundments after February 13, 2001. See 40 CFR 261.4(b)(15). We believe that it was appropriate to temporarily defer the application of the new waste codes to such leachate in order to avoid disruption of ongoing leachate management activities while the Agency decides if any further integration is needed of the RCRA and CWA regulations consistent with RCRA Section 1006(b)(1). We believe that it is still appropriate to defer regulation and avoid leachate management activities, and to permit the Agency to decide whether any further integration of the two programs is needed. As such, we would be concerned about forcing pretreatment of leachate even though pretreatment is neither required by the CWA, nor needed. Therefore, we are proposing to temporarily defer the regulation of landfill leachate and gas condensate derived from the wastes we are proposing for listing in today's rule, with the same conditions as described in 40 CFR 261.4(b)(15) for petroleum wastes. We seek comment on our proposed decision to extend the temporary deferral to include the wastes proposed for listing in today's notice.

IV. Proposed Treatment Standards Under RCRA's Land Disposal Restrictions

A. What Are EPA's Land Disposal Restrictions (LDRs)?

RCRA requires us to establish treatment standards for all wastes destined for the land disposal. These are the ''land disposal restrictions'' or LDRs. For any hazardous waste identified or listed after November 8, 1984, we must promulgate these LDR treatment standards within six months of the date of identification or final listing (RCRA Section 3004(g)(4), 42 U.S.C. 6924(g)(4)). RCRA also requires us to set as these treatment standards ''* * * levels or methods of treatment, if any, which substantially diminish the toxicity of the waste or substantially reduce the likelihood of migration of hazardous constituents from the waste so that short-term and long-term threats to human health and the environment are minimized.'' (RCRA Section 3004(m)(1), 42 U.S.C. 6924(m)(1)).

Once a hazardous waste is prohibited from land disposal, the statute provides only two options for legal land disposal: Meet the treatment standard for the waste prior to land disposal, or dispose of the waste in a land disposal unit that satisfies the statutory no migration test. A no migration unit is one from which there will be no migration of hazardous constituents for as long as the waste remains hazardous. RCRA sections 3004 (d), (e), (f), and (g)(5). Each waste identified for listing as hazardous in this rule will be subject to all the land disposal restrictions on the same day their respective listing becomes effective.

We gathered data on waste characteristics and current management practices for wastes proposed to be listed in this action. These data can be found in the administrative record for this rule. An examination of the constituents that are the basis of the proposed listings shows that we have previously developed numerical treatment standards for most of the constituents. We have determined that it is technically feasible and justified to apply existing universal treatment standards (UTS) to the hazardous constituents in the wastes proposed to be listed as K176, K177, and K178 that were found to be present at concentrations exceeding the treatment standards, because the waste compositions are similar to other wastes for which applicable treatment technologies have been demonstrated. Also see LDR Phase II final rule, 59 FR 47982, September 19, 1994, for a further discussion of UTS. A list of the proposed regulated hazardous constituents and the proposed treatment limits can be found in the following preamble sections and in the proposed regulatory Table 268.40—Treatment Standards for Hazardous Wastes. If we make a final decision to list the identified wastes, these constituents and treatment standards would apply.

We have provided in the BDAT background document a review of technologies that can be used to meet the proposed numerical concentration limits for K176, K177, and K178, assuming optimized design and operation. Where we are proposing numerical concentration limits, the use of other technologies capable of achieving the proposed treatment standards would be allowed, except for those treatment or reclamation practices constituting land disposal or impermissible dilution (see 40 CFR 268.3).

B. What Are the Treatment Standards for K176 (Baghouse Filters From Production of Antimony Oxide)?

The constituents identified to require treatment in this waste are antimony, arsenic, cadmium, lead, and mercury. We are proposing to apply the UTS levels to these constituents as the treatment standards. Therefore, the nonwastewaters treatment standard proposed for antimony is 1.15mg/L TCLP; arsenic is 5.0 mg/L TCLP; cadmium is 0.11 mg/L TCLP; lead is 0.75 mg/L TCLP; and, mercury is 0.025 mg/L TCLP. In the event that there are wastewater treatment residuals from treatment of K176 (which under the derived-from rule would also be considered as K176), the wastewater treatment standards are as follows: Antimony is 1.9 mg/L; arsenic is 1.4 mg/L; cadmium is 0.69 mg/L; lead is 0.69 mg/L; and, mercury is 0.15 mg/L.

We are requesting data and comment on the stabilization of antimony. Available stabilization data for antimony show effective treatment for wastes with initial antimony concentrations below those found in K176. Therefore, based on the available data, we are uncertain if stabilization will be effective for the antimony in this waste.

C. What Standards Are the Treatment Standards for K177 (Slag From the Production of Antimony Oxide That is Disposed of or Speculatively Accumulated)?

The constituents identified to require treatment in this waste are antimony, arsenic, and lead. We are proposing to apply the UTS levels to these constituents as the treatment standards. Therefore, the nonwastewater treatment standard for antimony is 1.15 mg/L TCLP, for arsenic is 5.0 mg/L TCLP, and for lead is 0.75 mg/L TCLP. In the event that there are wastewater treatment residuals from treatment of K177 (which under the derived-from rule also would be considered K177), the wastewater treatment standard for antimony is 1.9 mg/L, for arsenic is 1.4 mg/L, and for lead is 0.69 mg/L.

We are requesting data and comment on the stabilization of antimony. Available stabilization data for antimony show effective treatment for wastes with initial antimony concentrations below those found in K177. Therefore, based on the available data, we are uncertain if stabilization will be effective for the antimony in this waste.

D. What Are the Treatment Standards for K178 (Nonwastewaters From the Production of Titanium Dioxide by the Chloride-Ilmenite Process)?

The constituents of concern in this waste are the chlorinated congeners of dibenzo-p-dioxin and dibenzofuran, thallium and manganese. We are proposing to apply the UTS levels to the chlorinated congeners of dibenzo-p-dioxin and dibenzofuran, and thallium, as indicated in Table V–1. In addition we are also proposing the option of complying with the technology standard of combustion (CMBST) for the chlorinated dibenzo-p-dioxin and dibenzofuran (dioxins and furans) constituents present in K178.

We note at the outset that we typically promulgate numerical performance standards to allow facilities maximum flexibility in determining for themselves how best to achieve compliance with the LDR treatment standards. By promulgating combustion as an alternative compliance option, we are not disturbing the degree of flexibility afforded to facilities; rather, we are enhancing it.

However, when we specify a treatment technology like CMBST as the treatment standard, the analytical elements of compliance change. Typically, with specified technologies, no testing and analysis of treatment residuals is required because we are confident that use of the specified technology will reduce the level of target organic constituents to levels that minimize threats to human health and the environment. For K178, the regulated organic constituents of concern are dioxin/furan congeners. If combustion in well designed and operated units is used to treat K178, the dioxin/furan congeners in the K178 should be substantially destroyed. By prescribing CMBST, we ensure that the units treating K178 will be units subject to the standards in Part 264 Subpart O or Part 266 Subpart H, or from interim status incinerators which have made a specific demonstration that they operate in a manner equivalent to a Part 264 or Part 266 combustion unit. The practical effect of this change will be to limit the type of facilities that can combust K178 to well-regulated RCRA units (or, after the current transition period, Clean Air Act permitted units subject to MACT standards). This will ensure that combustion is done in a closely-regulated facility and in a manner that provides protection for human health and the environment. Furthermore, by restricting combustion of K178 to these units, combustion will only occur in units subject to the recently upgraded dioxin/furan emission standards of the MACT Hazardous Waste Combustion Rule as well as standards for other hazardous air pollutants, such as metals (64 FR 52828, September 30, 1999).

K178 does have metal constituents of concern, which would not be treated by the combustion process and that would remain in the combustion treatment residuals (*e.g.,* ash and scrubber water). We therefore are retaining metal treatment standards for all circumstances, i.e., whether or not the treatment used by a facility involves combustion. When combustion is used to treat the organics to achieve LDR compliance, facilities will still need to conduct compliance testing and analysis for all regulated metal constituents in the combustion treatment residuals prior to disposal. This approach is patterned after EPA's promulgation of a similar alternative treatment standard for F024 (wastes from production of chlorinated aliphatics) and also for F032 (wastes from wood preserving processes). See 55 FR 22580–81, June 1, 1990. See also 62 FR 26000–3, May 12, 1997.

For both solid and wastewater treatment residuals, we are proposing use of the Universal Treatment Standards (UTS) for all constituents of concern except manganese. Universal treatment standards have not been developed for manganese, although we are proposing standards below. We did not study this constituent in the development of F039 treatment standards in 1990 or UTS in 1994. Furthermore, we lack studies demonstrating treatment effectiveness for highly concentrated manganese nonwastewaters, such as those containing manganese at levels such as those found in K178. We did, however, identify treatability data for less concentrated manganese waste in our treatability database.

These data show that solidification offers promising results in reducing the mobility of manganese, at least in less concentrated manganese waste. Such treatment yielded concentrations of 0.002, 0.003, and 0.46 mg/L TCLP. Under the LDR program, we typically apply a variability factor of 2.8 to the treated waste data, to account for variations arising from mechanical limitations in the treatment equipment. Therefore we calculated potential treatment standards based on solidification treatment from our treatability database as 0.006, 0.008, and 1.29 mg/L TCLP. We are unsure whether these treatment standards would be achievable in a waste with the significantly higher concentrations of manganese found in K178. Therefore, we are not proposing treatment standards based on solidification. Rather, to propose a more achievable standard, we based it on a technology which results in higher post-treatment manganese levels. High temperature metals recovery (which vitrifies the manganese in the slag) resulted in a treated manganese concentration of 1.3 mg/L TCLP. Using this datum and our typical variability factor of 2.8, we calculated a proposed manganese treatment standard of 3.6 mg/L TCLP. We request comment and data on this proposed treatment standard, and we request anyone who has an interest in the treatment standard for manganese to comment to that effect. We may use the list of commenters on this topic as the only individuals notified of potential changes to this proposed treatment standard, so it is important for you to comment if you are in any way interested.

Because it is possible that commenters may submit data showing that this treatment option is inappropriate for K178, we request comment on the option of setting a treatment standard for manganese that is identical to the current UTS level for thallium, the other metal found in proposed K178. The thallium treatment level of 0.20 mg/L TCLP is based on stabilization. We also request any information regarding the similarity of manganese nonwastewater treatment to the treatment of other RCRA-regulated metals that now appear in the UTS, both from a structural or physico-chemical perspective as well as from a treatment performance perspective.

We have some treatment data for manganese in wastewater matrices derived from wastes other than K178 in our treatability database. It has been difficult to determine whether these treatment data are relevant because we have no examples of wastewaters derived from K178. We are therefore unsure if the wastes in our database are more or less concentrated than actual K178 wastewaters. To account for this uncertainty, we selected treatment data representing relatively high initial concentrations (up to 1000 mg/L), but also representing full scale operation and satisfactory treatment (at least 90 percent reduction in concentration). We found that sedimentation technology, the most effective treatment method in our database, resulted in a final effluent concentration of 6.1 mg/L and chemical precipitation technology resulted in final effluent concentrations of 2.4 and 4.8 mg/L (both operated at full scale and resulted in greater than 90 percent reduction). We have selected, to be conservative, the highest concentration (6.1 mg/L) to calculate a K178 wastewater standard. We applied a variability factor of 2.8 to obtain a proposed K178 LDR treatment standard of 17.1mg/L. Again, we request comments on and data relevant to this proposed treatment standard for wastewater forms of K178, both from those who support the standard and those who believe the standard is not achievable. We also request any information regarding the similarity of manganese wastewater treatment to the treatment of other RCRA-regulated metals that now appear in the UTS, both from a structural or physico-chemical perspective as well as from a treatment performance perspective. Only commenters on this subject may be notified of future changes we may make based on newly submitted data.

Because we typically include the same treatment standards for new listings into those for F039 (multisource leachate) to maintain equivalence within the LDR regulatory structure, we are also proposing to add the manganese treatment standard to the F039 section of the 268.40 table. The F039 waste code applies to hazardous waste landfill leachates in lieu of the original waste codes when multiple waste codes would otherwise apply. F039 wastes are subject to numerical treatment standards equivalent to UTS. We are proposing this addition to the constituents regulated by F039 to maintain the implementation benefits of having one waste code for multisource leachate. We are also proposing to add manganese to the UTS Table at 40 CFR 268.48. Manganese represents significant risk to human health and the environment, as shown in the risk assessment accompanying this rule. Its presence in other hazardous wastes should be mitigated by effective treatment to avoid similar risks after land disposal. Furthermore, when manganese is added to the UTS list, all characteristic wastes that have this constituent as an underlying hazardous constituent above the UTS levels will require treatment of manganese before land disposal. We solicit comments on these proposed conforming changes and especially on the impacts that they may have on other wastes beyond just K178.

We request comment on the full set of proposed standards for K178 listed in the following table.

TABLE IV–1.—TREATMENT STANDARDS FOR K178

Regulated hazardous constituent		Wastewaters	Nonwastewaters
Common name	CAS[1] No.	Concentration in mg/L[2], or technology code[3]	Concentration in mg/kg[4] unless noted as "mg/L TCLP", or technology code
1,2,3,4,6,7,8-Heptachlorodibenzo-*p*-dioxin	35822–39–4	0.000035 or CMBST[5]	0.0025 or CMBST[5]
1,2,3,4,6,7,8-Heptachlorodibenzofuran	67562–39–4	0.000035 or CMBST[5]	0.0025 or CMBST[5]
1,2,3,4,7,8,9-Heptachlorodibenzofuran	55673–89–7	0.000035 or CMBST[5]	0.0025 or CMBST[5]
HxCDDs (All Hexachlorodibenzo-*p*-dioxins)	34465–46–8	0.000063 or CMBST[5]	0.001 or CMBST[5]
HxCDFs (All Hexachlorodibenzofurans)	55684–94–1	0.000063 or CMBST[5]	0.001 or CMBST[5]
1,2,3,4,6,7,8,9-Octachlorodibenzo-*p*-dioxin (OCDD)	3268–87–9	0.000063 or CMBST[5]	0.005 or CMBST[5]
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	39001–02–0	0.000063 or CMBST[5]	0.005 or CMBST[5]
PeCDDs (All Pentachlorodibenzo-*p*-dioxins)	36088–22–9	0.000063 or CMBST[5]	0.001 or CMBST[5]
PeCDFs (All Pentachlorodibenzofurans)	30402–15–4	0.000035 or CMBST[5]	0.001 or CMBST[5]
TCDDs (All tetrachlorodi-benzo-*p*-dioxins)	41903–57–5	0.000063 or CMBST[5]	0.001 or CMBST[5]
TCDFs (All tetrachlorodibenzofurans)	55722–27–5	0.000063 or CMBST[5]	0.001 or CMBST[5]
Manganese	7439–96–5	17.1	3.6 mg/L TCLP
Thallium	7440–28–0	1.4	0.20 mg/L TCLP

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

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

[3] 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.

[4] 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.

[5] For these wastes, the definition of CMBST is limited to: (1) combustion units operating under 40 CFR 266, (2) combustion units permitted under 40 CFR Part 264, Subpart O, or (3) combustion units operating under 40 CFR 265, Subpart O, which have obtained a determination of equivalent treatment under 268.42(b).

What Other LDR Provisions Are Proposed to Apply?

1. *Debris.* We propose to apply the regulations at 40 CFR 268.45 to hazardous debris contaminated with K176, K177 or K178. Debris contaminated with these wastes would have to be treated prior to land disposal, using specific technologies from one or more of the following families of debris treatment technologies: extraction, destruction, or immobilization. Hazardous debris contaminated with a listed waste that is treated by an immobilization technology specified in 40 CFR 268.45 Table 1 is a hazardous waste and must be managed in a hazardous waste facility. Residuals generated from the treatment of debris contaminated with K176, K177, or K178 would remain subject to the treatment standards proposed today. See 57 FR 37277, August 18, 1992, for additional information on the applicability, scope, and content of the hazardous debris provisions.

2. *Soil.* In addition, we propose to apply the regulations at 40 CFR 268.49 to hazardous soil contaminated with K176, K177, or K178. Soil contaminated with these wastes would have to be treated prior to land disposal, meeting either alternative treatment standards (i.e., 10 times UTS or 90 percent reduction in initial constituent concentrations) or the standards at 40 CFR 268.40 being proposed today. Non-soil residuals generated from the treatment of soil contaminated with K176, K177, or K178 would remain subject to the treatment standards proposed today. See 63 FR 28602, May 26, 1998, for additional information on the applicability, scope, and content of the alternative soil treatment standard provisions.

3. *Underground Injection Wells that can be found in the administrative record for this rule.* Finally, because land disposal also includes placement in injection wells (40 CFR 268.2(c)) application of the land disposal restrictions to K176, K177, and K178 requires the modification of injection well requirements found in 40 CFR 148. We propose that K176, K177, and K178 be prohibited from underground injection. Therefore, these wastes could not be underground injected unless they have been treated in compliance with the LDR treatment standards being proposed today, or if they are disposed in a deep injection well that has been granted a no migration petition for those wastes.

E. Is There Treatment Capacity for the Proposed Wastes?

1. What Is a Capacity Determination?

EPA must determine whether adequate alternative treatment capacity exists nationally to manage the wastes subject to LDR treatment standards. RCRA section 3004 (h)(2). Thus, LDRs are effective when the new listings are effective (typically 6 months after the new listings are published in the **Federal Register**), unless EPA grants a national capacity variance from the otherwise-applicable date and establishes 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" (RCRA section 3004(h)(2), 42 U.S.C.6924(h)(2)).

Our capacity analysis methodology focuses on the amount of waste currently disposed on the land, which will require alternative or additional treatment as a result of the LDRs. The quantity of wastes that is not disposed on the land, such as discharges regulated under NPDES, discharges to a POTW, or treatment in a RCRA-exempt tank, is not included in the quantities requiring additional treatment as a result of the LDRs. Also, land-disposed wastes that do not require alternative or additional treatment are excluded from the required capacity estimates (i.e., those that currently are treated to meet the LDR treatment standards). Land-disposed wastes requiring alternative or additional treatment or recovery capacity that is available on site or within the same company also are excluded from the required commercial capacity estimates. The resulting estimates of required commercial capacity then are compared to estimates of available commercial capacity. If adequate commercial capacity exists, the waste is restricted from further land disposal. If protective alternative capacity does not exist, EPA has the authority to grant a national capacity variance.

In making the estimates described above, the volume of waste requiring treatment depends on the current waste management practices employed by the waste generators before this proposed regulation is promulgated and becomes effective. Data on waste management practices for these wastes were collected during the development of this proposed rule. However, we realize that as the regulatory process proceeds, generators of these wastes may decide to minimize or recycle their wastes or otherwise alter their management practices. Thus, we will monitor changes and update data on current management practices as these changes will affect the volume of wastes ultimately requiring commercial treatment or recovery capacity.

The commercial hazardous waste treatment industry may change rapidly. For example, national commercial treatment capacity changes as new facilities come on line or old facilities go off line, and as new units and new technologies are added at existing facilities. The available capacity at commercial facilities also changes as facilities change their commercial status (*e.g.,* changing from a fully commercial to a limited commercial or ''captive''—company owned—facility). Thus, we also continue to update and monitor changes in available commercial treatment capacity.

For wastes required to meet today's proposed treatment standards, we request data on the annual generation volumes and characteristics of wastes affected by this proposed rule, including proposed hazardous wastes K176, K177, and K178 in wastewater and nonwastewater forms. We also request data on soil or debris contaminated with these wastes, residuals generated from the treatment or recycling of these wastes, and the current and planned management practices for the wastes, waste mixtures, and treatment residuals.

For available capacity to meet the LDR requirements, we request data on the current treatment or recovery capacity capable of treating these wastes, facility and unit permit status related to treatment of the proposed wastes, and any plans that facilities may expand or reduce existing capacity or construct new capacity. In addition, we request information on the time and necessary procedures required for permit modification for generators or commercial treatment or disposal facilities to manage the wastes, required changes for operating practices due to the proposed listings or proposed additional constituent to be regulated in the wastes, and any waste minimization activities associated with the wastes. Of particular interest to us are chemical and physical constraints of treatment technologies for these wastes and any problems for disposing of these wastes. Also of interest are any analytical difficulties associated with identifying and monitoring the regulated constituents in these wastes.

F. What are the Capacity Analysis Results?

This preamble only provides a summary of the capacity analysis performed to support this proposed regulation. For additional and more detailed information, please refer to the ''Background Document for Capacity Analysis for Land Disposal Restrictions: Inorganic Chemical Production Wastes (Proposed Rule),'' August 2000 (*i.e.*, the Capacity Background Document).

For this capacity analysis, we examined data on waste characteristics and management practices gathered for the inorganic chemical hazardous waste listing determinations. We also examined data on available treatment or recovery capacity for these wastes. The sources for these data are the RCRA Section 3007 Survey distributed in the spring of 1999, record sampling and site visits (see the docket for today's rule for more information on these survey instruments and facility activities), the available treatment capacity data submission that was collected in the mid-1990's, and the 1997 Biennial Report.

For K176 and K177 wastes, the information from the surveys, sampling, and site visits indicates that there is no quantity of the wastewater form of K176 or K177 that is expected to be generated and therefore, there is no quantity of the wastewater form of K176 or K177 that will require alternative commercial treatment. These wastes are typically present in a nonwastewater form. Based on the RCRA § 3007 Survey information presented in the Capacity Background Document, required alternative treatment capacity for K176 nonwastewaters is estimated to be eight tons per year. Required alternative treatment capacity for K177 nonwastewaters is estimated to be 22 tons per year. As described in the section of proposed LDR treatment standards above, we are proposing that numerical treatment standards be applied to K176 and K177 nonwastewaters. We anticipate that commercially available stabilization, as well as other technologies, can be used in meeting these treatment standards. We estimate that the commercially available stabilization capacity is at least eight million tons per year based on the 1995 Biennial Report. Thus we expect there is sufficient capacity to treat the proposed K176 and K177 hazardous wastes that would require treatment. Therefore, we are proposing not to grant a national capacity variance for K176 or K177 wastewaters or nonwastewaters.

For K178 waste (chloride-ilmenite nonexempt nonwastewaters from the production of titanium dioxide), our data indicate that the waste is typically generated as a nonwastewater. We did not identify any wastewater forms of these wastes and therefore do not anticipate that alternative management for wastewaters is required. We found that the wastes are currently land disposed. We estimated that approximately 7,300 tons per year (derived from public information since data on amounts of treatment solids are confidential as reported in § 3007 Survey) may require alternative treatment. In our assessment, we assumed that facilities can segregate wastestreams and separately manage the newly-proposed hazardous waste. Although the generation quantity (and therefore, the quantity requiring treatment) may be higher due to the derived from rule, we expect that available treatment capacity still exists.

As discussed earlier for K178 treatment standards, we are proposing that numerical treatment standards be applied to K178 wastes. We anticipate that commercially available incineration, followed by stabilization if necessary, or high temperature metals recovery if applicable, can be used to meet these treatment standards. We also propose the technology standard of combustion (CMBST) as an alternative compliance option for hazardous organic constituents in the K178 wastes. The units treating the waste by using CMBST will be subject to certain standards, and facilities will need to meet treatment standards for all regulated metal constituents prior to disposal, as discussed in the earlier section on K178 treatment standards. We assume that facilities would achieve treatment standards using incineration, stabilization, or both. The quantity of commercially available combustion capacity for sludge and solid is a minimum of 300,000 tons per year and the quantity of commercially available stabilization capacity is at least eight million tons per year based on 1995 Biennial Report.

We have identified that there exist facilities managing K178 waste in surface impoundments (*i.e.,* in wastewater treatment systems that contain land based units). If the waste is managed in unretrofitted impoundments,[62] it would thus be land disposed in a prohibited manner. These impoundments can be retrofitted, closed or replaced with tank systems. If the impoundment continues to be used to manage K178 waste, the unit will be subject to Subtitle C requirements. In addition, any hazardous wastes managed in the affected impoundment after the effective date of today's rule are subject to land disposal prohibitions.[63] However, facilities may continue to manage newly listed K178 in surface impoundments, provided they are in compliance with the appropriate standards for impoundments (40 CFR Parts 264 and 265 subpart K) and the special rules regarding surface impoundments (40 CFR 268.14). EPA notes that those provisions require basic groundwater monitoring (40 CFR Parts 264 and 265 Subpart F), management, and recordkeeping, but (in keeping with RCRA section 3005(j)(6)(A)) are afforded up to 48 months to retrofit to meet minimum technological requirements.

Based on the foregoing, we expect that sufficient capacity to treat the proposed K178 hazardous wastes that would require treatment. Therefore, we are proposing not to grant a capacity variance for wastewater and nonwastewater forms of K178.

With respect to the revisions to the F039 and UTS lists, as discussed earlier in the section on K178 treatment standards, we are proposing to add manganese to the list of regulated constituents in F039 (§ 268.40) and the UTS table (§ 268.48). We have estimated what portion of the F039 or characteristic wastes (which require treatment of underlying hazardous constituents to UTS levels) may be required to meet these new treatment standards. We request comments on the estimates, the appropriate means of treatment (if necessary), and the sufficiency of available treatment capacity for the affected wastes by the addition of manganese to the F039 and UTS lists.

When changing the treatment requirements for wastes already subject to LDR (including F039 and characteristic wastes), EPA no longer has authority to use RCRA § 3004(h)(2) to grant a capacity variance to these wastes. However, EPA is guided by the overall objective of section 3004(h), namely that treatment standards which best accomplish the goal of RCRA § 3004(m) (to minimize threats posed by land disposal) should take effect as soon as possible, consistent with availability of treatment capacity.

We expect that only a limited quantity of hazardous waste leachate may be generated from the disposal of newly-listed K176, K177, and K178 wastes (due to the small number of generators) and added to the generation of leachates from other multiple restricted hazardous wastes already subject to LDR.

For the amount of characteristic wastes or leachates generated from those previously regulated hazardous wastes that would be subject only to the new treatment standards for manganese, we evaluated the universe of wastes that might be impacted by revisions to the lists of regulated constituents for F039 and UTS based on limited information. Based on 1997 Biennial Report data and some assumptions of waste compositions and their potential for land disposal, we were able to estimate the potential need for additional treatment. For example, we estimated an upper bound of 70,000 tons per year of nonwastewaters mixed with other waste codes, the F039 leachate from which would be potentially impacted by the revision to the F039 treatment standards. In a similar fashion, we estimated that no more than 520,000 tons per year of characteristic nonwastewaters potentially might be affected by the proposed changes (*i.e.*, the addition of manganese to the F039 and UTS lists).

These upper bound estimates are most likely very overstated since only a portion of each estimated waste volume may contain manganese at concentrations above the proposed level specified in the UTS table and the F039 list. The estimates assume that manganese is present at levels above the proposed treatment standards in all of these wastes and require alternative treatment, when it is likely that this may be true in only a small sets of the cases. Furthermore, EPA does not anticipate that waste volumes subject to treatment for F039 or characteristic wastes would significantly increase because waste generators already are required to comply with the treatment requirements for other metals that may be present in the wastes. The volumes of wastes for which additional treatment is needed solely due to the addition of manganese to the F039 and UTS lists are therefore expected to be very small. See the Capacity Background Document for detailed analysis.

However, even though our volume estimates are highly conservative and overstated, we find that there still would be no shortage of treatment capacity. Based on data submittals in the mid-1990's and the 1997 Biennial Report, EPA has estimated that approximately 37 million tons per year of commercial wastewater treatment capacity are available, and well over one million tons per year of liquid, sludge, and solid commercial combustion capacity are available. Also, as discussed earlier in this section, there exist several million tons of available stabilization capacity. These are well above the quantities of F039 or characteristic wastes potentially requiring treatment for manganese even under the conservative screening assumptions described above. Therefore, we are proposing a decision not to delay the effective date for adding manganese to the lists of constituents for F039 and UTS.

We request comment on its proposed decision not to delay the effective date for adding manganese to the lists of constituents for F039 and UTS. We request data on the annual generation volumes and characteristics of wastes potentially affected by the proposed changes to UTS and F039 in wastewater and nonwastewater forms (if any), and the current and planned management practices for the wastes, waste mixtures, and treatment residuals. We also request data on the current treatment or recovery capacity capable of treating the affected wastes.

---

[62] A unretrofitted impoundment is one not satisfying the minimum technology requirements (MTR) specified in sections 3004(o) and 3005(j)(11).

[63] See RCRA § 3004(m)(1) "Simultaneously with the promulgation of regulations under subsection (d), (e), (f), or (g) prohibiting one or more methods of land disposal of a particular hazardous waste * * * promulgate regulations specifying those levels or methods of treatment * * *"

Further, for soil and debris contaminated with the newly listed wastes (K176, K177, and K178), we believe that the vast majority of contaminated soil and debris contaminated with these wastes will be managed on-site and therefore will not require substantial commercial treatment capacity. Therefore, we are not proposing to grant a national capacity variance for hazardous soil and debris contaminated with these wastes covered under this proposal. Based on the 1999 RCRA § 3007 Survey followed by record sampling and site visits, there are no data showing the newly listed wastes managed by underground injection wells. Also, based on the 1999 RCRA § 3007 Survey followed by record sampling and site visits, there are no data showing mixed radioactive wastes associated with the proposed listings. EPA is proposing to not grant a national capacity variance for underground injected wastes, mixed radioactive wastes, or soil and debris contaminated with these mixed radioactive wastes, if such wastes are generated.

Therefore, we propose that LDR treatment standards for the affected wastes covered under today's rule thus become effective when the listing determinations become effective—the earliest possible date (see RCRA section 3004(h)(1)—land disposal prohibitions must take effect immediately when there is sufficient protective treatment capacity for the waste available). However, we may need to revise capacity analyses or capacity variance decisions if final listing determinations are changed or if we receive data and information to warrant any revision.

Finally, we request comments on the estimated quantities requiring alternative treatment and information on characteristics of the affected wastes, management practices for these wastes, and available treatment, recovery or disposal capacity for the wastes. We also request comments concerning alternative management for any of these wastes managed in surface impoundments, including new piping or tank systems, and the length of time required for such activities. In addition, we solicit comments on our decision not to grant a national capacity variance or delay the effective date for any of the affected wastes. We will consider all available data and information provided during the public comment period and revise our capacity analysis accordingly in making the final capacity determinations. Please note, the ultimate volumes of wastes estimated to require alternative or additional commercial treatment may change if the final listing determinations change. Should this occur, we will revise the capacity analysis accordingly.

V. Compliance Dates

We seek comment on the proposed decisions in this section.

A. Notification

Under the RCRA Section 3010 any person generating, transporting, or managing a hazardous waste must notify EPA (or an authorized state) of its activities. Section 3010(a) allows us to waive, under certain circumstances, the notification requirement under Section 3010 of RCRA. If these hazardous waste listings are promulgated, we propose to waive the notification requirement as unnecessary for persons already identified within the hazardous waste management universe (*i.e.,* persons who have an EPA identification number under 40 CFR 262.12). We do not propose to waive the notification requirement for waste handlers who have neither notified us that they may manage hazardous wastes nor received an EPA identification number. Such individuals will have to provide notification under RCRA Section 3010.

B. Interim Status and Permitted Facilities

Because HSWA requirements are applicable in authorized states at the same time as in unauthorized states, we will regulate the newly identified wastes listed under HSWA until states are authorized to regulate these wastes. Thus, once this regulation becomes effective as a final rule, we will apply Federal regulations to these wastes and to their management in both authorized and unauthorized states.

VI. State Authority

A. Applicability of Rule in Authorized States

Under Section 3006 of RCRA, we may authorize qualified states to administer and enforce the RCRA program within the state. (See 40 CFR Part 271 for the standards and requirements for authorization.) Following authorization, we retain enforcement authority under Sections 3007, 3008, 3013, and 7003 of RCRA, although authorized states have primary enforcement responsibility.

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

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

B. Effect on State Authorizations

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

Section 271.21(e)(2) of EPA's state authorization regulations (40 CFR Part 271) requires that states with final authorization modify their programs to reflect federal program changes and submit the modifications to EPA for approval. The deadline by which the states must modify their programs to adopt this proposed regulation, if it is adopted as a final rule, will be determined by the date of promulgation of a final rule in accordance with 40 CFR 271.21(e)(2). If the proposal is adopted as a final rule, Table 1 at 40 CFR 271.1 will be amended accordingly. Once we approve the modification, the state requirements become RCRA Subtitle C requirements.

States with authorized RCRA programs already may have regulations similar to those in this proposed rule. These state regulations have not been assessed against the Federal regulations being proposed to determine whether they meet the tests for authorization.

Thus, a state would not be authorized to implement these regulations as RCRA requirements until state program modifications are submitted to EPA and approved, pursuant to 40 CFR 271.21. Of course, States with existing regulations that are more stringent than or broader in scope than current Federal regulations may continue to administer and enforce their regulations as a matter of state law.

It should be noted that authorized states are required to modify their programs only when EPA promulgates Federal standards that are more stringent or broader in scope than existing Federal standards. Section 3009 of RCRA allows states to impose standards more stringent than those in the Federal program. For those Federal program changes that are less stringent or reduce the scope of the Federal program, states are not required to modify their programs. See 40 CFR 271.1(I). This proposed rule, if finalized, is neither less stringent than nor a reduction in the scope or the current Federal program, and, therefore, states would be required to modify their programs to retain authorization to implement and enforce these regulations.

VII. Designation of Inorganic Chemical Wastes under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

All hazardous wastes listed under RCRA and codified in 40 CFR 261.31 through 261.33, as well as any solid waste that is not excluded from regulation as a hazardous waste under 40 CFR 261.4(b) and that exhibits one or more of the characteristics of a RCRA hazardous waste (as defined in 40 CFR 261.21 through 261.24), are hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended (see CERCLA Section 101(14)(C)). CERCLA hazardous substances are listed in Table 302.4 at 40 CFR 302.4 along with their reportable quantities (RQs). If a hazardous substance is released in an amount that equals or exceeds its RQ, the release must be reported immediately to the National Response Center (NRC) pursuant to CERCLA Section 103.

A. 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 is equal to or exceeds its RQ must immediately notify the NRC as soon as that person has knowledge of the release. The toll-free telephone number of the NRC is 1–800–424–8802; in the Washington, DC, metropolitan area, the number is (202) 267–2675. In addition to this reporting requirement under CERCLA, Section 304 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) requires owners or operators of certain facilities to report releases of extremely hazardous substances and CERCLA hazardous substances to State and local authorities. Immediately after the release of an RQ or more of an extremely hazardous substance or a CERCLA hazardous substance, EPCRA Section 304 notification must be given to the community emergency coordinator of the local emergency planning committee for any area likely to be affected by the release, and to the State emergency response commission of any State likely to be affected by the release.

Under Section 102(b) of CERCLA, all hazardous substances (as defined by CERCLA Section 101(14)) have a statutory RQ of one pound, unless and until the RQ is adjusted by regulation. In today's proposed rule, we propose: (1) to list the following three wastestreams as RCRA hazardous wastes; (2) to designate these wastestreams as CERCLA hazardous substances, and (3) to adjust the one-pound statutory RQs for two of these wastestreams. The proposed wastestreams are as follows:

K176 Baghouse filters from the production of antimony oxide

K177 Slag from the production of antimony oxide that is disposed of or speculatively accumulated

K178 Nonwastewaters from the production of titanium dioxide by the chloride-ilmenite process. [This listing does not apply to chloride process waste solids from titanium tetrachloride production exempt under 40 CFR 261.4(b)(7).]

B. Basis for Proposed RQ Adjustment

Our methodology for adjusting the RQs of individual hazardous substances begins with an evaluation of the intrinsic physical, chemical, and toxicological properties of each hazardous substance. The intrinsic properties examined—called ''primary criteria''—are aquatic toxicity, mammalian toxicity (oral, dermal, and inhalation), ignitability, reactivity, chronic toxicity, and potential carcinogenicity.

Generally, for each intrinsic property, we rank the hazardous substance on a five-tier scale, associating a specific range of values on each scale with an RQ value of 1, 10, 100, 1,000, or 5,000 pounds. Based on the various primary criteria, the hazardous substance may receive several tentative RQ values. The lowest of the tentative RQs becomes the ''primary criteria RQ'' for that substance.

After the primary criteria RQ is assigned, the substance is evaluated further for its 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 primary criteria RQ is generally raised one level. 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 for the original substance.

The standard methodology used to adjust the RQs for RCRA hazardous wastestreams differs from the methodology applied to individual hazardous substances. The procedure for assigning RQs to RCRA wastestreams is based on an analysis of the hazardous constituents of the wastestreams. The constituents of each RCRA hazardous wastestream are identified in 40 CFR part 261, Appendix VII. We determine an RQ for each constituent within the wastestream and establish the lowest RQ value of these constituents as the adjusted RQ for the wastestream.

In today's proposed rule, we propose to assign a one-pound adjusted RQ to the K176 wastestream and 5,000 pounds to the K177 wastestream. The proposed adjusted RQs for both of these wastestreams are based on the lowest RQ value of the constituents present in each wastestream, are presented in Table VII–1 below. We seek comment our proposed adjustments to the RQ values for these wastes. We are not adjusting the RQ for K178 at this time because we have not yet developed a ''waste constituent RQ'' for manganese, one of the constituents of concern in this waste.

TABLE VII–1.—PROPOSED ADJUSTED RQS FOR WASTESTREAMS K176, K177, AND K178

Wastestream	Wastestream constituent	Wastestream constituent RQ (lb.)	Wastestream RQ (lb.)
K176	arsenic	1	1
	lead	10	
K177	antimony	5,000	5,000

VIII. Administrative Assessments

A. Executive Order 12866

Under Executive Order 12866, [58 FR 51,735 (October 4, 1993)] the Agency must determine whether the regulatory action is ‘‘significant’’ and therefore subject to OMB review and the requirements of the Executive Order. The Order defines ‘‘significant regulatory action’’ as one that is likely to result in a rule that may: (1) Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities; (2) create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; (3) materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or (4) raise novel, legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

The Agency estimated the costs of today's proposed rule to determine if it is a significant regulation as defined by the Executive Order. The analysis considered compliance costs and economic impacts for inorganic chemical producers affected by this rule. We estimate the total cost of the rule to be $3 million annually. This analysis suggests that this rule is not economically significant according to the definition in E.O. 12866. The Office of Management and Budget has deemed this rule to be significant for novel policy reasons and has reviewed this rule.

Detailed discussions of the methodology used for estimating the costs, economic impacts and the benefits attributable to today's proposed rule for listing hazardous wastes from inorganic chemical production, followed by a presentation of the cost, economic impact and benefit results, may be found in the background document: ‘‘Economic Analysis of the Proposed Rule For Listing Hazardous Waste From Inorganic Chemical Production,’’ which was placed in the docket for today's proposed rule. We seek comment on the methodology used, the projected economic impacts, and the benefits assumed for the proposed listings.

1. Methodology Section

To estimate the cost, economic impacts to potentially affected firms and benefits to society from this proposed rulemaking, We evaluated § 3007 Survey responses from inorganic chemical producers, firm financial reports, and chemical production data. The Agency has developed model facilities that represent composite information about inorganic chemical producers at both the facility and firm level. We also evaluated two scenarios. The first scenario evaluates the cost of listing all wastes that we propose to list in today's proposal. The second scenario includes not only wastes that EPA has proposed to list but also any waste that has exceeded risk screens (or other screening criteria) and had quantitative risk assessment completed. Analysis of these scenarios allows the public to understand what costs would have resulted from this rule making if all of the quantitative risk assessments involving fate and transport modeling had shown risk to human health.

To estimate the incremental cost of this rule making, we reviewed baseline management practices and costs of potentially affected firms. Where more than one baseline management method was used (*e.g.* municipal incineration and landfilling), we either modeled more than one form of baseline management or selected the least expensive form of baseline management (which would overestimate rather than underestimate the cost of the rule).

The Agency has modeled the most likely post-regulatory scenario resulting from the listing (*e.g.,* disposal in a Subtitle C hazardous waste landfill, recycling) and estimated the cost of complying with it. The difference between the baseline management cost and the post-regulatory cost is the incremental cost of the rulemaking.

To estimate the economic impact of today's proposed rulemaking, we compared the incremental cost of the rulemaking with model firm sales and either net profit or product value. The Agency has also considered the ability of potentially affected firms to pass compliance costs on in the form of higher prices.

To estimate the benefits of today's proposal, we evaluated risk assessment results and as well as a qualitative assessment of benefits including natural resource protection of groundwater.

2. Results

a. Volume Results. Data reviewed by the Agency indicates that there are 9 inorganic chemical producers potentially affected by today's proposed rule. The data report that these firms generated 700,000 tons of inorganic chemical production waste annually that are potentially affected by today's proposed rule and modeled under Scenario 1. Data also indicate that there are 26 inorganic chemical producers who have generated wastes that are either being listed because they exhibit a characteristic or have been evaluated for quantitative risk assessment involving fate and transport modeling by the Agency to evaluate their potential effect on human health and the environment. These wastes are being modeled under Scenario 2.

b. Cost Results. For today's proposed rule, we estimate the total annual incremental costs from today's proposal to be $ 2.5 million for all facilities. Sectors costs are summarized in Table 2.

TABLE VIII–1.—ESTIMATED INCREMENTAL COST BY INORGANIC CHEMICAL SECTOR

Sector	Estimated incremental annual costs $ 000s (1999 $)		Number of affected facilities	
	Scenario 1	Scenario 2	Scenario 1	Scenario 2
Antimony Oxide	1.6 (recycling), 35 (disposal).	1.6 (recycling), 35 (disposal).	3	3
Hydrogen Cyanide		215	3	5
Sodium Chlorate		225	0	5
Sodium Phosphate		76	0	4
Titanium Dioxide	2900	6500	3	9
Total	2937	7051	9	26

c. Economic Impact Results. To estimate potential economic impacts resulting from today's proposed rule, we used first order economic impacts measures such as the estimated incremental costs of today's proposed rule as a percentage of both affected firms' sales and estimated profits[64]. We applied these measures to affected inorganic chemical producers. For affected inorganic chemical producers in the antimony oxide and sodium chlorate sectors, we estimated the costs to be less than 3 percent of a typical firm's sales and less than 2 percent of a firm's estimated profits. For affected inorganic chemical producers in the hydrogen cyanide sector, we estimated the cost to be less than 1 percent of a typical firm's sales and estimated profits. More detailed information on this estimate can be found in the economic analysis placed into today's docket.

d. Benefits Assessment. EPA has not conducted a quantitative assessment of actual benefits from this proposed rule. Because today's proposed rule results in new hazardous waste management requirements for K176, K177, and K178 wastes, the Agency believes that there may be a reduction in releases of hazardous constituents to the environment.

B. Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), 5 USC 601 et. seq.

The RFA generally requires an agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedures Act or any other statute unless the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small organizations, and small governmental jurisdictions.

For purposes of assessing the impacts of today's rule on small entities, a small entity is defined as: (1) A small business that has fewer than 1000 or 100 employees per firm depending upon the SIC code the firm primarily classified in[65]; (2) a small governmental jurisdiction that is a government of a city, county, town, school district or special district with a population of less than 50,000; and (3) a small organization that is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.

After considering the economic impacts of today's proposed rule on small entities, I certify that this action will not have a significant economic impact on a substantial number of small entities.

There are two potentially affected inorganic producing firms that constitute small entities. These firms are located in the antimony oxide sector. We have determined that these two firms would under this proposal incur costs of less than 1 percent of both the firm's sales and estimated profits under one scenario analyzed for the wastes in this sector. We continue to be interested in the potential impacts of the proposed rule on small entities and welcome comments on issues related to such impacts.

C. Paperwork Reduction Act

The information collection requirements in this proposed rule have been submitted for approval to the Office of Management and Budget (OMB) under the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.* An Information Collection Request (ICR) document has been prepared (ICR No. 1968.01) and a copy may be obtained from Sandy Farmer by mail at Collection Strategies Division; U.S. Environmental Protection Agency (2822); 1200 Pennsylvania Ave., NW, Washington, DC 20460,by email at farmer.sandy@epamail.epa.gov, or by calling (202) 260–2740. A copy may also be downloaded off the internet at *http://www.epa.gov/icr.*

This rule is proposed under the authority of sections 3001(e)(2) and 3001(b)(1) of the Hazardous and Solid Waste Amendments (HSWA) of 1984. The effect of listing the wastes described earlier will be to subject industry to management and treatment standards under the Resource Conservation and Recovery Act (RCRA).

This proposed rule does not contain any new information collection requirements, nor does it propose to modify any existing information collection requirements. As a result, this proposed rule represents only an incremental increase in burden for generators and subsequent handlers of the newly listed wastes in complying with existing RCRA information collection requirements.

The total annual respondent burden and cost for all existing paperwork associated with this proposed rule presented here represents the incremental increase in paperwork burden under six existing Information Collection Requests (ICRs). We estimate the total annual respondent burden for

---

[64] Because profit information is often either unavailable or more variable from year to year than sales measures, the Agency has chose to use a profit surrogate in completing the economic impact analysis of this proposal. According to Dun and Bradstreet's Industry Norms and Key Business Indicators (1995) the average net after tax profit for inorganic chemical producers in the 2819 SIC code was 6.3 percent. This percentage is applied to reported sales of affected firms in order to estimate their profits.

[65] The Small Business Administration has classified firms in the manufacturing sector (SIC Codes 20–39) and wholesale trade sector (SIC Codes 50–51) as small businesses within the sector based on the number of employees per firm. See Small Business Size Standards, 61 FR 3280, 3289 (January 31, 1996). Thus, to determine if a inorganic chemical producer is a small business, the primary SIC code of the firm would have to be determined. The small entities in today's rulemaking are in two SIC codes: (1) 2812 Alkalies and Chlorine, size standard 1000 employees and (2) 5082 Construction and Mining (except Petroleum) Machinery and Equipment size standard 100 employees.

all information collection activities to be approximately 417 hours, at an annual cost of approximately $19,916.

Comments are requested on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques. Send comments on the ICR to the Director, Collection Strategies Division; U.S. Environmental Protection Agency (2822); 1200 Pennsylvania Ave., NW, Washington, DC 20460; and to the Office of Information and Regulatory Affairs, Office of Management and Budget, 725 17th St., N.W., Washington, DC 20503, marked ''Attention: Desk Officer for EPA.'' Include the ICR number in any correspondence. Since OMB is required to make a decision concerning the ICR between 30 and 60 days after September 14, 2000, a comment to OMB is best assured of having its full effect if OMB receives it by October 16, 2000. The proposed rule will respond to any OMB or public comments on the information collection requirements contained in this proposal.

D. 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 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 proposed rule an explanation why that alternative was not adopted. Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant Federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements.

Today's rule contains no Federal mandates (under the regulatory provisions of Title II of the UMRA) for State, local, or tribal governments or the private sector. 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. 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, we determined that this rule contains no regulatory requirements that might significantly or uniquely affect small governments. We have fulfilled the requirement for analysis under the Unfunded Mandates Reform Act.

E. Executive Order 12898: Environmental Justice

EPA is committed to addressing environmental justice concerns and is assuming a leadership role in environmental justice initiatives to enhance environmental quality for all populations in the United States. The Agency's goals are to ensure that no segment of the population, regardless of race, color, national origin, or income bears disproportionately high and adverse human health or environmental impacts as a result of EPA's policies, programs, and activities, and that all people live in safe and healthful environments. In response to Executive Order 12898 and to concerns voiced by many groups outside the Agency, EPA's Office of Solid Waste and Emergency Response formed an Environmental Justice Task Force to analyze the array of environmental justice issues specific to waste programs and to develop an overall strategy to identify and address these issues (OSWER Directive No. 9200.3–17).

Today's proposed rule covers wastes from inorganic chemical production. It is not certain whether the environmental problems addressed by this rule could disproportionately affect minority or low-income communities. Today's proposed rule is intended to reduce risks of hazardous wastes as proposed, and to benefit all populations. As such, this rule is not expected to cause any disproportionately high and adverse impacts to minority or low-income communities versus non-minority or affluent communities.

In making hazardous waste listing determinations, we base our evaluations of potential risk from the generation and management of solid wastes on an analysis of potential individual risk. In conducting risk evaluations, our goal is to estimate potential risk to any population of potentially exposed individuals (*e.g.,* home gardeners, adult farmers, children of farmers, anglers) located in the vicinity of any generator or facility handling a waste. Therefore, we are not putting poor, rural, or minority populations at any disadvantage with regard to our evaluation of risk or with regard to how the Agency makes its proposed hazardous waste listing determinations.

In proposing today to list wastes as hazardous (*i.e.,* filter baghouses and low antimony slags from antimony oxide production that are discarded, nonexempt nonwastewater from the titanium dioxide chloride-ilmenite process,), all populations potentially exposed to these wastes or potentially exposed to releases of the hazardous constituents in the wastes will benefit from the proposed listing determination. In addition, listing determinations take effect at the national level. The wastes proposed to be listed as hazardous will be hazardous regardless of where they are generated and regardless of where they may be managed. Although the Agency understands that the proposed listing determinations, if finalized, may affect where these wastes are managed in the future (in that hazardous wastes must be managed at subtitle C facilities), the Agency's decision to list these wastes as hazardous is independent of any decisions regarding the location of waste generators and the siting of waste management facilities.

Similarly, in cases where the Agency is proposing not list a solid waste as hazardous because the waste does not meet the criteria for being identified as a hazardous waste, these decisions are based upon an evaluation of potential individual risks located in proximity to any facility handling the waste. Therefore, any population living proximately to a facility that produces a solid waste that the Agency has proposed not to list would not be adversely affected either because the waste is already being managed as a hazardous waste in the Subtitle C system or because the solid waste does not pose a sufficient risk to the local population. We encourage all stakeholders including members of the environmental justice community and members of the regulated community to provide comments or further information related to potential environmental justice concerns or impacts, including information and data on facilities that have evaluated potential ecological and human health impacts (taking into account subsistence patterns and sensitive populations) to minority or low-income communities.

F. Executive Order 13045: Protection of Children From Environmental Health Risks and Safety Risks

Executive Order 13045, ''Protection of Children from Environmental Health Risks and Safety Risks'' (62 FR 19885, April 23, 1997), applies to any rule that: (1) is determined to be ''economically significant'' as defined under Executive Order 12866, and (2) concerns an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, the Agency must evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency. This proposed rule is not subject to the Executive Order because it is not economically significant as defined in E.O. 12866, and because the Agency does not have reason to believe the environmental health or safety risks addressed by this action present a disproportionate risk to children.

The topic of environmental threats to children's health is growing in regulatory importance as scientists, policy makers, and village leaders continue to recognize the extent to which children are particularly vulnerable to environmental hazards. Recent EPA actions have been in the forefront of addressing environmental threats to the health and safety of children. Today's proposed rule further reflects our commitment to mitigating environmental threats to children.

A few significant physiological characteristics are largely responsible for children's increased susceptibility to environmental hazards. First, children eat proportionately more food, drink proportionately more fluids, and breathe more air per pound of body weight than do adults. As a result, children potentially experience greater levels of exposure to environmental threats than do adults. Second, because children's bodies are still in the process of development, their immune systems, neurological systems, and other immature organs can be more easily and considerably affected by environmental hazards.

Today's proposed rule is intended to avoid releases of hazardous constituents to the environment at levels that will cause unacceptable risks. We considered risks to children in our risk assessment. The more appropriate and safer management practices proposed in this rule are projected to reduce risks to children potentially exposed to the constituents of concern. The public is invited to submit or identify peer-reviewed studies and data, of which the agency may not be aware, that assess results of early life exposure to the proposed hazardous constituents from wastes from inorganic chemical production proposed for listing in today's rulemaking.

G. Executive Order 13084: Consultation and Coordination With Indian Tribal Governments

Under Executive Order 13084, EPA may not issue a regulation that is not required by statute, that significantly or uniquely affects the communities of Indian tribal governments, and that imposes substantial direct compliance costs on those communities, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by the tribal governments, or EPA consults with those governments. If EPA complies by consulting, Executive Order 13084 requires EPA to provide to the Office of Management and Budget, in a separately identified section of the preamble to the rule, a description of the extent of EPA's prior consultation with representatives of affected tribal governments, a summary of the nature of their concerns, and a statement supporting the need to issue the regulation. In addition, Executive Order 13084 requires EPA to develop an effective process permitting elected officials and other representatives of Indian tribal governments ''to provide meaningful and timely input in the development of regulatory policies on matters that significantly or uniquely affect their communities.''

For the reasons described above, today's proposed rule does not create a mandate on State, local or tribal governments, nor does it impose any enforceable duties on these entities. Accordingly, the requirements of section 3(b) of Executive Order 13084 do not apply to this rule.

H. Executive Order 13132—Federalism

Executive Order 13132, entitled ''Federalism'' (64 FR 43255, August 10, 1999), requires EPA to develop an accountable process to ensure ''meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications.'' ''Policies that have federalism implications'' is defined in the Executive Order to include regulations that have ''substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.''

Under Section 6 of Executive Order 13132, EPA may not issue a regulation that has federalism implications, that imposes substantial direct compliance costs, and that is not required by statute, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by State and local governments, or EPA consults with State and local officials early in the process of developing the proposed regulation. EPA also may not issue a regulation that has federalism implications and that preempts State law, unless the Agency consults with State and local officials early in the process of developing the proposed regulation.

Section 4 of the Executive Order contains additional requirements for rules that preempt State or local law, even if those rules do not have federalism implications (*i.e.,* the rules will not have substantial direct effects on the States, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government). Those requirements include providing all affected State and local officials notice and an opportunity for appropriate participation in the development of the regulation. If the preemption is not based on express or implied statutory authority, EPA also must consult, to the extent practicable, with appropriate State and local officials regarding the conflict between State law and Federally protected interests within the agency's area of regulatory responsibility.

This proposed rule does not have federalism implications. It will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132. This proposed rule directly affects primarily inorganic chemical producers. There are no State and local government bodies that incur direct compliance costs by this rulemaking. State and local government implementation expenditures are expected to be less than $500,000 in any one year.[66] Thus, the requirements of section 6 of the Executive Order do not apply to this rule.

This proposed rule would preempt State and local law that is less stringent for these inorganic chemical production wastes as hazardous wastes. Under the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. 6901 to 6992k, the relationship between the States and the national government with respect to hazardous waste management is established for authorized State hazardous waste programs, 42 U.S.C. 6926 (3006), and retention of State authority, 42 U.S.C. 6929 (3009). Under section 3009 of RCRA, States and their political subdivisions may not impose requirements less stringent for hazardous waste management than the national government. By publishing and inviting comment on this proposed rule, we hereby provide State and local officials notice and an opportunity for appropriate participation. Thus, we have complied with the requirements of section 4 of the Executive Order.

I. National Technology Transfer and Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (''NTTAA''), Public Law 104–113, section 12(d) (15 U.S.C. 272 note) directs EPA 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, and business practices) that are developed or adopted by voluntary consensus standards bodies. The NTTAA directs EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards. This proposed rulemaking involves technical standards. EPA proposes to use Toxicity Characteristic Leaching Procedure (TCLP) for treatment standards for associated with hazardous metal constituents in wastes proposed for listing in today's proposal. The TCLP is the standard test method used to evaluate the toxicity characteristic for the definition of hazardous waste (see 40 CFR 261.24) and treatment standards for metal constituents under the Land Disposal Restrictions (see 40 CFR 268.40 and 268.48.). The Agency has used the TCLP in completing its treatment standards for the same hazardous metal constituents across a range of listed and characteristic hazardous wastes. The performance level for leachability is based on the Best Commercially-Available Demonstrated Technology (BDAT). The use of the TCLP for the same constituents assures uniformity and consistency in the treatment of hazardous waste in fulfillment of the Congressional Mandate to minimize long-term threats to human health or the environment. 42 U.S.C. 6924(m). The use of any voluntary consensus standard would be impractical with applicable law because it would require a different leaching method than is currently used to determine hazardous characteristics. The use of different chemical methods to assess hazardousness of the waste and compliance with treatment standards would create disparate results between hazardous waste identification and effective treatment of land disposed hazardous wastes. We have not, therefore, used any voluntary consensus standards. EPA welcomes comments on this aspect of the proposed rulemaking and, specifically, invites the public to identify potentially-applicable voluntary consensus standards and to explain why such standards should be used in this regulation. EPA has also issued an advanced notice of proposed rulemaking for the Land Disposal Restriction program (65 FR 37932, June 19, 2000) that has included discussion on the effectiveness of stabilization on metals in hazardous wastes.

List of Subjects

40 CFR Part 148

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

40 CFR Part 261

Environmental protection, Hazardous materials, Waste treatment and disposal, Recycling.

40 CFR Part 268

Environmental protection, Hazardous materials, Waste management, Reporting and recordkeeping requirements, Land Disposal Restrictions, Treatment Standards.

40 CFR Part 271

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

40 CFR Part 302

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

Dated: August 30, 2000.

Carol M. Browner,

Administrator.

For the reasons set forth in the preamble, title 40, chapter I of the Code of Federal Regulations is proposed to be 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 paragraphs (l) and (m) to read as follows:

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

* * * * *

(l) Effective [date six months after publication of final rule], the wastes specified in 40 CFR 261.32 as EPA Hazardous Waste Numbers K176, K177, and K178 are prohibited from underground injection.

(m) The requirements of paragraphs (a) through (l) of this section do not apply:

(1) If the wastes meet or are treated to meet the applicable standards specified in subpart D of part 268 of this chapter; or

(2) If an exemption from a prohibition has been granted in response to a petition under subpart C of this part; or

(3) During the period of extension of the applicable effective date, if an extension has been granted under § 148.4.

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.

---

[66] For more information, please refer to Appendix C of the background document ''Economic Analysis of the Proposed Rule For Listing Hazardous Waste From Inorganic Chemical Production,'' which was placed in the docket for today's proposed rule.

4. Section 261.4 is amended by revising paragraph (b)(15) to read as follows:

§ 261.4 Exclusions.

* * * * *

(b) * * *

(15) Leachate or gas condensate collected from landfills where certain solid wastes have been disposed, provided that:

(i) The solid wastes disposed would meet one or more of the listing descriptions for Hazardous Waste Codes K169, K170, K171, K172, K174, K175, K176, K177, and K178, if these wastes had been generated after the effective date of the listing;

(ii) The solid wastes described in paragraph (b)(15)(i) of this section were disposed prior to the effective date of the listing:

(iii) The leachate or gas condensate do not exhibit any characteristic of hazardous waste nor are derived from any other listed hazardous waste;

(iv) Discharge of the leachate or gas condensate, including leachate or gas condensate transferred from the landfill to a POTW by truck, rail, or dedicated pipe, is subject to regulation under Sections 307(b) or 402 of the Clean Water Act.

(v) After February 13, 2001, leachate or gas condensate derived from K169–K172 will no longer be exempt if it is stored or managed in a surface impoundment prior to discharge. After [date 24 months after publication date of the final rule], leachate or gas condensate derived from K176, K177, and K178 will no longer be exempt if it is stored or managed in a surface impoundment prior to discharge. There is one exception: if the surface impoundment is used to temporarily store leachate or gas condensate in response to an emergency situation (*e.g.,* shutdown of wastewater treatment system), provided the impoundment has a double liner, and provided the leachate or gas condensate is removed from the impoundment and continues to be managed in compliance with the conditions of paragraph (b)(15)(v) after the emergency ends.

* * * * *

5. In § 261.32, the table is amended by adding in alphanumeric order (by the first column) the following wastestreams to the subgroup ''Inorganic Chemicals'' to read as follows:

§ 261.32 Hazardous waste from specific sources.

* * * * *

Industry and EPA hazardous waste No.	Hazardous waste	Hazardous code
* * *	* * *	*
Inorganic chemicals:		
* * *	* * *	*
K176	Baghouse filters from the production of antimony oxide	(E)
K177	Slag from the production of antimony oxide that is disposed of or speculatively accumulated	(T)
K178	Nonwastewaters from the production of titanium dioxide by the chloride-ilmenite process. [This listing does not apply to chloride process waste solids from titanium tetrachloride production exempt under section 261.4(b)(7)].	(T)
* * *	* * *	*

* * * * *

6. Appendix VII to Part 261 is amended by adding the following wastestreams in alphanumeric order (by the first column) to read as follows:

APPENDIX VII TO PART 261—BASIS FOR LISTING HAZARDOUS WASTE

EPA hazardous waste No.	Hazardous constituents for which listed
* *	* * *
K176	Arsenic, lead.
K177	Antimony.
K178	Manganese, thallium.

* * * * *

7. Appendix VIII to Part 261 is amended by adding in alphabetical sequence of common name the following entries:

APPENDIX VIII TO PART 261—HAZARDOUS CONSTITUENTS

Common name	Chemical abstracts name	Chemical abstracts No.	Hazardous waste No.
* * *	* *	*	*
Manganese	Same	7439–96–5	
* * *	* *	*	*

PART 268—LAND DISPOSAL RESTRICTIONS

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

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

Subpart C—Prohibitions on Land Disposal

9. Section 268.36 is added to read as follows:

§ 268.36 Waste specific prohibitions—inorganic chemical wastes.

(a) Effective [*date six months from date of publication of final rule*], the wastes specified in 40 CFR Part 261 as EPA Hazardous Wastes Numbers K176, K177, and K178, and soil and debris contaminated with these wastes, radioactive wastes mixed with these wastes, and soil and debris contaminated with radioactive wastes mixed with these wastes are prohibited from land disposal.

(b) The requirements of paragraph (a) 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 has met the treatment standards in § 268.40 or 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.

(c) 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 regulated constituents in excess of the applicable Subpart D levels, the waste is prohibited from land disposal, and all requirements of Part 268 are applicable, except as otherwise specified.

10. In § 268.40, the Table is amended by adding in alphanumeric order new entries for K176, K177, and K178 to read as follows:

§ 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	Nonwastewaters
		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
*	*	* *	*	*	*
K176	Baghouse filters from the production of antimony oxide.	Antimony	7440–36–0	1.9	1.15 mg/L TCLP
		Arsenic	7440–38–2	1.4	5.0 mg/L TCLP
		Cadmium	7440–43–9	0.69	0.11 mg/L TCLP
		Lead	7439–92–1	0.69	0.75 mg/L TCLP
		Mercury	7439–97–6	0.15	0.025 mg/L TCLP
K177	Slag from the production of antimony oxide that is disposed of or speculatively accumulated.	Antimony	7440–36–0	1.9	1.15 mg/L TCLP
		Arsenic	7440–38–2	1.4	5.0 mg/L TCLP
		Lead	7439–92–1	0.60	0.75 mg/L TCLP
K178	Nonwastewaters from the production of titanium dioxide by the chloride-ilmenite process. [This listing does not apply to chloride process waste solids from titanium tetrachloride production exempt under section 261.4(b)(7).].	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD). 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF).	35822–39–4 67562–39–4	0.000035 or CMBST[11] 0.000035 or CMBST[11]	0.0025 or CMBST[11] 0.0025 or CMBST[11] 0.0025 or CMBST[11]
		1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF).	55673–89–7	0.000035 or CMBST[11]	0.0025 or CMBST[11]
		HxCDDs (All Hexachlorodibenzo-p-dioxins).	34465–46–8	0.000063 or CMBST[11]	0.001 or CMBST[11]
		HxCDFs (All Hexachlorodibenzofurans).	55684–94–1	0.000063 or CMBST[11]	0.001 or CMBST[11]
		1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD).	3268–87–9	0.000063 or CMBST[11]	0.005 or CMBST[11]
		1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF).	39001–02–0	0.000063 or CMBST[11]	0.005 or CMBST[11]
		PeCDDs (All Pentachlorodibenzo-p-dioxins).	36088–22–9	0.000063 or CMBST[11]	0.001 or CMBST[11]
		PeCDFs (All Pentachlorodibenzofurans).	30402–15–4	0.000035 or CMBST[11]	0.001 or CMBST[11]
		TCDDs (All tetrachlorodibenzo-p-dioxins).	41903–57–5	0.000063 or CMBST[11]	0.001 or CMBST[11]
		TCDFs (All tetrachlorodibenzofurans).	55722–27–5	0.000063 or CMBST[11]	0.001 or CMBST[11]

TREATMENT STANDARDS FOR HAZARDOUS WASTES—Continued

[Note: NA means not applicable]

Waste code	Waste description and treatment/regulatory subcategory [1]	Regulated hazardous constituent		Wastewaters	Nonwastewaters
		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
		Manganese	7439–96–5	17.1	3.6 mg/L TCLP
		Thallium	7440–28–0	1.4	0.20 mg/L TCLP
*	*	* *	*	*	*

* * * * * * *

FOOTNOTES TO TREATMENT STANDARD TABLE 268.40

[1] The waste descriptions provided in this table do not replace waste descriptions in 40 CFR part 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 its salts and/or esters, the CAS number is given for the parent compound only.

[3] Concentration standards for wastewaters are expressed in mg/L and 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 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.

* * * * * * *

[11] For these wastes, the definition of CMBST is limited to: (1) combustion units operating under 40 CFR 266, (2) combustion units permitted under 40 CFR part 264, Subpart O, or (3) combustion units operating under 40 CFR 265, Subpart O, which have obtained a determination of equivalent treatment under 268.42(b).

11. In § 268.48, the Table is amended by adding in alphabetical order under the heading of “Inorganic Constituents” a new entry to read as follows: (The footnotes are republished without change.)

§ 268.48 Universal treatment standards.

* * * * *

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’
* * * *	*	*	*
Inorganic Constituents			
* * * *	*	*	*
Manganese	7439–96–5	17.1	3.6 mg/l TCLP
* * * *	*	*	*

* * * * * * *

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

[2] Concentration standards for wastewaters are expressed in mg/L and 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 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 Table 1 and Table 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
* * *	*	* *	*
[*insert date of signature of final rule*]	Listing of Hazardous Wastes K176, K177, and K178	[*insert Federal Register page numbers*]	[*insert effective date of final rule*]
* * *	*	* *	*

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

Effective date	Self-implementing provision	RCRA citation	Federal Register reference
* * *	*	* *	*
[*effective date of final rule*].	Prohibition on land disposal of K176, K177, and K178 wastes, and prohibition on land disposal of radioactive waste mixed with K176, K177, and K178 wastes, including soil and debris.	3004(g)(4)(C) and 3004(m).	[*date of publication of final rule*] [*FR page numbers*].
* * *	*	* *	*

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. In § 302.4, Table 302.4 is amended by adding the following new entries in alphanumeric order at the end of the table to read as follows:

§ 302.4 Designation of hazardous substances

* * * * *

TABLE 302.4.—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code †	RCRA Waste Number	Category	Pounds (Kg)
*	*	*	*	*	*	*	
K176			*1	4	K176	X	1 (0.454)
Baghouse filters from the production of antimony oxide.							
K177			*1	4	K177	X	5,000 (2,270)
Slag from the production of antimony oxide.							
K178			*1	4	K178	X	#
Nonwastewaters from the production of titanium dioxide by the chloride-ilmenite process. [This listing does not apply to chloride process waste solids from titanium tetrachloride production exempt under section 261.4(b)(7).].							

† Indicates the statutory source as defined by 1, 2, 3, and 4 below.

* * * * * * *

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.
The Agency may adjust the statutory RQ for this hazardous substance in a future rulemaking; until then the statutory RQ applies.

* * * * * * *

[FR Doc. 00–22810 Filed 9–13–00; 8:45 am]

BILLING CODE 6560–50–U