

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 260, 261, 262, 264, 265, 268, 270, and 271

[SWH-FRL 3089-6]

Hazardous Waste Management System: Land Disposal Restrictions

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule.

SUMMARY: The Environmental Protection Agency is today proposing to codify the statutory land disposal prohibition levels for a list of hazardous constituents known as the "California List" wastes. EPA is taking this action in response to the requirements of the Resource Conservation and Recovery Act (RCRA), enacted through the Hazardous and Solid Waste Amendments of 1984 (HSWA).

Section 3004(d) of RCRA prohibits the land disposal of hazardous wastes containing the California list constituents in concentrations at or above specified levels after July 8, 1987. This section of the Act also authorizes EPA to substitute more stringent concentration levels where necessary to protect human health and the environment. Today's action proposes to codify the statutory concentration levels for all California waste categories, and requests comment on an alternative approach that would lower the restriction levels for some or all of the "California List" metals. Treatment standards are proposed for hazardous wastes with a pH less than or equal to two, those containing polychlorinated biphenyls at greater than 50 ppm, and those containing halogenated organic compounds in total concentration greater than 1000 mg/kg. This action also proposes methods for determining compliance with the regulatory requirements. In addition, this proposal includes discussion of treatment technologies which are capable of reducing the concentration of the California list wastes to below their respective restriction levels.

DATE: Comments on this proposed rule must be submitted on or before January 28, 1987. A public hearing is scheduled for January 14, 1987, 9:00 a.m. to 4:30 p.m.

ADDRESSES: The public must send an original and two copies of their comments to EPA RCRA Docket (S-212) (WH-562), Environmental Protection Agency, 401 M Street SW., Washington, DC 20460. Place the Docket Number F-86-LDR4-FFFFF on your comments. For

additional details see the "OSW Docket" section in **SUPPLEMENTARY INFORMATION**. The public hearing will be held at the following location: Marriott Crystal Gateway Hotel, 1700 Jefferson Davis Highway, Arlington, VA (703-920-3230). A block of rooms has been reserved at the hotel for the convenience of attendees requiring overnight accommodations. Please make reservations by calling the hotel directly. Special room rates of \$72.00 single and \$97.00 double have been established.

Anyone wishing to make a statement at the hearings should notify, in writing, Ms. Geraldine Wyer, Public Participation Officer, Office of Solid Waste (WH-562), U.S. Environmental Protection Agency, 401 M Street SW., Washington, DC 20460. Persons wishing to make oral presentations must restrict them to 15 minutes and are encouraged to have written copies of their complete comments for inclusion in the official record.

FOR FURTHER INFORMATION CONTACT: For general information contact the RCRA Hotline, Office of Solid Waste (WH-562), U.S. Environmental Protection Agency, 401 M St. SW., Washington, DC 20460, (800) 424-9346 (toll-free) or (202) 382-3000 locally.

For information on specific aspects of this proposed rule, contact: Stephen Weil, or Richard Dailey, Office of Solid Waste (WH-562B), U.S. Environmental Protection Agency, 401 M St. SW., Washington, DC 20460, (202) 382-4770.

SUPPLEMENTARY INFORMATION:

OSW Docket

The OSW docket is located in the EPA RCRA Docket Room (subbasement), 401 M. St. SW., Washington, DC 20460. The docket is open from 9:30 to 3:30, Monday through Friday, except for public holidays. To review docket materials, the public must make an appointment by calling Mia Zmud at (202) 475-9327 or Kate Blow at (202) 382-4675. The public may copy a maximum of 50 pages from any regulatory docket at no cost. Additional copies cost \$.20 per page.

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I. Background

A. Congressional Mandate

According to Section 3004(d) of the Hazardous and Solid Waste Amendments of 1984 (HSWA), effective 32 months after the date of enactment, the land disposal of liquid hazardous wastes containing certain metals, free cyanides, polychlorinated biphenyls (PCBs), corrosives with a pH of less than or equal to 2.0, and liquid and non-liquid hazardous wastes containing halogenated organic compounds (HOCs) is prohibited unless the waste complies with treatment standards established by the Environmental Protection Agency (EPA) under section 3004(m), or a petition has been approved based on a showing that, to a reasonable degree of certainty, when such wastes are placed in a land disposal unit that "there will be no migration of hazardous constituents from the disposal unit or

injection zone for as long as the wastes remain hazardous" (section 3004(d)(1)). The list of California wastes and their respective restriction levels that are shown below were taken directly from the statute:

(A) Liquid hazardous wastes, including free liquids associated with any solid or sludge, containing free cyanides at concentrations greater than or equal to 1000 mg/l.

(B) Liquid hazardous wastes, including free liquids associated with any solid or sludge, containing the following metals (or elements) or compounds of these metals (or elements) at concentrations greater than or equal to those specified below:

(i) Arsenic and/or compounds (as As) 500 mg/l;

(ii) Cadmium and/or compounds (as Cd) 100 mg/l;

(iii) Chromium (VI and or compounds (as Cr VI)) 500 mg/l;

(iv) Lead and/or compounds (as Pb) 500 mg/l;

(v) Mercury and/or compounds (as Hg) 20 mg/l;

(vi) Nickel and/or compounds (as Ni) 134 mg/l;

(vii) Selenium and/or compounds (as Se) 100 mg/l;

(viii) Thallium and/or compounds (as Tl) 130 mg/l;

(C) Liquid hazardous waste having a pH less than or equal to two (2.0).

(D) Liquid hazardous wastes containing polychlorinated biphenyls at concentrations greater than or equal to 50 ppm.

(E) Hazardous wastes containing halogenated organic compounds in total concentration greater than or equal to 1,000 mg/kg.

Collectively, these specific hazardous waste categories are referred to as the California list, since the State of California developed regulations to restrict the land disposal of wastes containing these constituents. Congress incorporated the California list into the provisions of HSWA primarily because California had conducted studies which demonstrated that wastes containing these constituents may be harmful to human health and the environment. (S. Rep. No. 284, 98th Cong., 1st Sess., 17 (1983)).

Congress intended the California list prohibitions as a starting point in carrying out the congressional mandate to minimize land disposal of hazardous waste. (H.R. Rep. No. 198, Part I, 98th Cong., 1st Sess. 34 (1983)). Congress' intent in specifying threshold levels for the land disposal of California list wastes was to avoid time-consuming litigation over the selection of appropriate levels (H.R. Rep. No. 198, Part I, at 34). While the legislation adopted the regulatory concentration levels developed by the State of California, section 3004(d)(2) of RCRA authorizes the Agency to substitute

more stringent levels where necessary to protect human health and the environment.

B. Criteria for Selection of California List Constituents

In developing its list of specific categories of hazardous wastes, California sought to restrict those wastes that were known to create substantial risks to human health and the environment when land disposed. The State of California therefore identified hazardous constituents that are known to be highly toxic, persistent, bioaccumulative, mobile and corrosive. For example, high concentrations of free cyanides can be lethal to humans and to animals, and sublethal concentrations may cause gastrointestinal and neurological disturbances. Additionally, there is the potential for the formation of highly toxic hydrogen cyanide gas. The available evidence regarding polychlorinated biphenyls suggest that certain levels of exposure can cause birth defects, reproductive problems, liver malfunctions, digestive disturbances, and skin problems. Some evidence suggests that PCBs may be carcinogenic. Many of the halogenated organic compounds are carcinogenic, mutagenic, or teratogenic, while others cause damage to the liver, lungs, and kidneys. Corrosives are of concern because they may harm human skin, mobilize toxic constituents when co-disposed with other wastes, and damage land disposal containment systems. In doses exceeding the trace quantities necessary to living organisms, the listed metals can be acutely or chronically toxic. They are potentially mobile, and have been found to bioaccumulate in livestock, birds, aquatic organisms, and humans (California Department of Health Services, 1982).

In developing threshold levels for these hazardous constituents, California attempted to establish thresholds which would prohibit the land disposal of wastes that may pose substantial risk to human health and the environment. A number of considerations were involved in making these determinations, including toxicity to living organisms, adverse effects on the environment, and physical/chemical interactions in the land disposal environment. For example, California determined that liquid cyanide wastes containing greater than 1,000 mg/l cyanide could create dangerous emissions of hydrogen cyanide gas above land disposal facilities. Since hydrogen cyanide gas is known to be extremely hazardous to humans, the cyanide concentration threshold was set at 1,000 mg/l to lessen

the possibility of forming hydrogen cyanide gas.

With respect to metals, California developed a health-based threshold level using the National Interim Primary Drinking Water Standard and a 10,000-fold attenuation factor to take into account dispersion and dilution which generally occur when these constituents migrate to ground water. For nickel and thallium, however, a threshold level was derived from application of an attenuation factor of 10,000 applied to the Water Quality Criteria for these two metals.

California also restricts from land disposal liquid wastes having pH less than or equal to 2.0. These restrictions are based solely on the ability of these wastes to mobilize and react with other wastes and to breach or impair containment mechanisms such as drums and liners.

The level set for polychlorinated biphenyls was based primarily on considerations of consistency. The EPA regulates the disposal of polychlorinated biphenyls under the Toxic Substances Control Act of 1976 (TSCA). Under TSCA regulations codified in 40 CFR 761.60, liquid PCBs at concentrations between 50 ppm and 500 ppm may be landfilled if first absorbed. Therefore, California selected the 50 ppm level to be consistent with existing federal regulations.

Regarding HOCs, California established the 1,000 mg/kg level based on a combination of factors, including the toxicity of the compounds, the estimated volume of wastes that would be brought into the restrictions system, and the available capacity for handling such wastes.

II. Summary of Today's Proposal

A. Proposed Approach

The Agency is proposing to codify the statutory levels for the California list as set forth in section 3004(d) of the Hazardous and Solid Waste Amendments to the Resource Conservation and Recovery Act.

The Agency is also proposing two changes to the list. The first change in the proposed codification would require that the statutory level for cyanides (1,000 mg/l) apply to *total* cyanide rather than *free* cyanide as specified in the statute. This proposed change, which is discussed more fully in section IV. B., is being considered because of a lack of consensus within the literature on the definition of "free" cyanide, and because complexed cyanide (total cyanide) may convert to free cyanide under certain conditions that may exist in the environment. The alternative is to

adopt an intermediate definition based on an analytical method that would at necessity capture more than just "free" cyanides but would not capture "total" cyanides. The Agency is also requesting comment on whether isocyanides should be included as restricted cyanide-containing California list wastes.

The Agency is also proposing to define the universe of halogenated organic compounds (HOCs) as those that are listed or identified as hazardous under 40 CFR Part 261, or listed as a hazardous constituent under 40 CFR Part 261, Appendix VIII including PCBs. An alternative approach under consideration would not require that the HOCs be limited to Appendix VIII, but would bring any RCRA hazardous waste containing halogenated organic compounds (including polymers such as polyvinyl chloride) above 1,000 mg/kg within the scope of the prohibition, regardless of the degree of hazard associated with the HOC. The Agency is soliciting comment on this approach.

The Agency has considered an approach that would lower the statutory levels for those metals for which Extraction Procedure (EP) toxicity characteristic levels exist (*i.e.*, arsenic, cadmium, chromium, lead, mercury, selenium) to the EP levels. While the Agency currently is rejecting this approach, which is discussed in Section IV.C. of today's proposal, the Agency is requesting comment on this and other possible alternatives. The Agency also solicits comment on whether the statutory levels should be lowered for wastes other than those for which the EPA has established EP levels.

B. Testing/Recordkeeping and Waste Analysis Requirements

The Agency is proposing analytical procedures and methods for the identification of wastes that are subject to the California list land disposal restriction rules. The tests EPA is proposing to require in order to implement this program are: (1) The Paint Filter Liquids Test to determine whether a waste is a liquid or a non-liquid, and; (2) the Toxicity Characteristic Leaching Procedure (TCLP) in order to provide a leachate from which it can be determined whether the particular California list constituent exceeds the restriction level. Additionally, the Agency recommends several reference works that may be used as guidance in determining appropriate qualitative/quantitative analytical methods for California list constituents. The Agency is also proposing several approaches for which part or parts of the waste must be analyzed for hazardous constituents. All

of the above, including references for analytical guidance, are described in more detail in Section IV.A. The regulatory framework for the above (except for the Paint Filter Liquids Test) was published in the *Federal Register* in the solvents and dioxins final rule November 7, 1986 (51 FR 40572), and is to be codified at 40 CFR 268.7.

The Agency is also proposing (with some minor changes) that those California list wastes for which treatment standards have been established must comply with the basic certification and recordkeeping requirements established by the solvents and dioxins rule, published in the *Federal Register* in November 7, 1986, and which are to be codified at 40 CFR 268.7. The Agency is asking for comment on some changes to these requirements that are specific to the California list restrictions. The Agency is also proposing to require certification and recordkeeping for all wastes potentially subject to the California list provisions.

C. Best Demonstrated Available Treatment (BDAT) Technologies

In today's notice, the Agency defines BDAT as the application of specified technologies (see Section IV.G.) to restricted wastes containing HOCs, PCBs, and corrosives (wastes with a pH of less than two). For PCB-containing wastes, BDAT is proposed to be incineration, or thermal destruction in high-efficiency boilers, or other "equivalent methods" in accordance with the requirements promulgated under the Toxic Substances Control Act (TSCA) at 40 CFR 761.60 and 761.70. Best demonstrated available technology for California list wastes containing HOCs at greater than 1% (including both liquids and organic and inorganic solids and sludges) is proposed to be incineration in accordance with the requirements of 40 CFR 264.343 for permitted facilities or 265.343 for interim status facilities. For non-liquid hazardous wastes containing greater than 1000 mg/kg HOCs and less than 1% total organic carbon, the Agency is proposing that BDAT be incineration as described above. BDAT treatment for corrosive wastes is proposed to be defined as neutralization to a pH of greater than two.

The Agency is not proposing BDAT for HOC-containing liquid wastes between 1,000 ppm and 10,000 ppm. While technologies such as biological treatment, carbon adsorption, and steam stripping are generally applicable treatment technologies for some halogenated organic wastes (such as

halogenated solvents) at these concentrations, the Agency, at this time, does not have adequate data to specify which, if any, of these treatments would be applicable to all HOC-containing wastes, nor is it able to define operating parameters or technologies based on performance standards.

The Agency is not proposing BDAT for other California list constituents at this time. This notice does include a discussion of treatment technologies for California list metals and cyanides which, when used, may reduce the concentrations of those constituents in liquid hazardous wastes to below their respective statutory levels (see Section IV.G.). These technologies may become the basis for BDAT when the Agency sets treatment standards for the metal-bearing and cyanide-bearing wastes under the Schedule for Final Land Disposal Restrictions which was published in the *Federal Register* at 51 FR 19300, May 28, 1986.

D. Prohibition on Dilution and/or Evaporation as Treatment

The Agency today proposes to amend the § 268.3 prohibition on dilution as treatment (51 FR 40639, November 7, 1986) to prohibit dilution as a means of achieving the statutory concentration levels and prohibit dilution as a means of circumventing the effective date of a prohibition under Subpart C. A detailed discussion of the dilution prohibition is found in Section IV. I.

The Agency is also considering a prohibition on evaporation for purposes of the § 268.4 treatment in surface impoundments exemption from the land disposal prohibitions. A discussion of the evaporation prohibition is found under Section IV. J.

E. Nationwide Variances From the Ban Effective Date

As discussed earlier, today's notice proposes several treatment technologies that are to be considered BDAT for the purposes of establishing treatment standards for the restricted HOC and PCB-containing wastes. Incineration required as BDAT for the HOCs and PCBs is also required to treat solvent-containing and dioxin-containing wastes (51 FR 40572). It has been estimated that the available incineration capacity will be exhausted by the treatment of both solvent-containing and dioxin-containing wastes. Therefore, the Agency is proposing (under the authority granted in section 3004(h)(2)) to grant two-year nationwide variances to the ban effective date for HOC-containing and PCB-containing California list wastes. A discussion of the ban effective dates and the

nationwide variances is found in Sections V. A and L.

F. Petition Processes

Today's notice proposes to adhere to the regulatory framework established by the Solvents and Dioxins Final Rule of November 7, 1986 for (1) granting extensions of the ban effective date on a case-by-case basis, and, (2) the land disposal of wastes not meeting a relevant treatment standard. These two petition processes are codified at §§ 268.5, and 268.6, respectively.

G. Prohibition on Storage

Today's notice proposes to treat storage of the California list wastes in the same way as other restricted wastes, as noted in the solvents and dioxins final rule (see 51 FR 40572, November 7, 1986). In that final rule, the Agency prohibited storage except for the purposes of accumulating such quantities as are necessary to facilitate proper recovery, treatment, or disposal. The Agency has established in the regulation a rebuttable presumption that such storage is necessary (the burden of proof is on the Agency to show that it is not necessary). Storage of restricted wastes for longer than one year is allowed provided that the owner/operator is able to demonstrate that the additional time is required solely to accumulate quantities of waste that facilitate the treatment and disposal of restricted wastes. These requirements are codified at 40 CFR 268.50.

H. Facilities Operating Under a Permit or Interim Status

The Agency is proposing two amendments to Part 270 to give treatment and storage facilities more flexibility in handling restricted wastes. First, the Agency is proposing to allow permitted facilities to use the minor modification process to obtain approval to change their facilities to treat or store restricted wastes in tanks or containers as necessary to comply with the Part 268 land disposal restrictions. Second, EPA is proposing to allow interim status facilities to expand their operations by more than 50 percent to treat or store restricted wastes in tanks or containers as necessary to comply with the Part 268 land disposal restrictions. (See Section IV.J.). These modifications would cover all restricted wastes, and not just California list wastes.

I. Treatability Variances

The Agency is requesting comment on a simplified (non-rulemaking) procedure for granting treatability variances. (See Section IV.L. in this notice.)

III. Scope and Applicability

A. RCRA Section 3004(d) Requirements

The RCRA section 3004(d) provisions prohibit the land disposal of hazardous wastes containing California list constituents above specified concentrations. With the exception of halogenated organic compounds (HOCs), the restricted wastes are liquids. In order to be subject to the section 3004(d) provisions, a given waste must meet each of the four criteria discussed in this section: (1) The waste must contain a constituent specified in the California list provisions in section 3004(d) or have a pH less than or equal to two (2.0); (2) the physical form of the waste must be a liquid (except for HOCs); (3) the waste containing the California list constituent must be listed or identified as hazardous under RCRA section 3001 (as implemented in 40 CFR Part 261); and (4) the waste must contain a concentration of one or more California list constituents at or above the levels specified in section 3004(d) (or more stringent levels that may be promulgated by EPA).

1. Definition of California List Constituents

The California list metals are easily defined with reference to the periodic table of elements. The requirement applies both to individual constituents and to the relevant metal portion of any compounds containing California list metals. The Agency is proposing that wastes having a pH less than or equal to two (2.0) are to be determined using the method specified for determining the characteristic of corrosivity at 40 CFR 261.22. The proposed definition of PCBs is consistent with an existing definition in the PCB regulations promulgated under the Toxic Substances Control Act (TSCA) at 40 CFR 761.3. HOCs are defined to include any halogenated organic compounds either identified or listed as hazardous under 40 CFR Part 261 or listed as a hazardous constituent under 40 CFR Part 261, Appendix VIII. An alternative definition being considered would not limit HOCs to those specified in Part 261. Cyanides are defined as any substance that can be shown as having a resonance structure containing a carbon-nitrogen triple bond. More detailed definitions of wastes containing cyanides, PCBs, and/or HOCs are provided later in the preamble sections addressing those constituents.

2. Physical Form Requirement

Except for HOCs (which are prohibited from land disposal in both

liquid and non-liquid form), RCRA section 3004(d) prohibits the land disposal of California list wastes only if such wastes exist in liquid form.¹ For purposes of determining whether a given waste is a liquid, the Agency is proposing to require that the Paint Filter Liquids Test (Method 9095 in EPA Publication SW-846) be used. On April 30, 1985 (50 FR 18370), EPA promulgated a final rule requiring use of the Paint Filter Liquids Test in determining whether a waste sample contains free liquids. Today's proposal is consistent with this existing requirement.

The California list wastes are determined to be liquids, and, therefore, potentially subject to the section 3004(d) prohibitions, at the point of disposal. While this differs from the final solvents and dioxins rule, which requires that wastes are determined to be restricted from land disposal at the point of generation (see 51 FR 40572, November 7, 1986), EPA believes that determining whether the California list wastes are liquid or non-liquids at the point of disposal is consistent with congressional intent.

Except for the HOC wastes, which are prohibited in both liquid and non-liquid form, Congress was concerned with the land disposal of California list constituents only in their liquid or mobile form. Therefore, a liquid hazardous waste containing a California list constituent may be treated so as to render the waste a non-liquid and subsequently land disposed without being subject to the restrictions in section 3004(d). It should be noted that RCRA section 3004(c) (as codified at 40 CFR 264.314 and 265.314) requires that bulk or non-containerized liquid hazardous wastes be rendered non-liquid by means other than by the use of absorbents prior to placement in a landfill.

3. Hazardous Waste Requirement

RCRA section 3004(d)(2) states that the California list land disposal prohibition "applies to the following hazardous wastes listed or identified under section 3001." According to the plain language of this provision, section 3004(d) applies only to those wastes which are listed as hazardous under 40

CFR Part 261 or exhibit one or more of the characteristics of hazardous waste identified in Part 261 (i.e. ignitability, corrosivity, reactivity, or toxicity), and which also contain a California list constituent as defined above.

4. Concentration Levels Prohibited From Land Disposal

The California list prohibitions in RCRA section 3004(d) establish certain concentration levels above which there is a strong statutory presumption against land disposal. The only circumstances in which California list wastes may be land disposed in concentrations above the levels specified in section 3004(d) (or those more stringent levels as may be promulgated by EPA) are those cases where the waste meets a treatment standard established under section 3004(m) or, as provided for in section 3004(d)(1), a petition has been granted based on a demonstration that "to a reasonable degree of certainty, there will be no migration of hazardous constituents from the disposal unit or injection zone for as long as the wastes remain hazardous." (See the solvents and dioxins rule final at 51 FR 40572, November 7 1986, for a more complete discussion of the petition process.)

Although RCRA specifies allowable concentration levels for each of the California list constituents, the statute directs EPA to establish more stringent concentration levels when necessary to protect human health and the environment. This requirement applies when the Administrator has sufficient evidence to show that there is a substantial threat to humans and the environment when wastes containing statutory concentrations of California list compounds are land disposed. The Agency recognizes that the California list prohibitions were only intended as a starting point in minimizing reliance on land disposal. Land disposal of listed or characteristic wastes containing these constituents will be reevaluated according to the Agency's final schedule for promulgating land disposal restrictions (51 FR 19300).

Considering the factors specified by Congress, EPA acknowledges that many of the California list constituents may be toxic, persistent, bioaccumulative, mobile and corrosive. EPA believes, however, that the primary purpose of the statutory concentration limits is to control the timing of EPA's review of the wastes containing the California list constituents. The statutory concentration limits were not intended to distinguish wastes that are appropriate for land disposal from those that are not. Indeed, the legislative

history indicates that no presumption is to be drawn that less concentrated wastes are less hazardous. See H.R. Rep. No. 198, 98th Cong., 2d Sess., Part 1, at 34 (1983). Rather, the statutory thresholds were intended to require EPA to consider under section 3004(d) those wastes containing constituent concentrations that are clearly "highly toxic," while allowing the remainder of the wastes to be reviewed according to the schedule in section 3004(g). See S. Rep. No. 284, 98th Cong., 2d Sess. 17 (1983). Thus, the constituent concentrations of wastes that fall below the California list levels still may be of concern. In the context of this statutory structure and legislative history, EPA believes that in order to show that more stringent concentration limits are necessary to protect human health and the environment, EPA should show that wastes containing concentrations of constituents below the statutory thresholds are of such concern that they should be considered on an accelerated schedule rather than under the schedule in section 3004(g). EPA does not have such data for any of the California list wastes. For this reason, the Agency is proposing to defer to the statutory levels for the California list wastes. These wastes will be addressed as part of the schedule for restricting wastes for land disposal and establishing BDAT (51 FR 19300).

However, as noted in the summary of today's notice, the Agency is requesting comment on an approach that would substitute more stringent concentration levels for at least those metal-bearing wastes for which EPA has already established EP toxicity limits. Although EPA does not have data to suggest that lower levels (such as the EP toxicity levels) for the California list metals are necessary to avoid substantial risks to human health and the environment when wastes are disposed in hazardous waste disposal facilities, the Agency is concerned with the toxicity and persistence of these metals when placed in other types of land disposal facilities and, therefore, requests comment and data on possible hazards posed by these compounds in Subtitle C facilities. In establishing the EP toxicity levels, EPA modeled a mismanagement scenario involving co-disposal of wastes in an actively decomposing municipal landfill overlying a ground water aquifer (45 FR 33110, May 19, 1980). Given the additional technological requirements for RCRA hazardous waste disposal facilities, disposal of wastes below the statutory levels may not pose such a severe threat as to warrant consideration of such wastes in this

¹ EPA will address non-liquid forms of the California list wastes (except PCBs, which are not currently regulated as RCRA hazardous wastes) at later dates in accordance with the schedule finalized on May 28, 1988 (51 FR 19300). Listed wastes containing metals in a non-liquid matrix will be addressed pursuant to the various time frames in the final schedule and non-liquid wastes identified by characteristic will be addressed no later than May 8, 1990, in accordance with the provisions in RCRA section 3004(g)(4) and the final schedule.

rulemaking rather than under section 3004(g).

B. Impact of the RCRA Section 3004(c) Liquids in Landfills Prohibition

Effective May 8, 1985, RCRA section 3004(c)(1) prohibits the placement of bulk or non-containerized liquid hazardous waste or free liquids contained in hazardous waste (whether or not absorbents have been added) in any landfill. This statutory prohibition was codified by EPA in 40 CFR 264.314 and 265.314 on July 15, 1985 (50 FR 28702), and it extends to liquid California list wastes, liquid wastes that meet treatment standards promulgated under section 3004(m) but which have not been delisted or otherwise rendered no longer a RCRA hazardous waste, and those subject to a successful petition granted under 40 CFR Part 268. Furthermore, even where the waste is no longer hazardous, section 3004(c)(4) (also codified at §§ 264.314 and 265.314) prohibits its placement (in most cases) in a hazardous waste landfill. Because these prohibitions apply to the same category of wastes that are the major focus of the California list prohibitions (i.e. liquid hazardous wastes), today's proposed rule will impose additional requirements on Subtitle C landfill operations only to the extent that such landfills dispose of non-liquid hazardous wastes containing greater than 1,000 mg/kg HOCs. Therefore, the primary impact of the California list prohibitions is on land disposal in facilities other than landfills (e.g. surface impoundments).

C. Exemption for Treatment in Surface Impoundments

Restricted wastes may be placed in treatment surface impoundments under certain conditions as authorized by RCRA sections 3005(j)(11)(A) and (B) and implemented in 40 CFR 268.4. A detailed explanation of the surface impoundment exemption is found in the regulatory framework for the final solvents and dioxins rule at 51 FR 40572, November 7, 1986. Essentially, the Agency is proposing to expand the § 268.4 treatment in surface impoundments exemption to the California list wastes. The Agency has construed the requirement in section 3005(j)(ii)(B) to remove "residues which are hazardous" to apply to residues that have not been delisted, do not meet the treatment standards, or have not been the subject of a successful petition. In addition, the Agency is proposing that any treatment residues that do not meet the treatment standards or prohibition levels (where no treatment standards have been established) must also be

removed at least annually. EPA believes that it is reasonable to include wastes meeting the California list levels because these are no longer prohibited wastes and could be disposed in another surface impoundment.

IV. Regulatory Approach for California List Wastes

A. Testing and Recordkeeping Requirements

1. Definition of a Liquid

Except for the halogenated organic compounds, section 3004(d) specifies that all of the wastes that are to be restricted from land disposal are either liquids or sludges containing free liquids. In order to define those wastes that are to be considered liquids for the purpose of the California list land disposal restriction rules, the Agency is proposing to require the use of the Paint Filter Liquids Test (See method 9095 in EPA publication SW-846, Test Methods for Evaluating Solid Waste, or 50 FR 18370, April 30, 1985) as the method for distinguishing liquid from non-liquid wastes. The Agency is using this test in other contexts to determine if wastes are liquid for other regulatory requirements. Basically, the method consists of placing a predetermined amount of liquid into a paint filter. If any portion of the material passes through the filter within five minutes, the material is deemed to contain free liquids and, for the purposes of this rule, will be considered a liquid. The Agency believes that the use of this test is appropriate because the test is intended to identify wastes that are likely to leach materials into the environment. The Agency requests comment on this definition and on other possible definitions of what constitutes a liquid.

2. Leachate Generation Method

Determining whether a waste meets the concentration levels set out in section 3004(d) or more stringent limits established by regulation at times may require the use of a leachate generation technique (see the discussion in subparagraph three below). The Agency is today proposing that the Toxicity Characteristic Leaching Procedure (TCLP) be used as the method for generating a leachate from California list-containing wastes that have been demonstrated to be liquids by the Paint Filter Liquids Test. The TCLP was proposed at 51 FR 21648, June 13, 1986 and was promulgated for the purposes of the land disposal restrictions rules for the wastes addressed in the final solvents and dioxins rule on November 7, 1986.

3. Determination of Concentration Levels

Using the Paint Filter Liquids Test to determine whether or not a waste is a liquid results in a filtrate (the liquid that comes through the filter) and, in many cases, a residue that is left behind. The hazardous constituents of concern for the California wastes may be contained in the filtrate, entrained in the matrix of the solid residue left on the filter, or may be partitioned between the two phases. Because of this possible partitioning, the Agency is considering several approaches as to which part or parts of the wastes should be analyzed in order to determine if the California list constituents meet or exceed the restrictions levels, and is requesting comment on these possible approaches.

a. *Analysis of the Paint Filter Liquids Test filtrate.* The State of California, which uses the Paint Filter Liquids Test to determine if a waste is a liquid, identifies the hazardous constituents of concern by analyzing only the Paint Filter Liquids Test filtrate. Since Congress adopted the HSWA land disposal restrictions directly from California's program, the Agency considered analyzing only the Paint Filter Test filtrate to determine whether the restriction levels were exceeded. The Agency is not proposing this approach because it believes that the approach does not fully reflect congressional concern about the potential for the California list constituents to migrate from the waste, and the possible contamination of groundwater. Analysis of only the Paint Filter Liquids Test filtrate does not take into account the hazardous constituents that may be entrained in the waste matrix, and which may leach out over a period of time. Therefore, EPA believes that this approach is not consistent with congressional intent and, therefore, is not the best approach for implementing the California list land disposal restrictions.

b. *Use of the Toxicity Characteristic Leaching Procedure (TCLP).* As indicated above, the Agency believes that wastes which fail the Paint Filter Liquids Test may have hazardous constituents contained not only in the liquid portion that passes through the paint filter, but in the residue that remains on the filter as well. The possibility that these constituents, when land disposed, may migrate from the waste matrix to ground water is of concern to the Agency, and EPA believes that it was of concern to Congress as well. Therefore, the Agency today proposes that the Toxicity

Characteristic Leaching Procedure be used on wastes that have been defined as liquids by the Paint Filter Liquids Test and to generate a leachate from which it may be determined if those wastes exceed the California list restriction levels. In the TCLP, depending upon the percent solids content of the waste, an initial liquid filtrate and the test-generated leachate may be combined for both qualitative/quantitative analysis. The procedure is designed so that potentially mobile constituents are likely to leach from the waste matrix and be present in the collected leachate. Thus, the potentially mobile fraction of the constituents in the waste are considered.

c. *Total constituent analysis.* A third approach considered by the Agency is the total constituent analysis. This approach, which would be the most conservative of the three, would analyze the entire waste sample for constituents of concern, and may more directly account for the effects of direct exposure (e.g., dermal exposure or inhalation). However, the Agency does not believe that direct exposure is a significant problem for these wastes following land disposal in a properly operated land disposal facility and, therefore, believes that this approach is not necessary.

d. *Analytical methods.* The Agency is recommending that the methods found in "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods," SW-846, 2nd ed., July 1982, as amended, be used for the qualitative and quantitative analysis of hazardous wastes containing the California list constituents of concern whenever such tests are necessary as proposed in today's notice.

4. Recordkeeping

Today's notice proposes to adopt, where applicable, the recordkeeping and certification requirements that have been established in the regulatory framework in the solvents and dioxins final rule for implementation of the California list land disposal restrictions rule. (See 51 FR 40572, November 7, 1986.) The Agency is also considering modifying those requirements to require periodic testing by generators. The California list prohibitions also differ for solvents and dioxins in that wastes meeting the threshold level can continue to be land disposed regardless of whether a treatment standard has been met. Wastes rendered non-liquid (except HOCs) can be land disposed as well. The recordkeeping and certification requirements will be modified to account for this difference.

B. Cyanides

According to section 3004(d)(2), effective 32 months after the enactment of the Hazardous and Solid Waste Amendments of 1984, "liquid hazardous wastes . . . containing free cyanides at concentrations greater than or equal to 1000 mg/l" are subject to the land disposal restrictions. In order to characterize the wastes that will be subject to section 3004(d)(2), the Agency must define the term "free" cyanides. However, a review of the literature indicates that there is no widely accepted definition of the term.

Therefore, for the purposes of this rulemaking, EPA considered using a very narrow definition of "free" cyanides as that cyanide present as CN^- and as molecular HCN. However, complex cyanides are known to dissociate to form CN^- and HCN under conditions that may exist in the environment. Because of this phenomenon, cyanide-containing wastes that would be exempt from the land disposal restrictions if the Agency were to use the narrow definition could produce "free" cyanide after disposal.

Because of the potential dissociation of complex cyanides and the difficulty in defining the term "free" cyanides the Agency is proposing to take a conservative approach by assuming that any liquid hazardous waste containing free or bound cyanide may be subject to the requirements of section 3004(d)(2). The Agency's approach is described in more detail below.

1. Definition of "Free" Cyanide

There is currently no regulatory definition for "free" cyanide, nor is there a commonly accepted definition based on an analytical method. According to *Standard Methods for the Examination of Water and Wastewater* (16th edition, 1985) (Ref. 4), free and potentially dissociable cyanides may be estimated as weak acid dissociable cyanides or as cyanides amenable to chlorination, with the exception of certain industrial wastes (e.g., steel industry and petroleum refining wastes and pulp and paper effluents) that contain substances that may interfere with the latter test. The definition of "free cyanide" in *The Annual Book of ASTM Standards* (1984) (Ref. 5) is similar, and refers to the cyanide ion that is determined by titration with silver nitrate without pretreatment for complex dissociation. Other methods include the colorimetric method using chloramine-T and the cyanide-selective electrode test method.

Both Lowenheim (1978) (Ref. 8) and Cherry (1982) (Ref. 6) used the definition approved by the American Society of

Testing and Materials (ASTM) in B374, Standard Definitions of Terms Relating to Electroplating:

Free cyanide:

True: "The actual concentration of cyanide radical (CN^- or HCN) or equivalent alkali cyanide, not compounded in complex ions with metals in solution."

Calculated: "The concentration of cyanide or alkali cyanide, present in solution in excess of that calculated as necessary to form a specified complex ion with a metal or metals present in solution."

Analytical: "The free cyanide content of a solution as determined by a specified analytical method."

According to *Electroplating*, the definition of "free cyanide" is not straightforward:

Free cyanide is "intended to represent the concentration of cyanide ion beyond that required to form the metal-cyanide complex in question. Therefore, its determination requires a knowledge of the formula of the metal-cyanide complex, and this is not always known with any certainty . . . Therefore, since we do not know how much of the total cyanide is tied up with the metal, we cannot know how much of it is free. Hence, where possible, it is preferable to specify, and determine, total cyanide; if free cyanide must be known, the formula of the complex is chosen arbitrarily, as the most probable of the several possibilities." (Lowenheim, 1978.)

The various definitions provided above support the Agency's assertion that currently there is no commonly accepted definition of "free cyanides."

2. Dissociation of Complex Cyanides

Some complex cyanides (e.g., cyanide salts, cyanogens) can be converted to free cyanides under certain chemical conditions that can exist in the environment. According to *Standard Methods* (1985) and Kelada et al. (1978) (Ref. 7), silver and nickel cyanide complexes dissociate slowly, while the strong metal cyanide complexes of cobalt, gold, iron, and platinum do not dissociate readily. However, dilute solutions of iron cyanide dissociate rapidly upon exposure to ultraviolet light, producing free and simple cyanides. Kelada et al. (1978) analyzed solutions of nitriles, various metal cyanide complexes, and other potentially cyanide-forming materials for free and simple cyanides. The researchers detected free cyanide in cadmium and nickel cyanide complex solutions and in the cyanohydrins. In that study, free cyanide was not detected in the nitrile, cyanate, and thiocyanate solutions.

3. Proposed Approach

Because of the potential for complex cyanides to dissociate and because of the difficulty in defining the term "free" cyanides, the Agency intends to take a conservative approach by assuming that all cyanide-containing or potentially cyanide-forming wastes may contain free cyanides. Therefore, any waste containing a compound that can be shown to have a resonance structure with a carbon-nitrogen triple bond is potentially affected by section 3004(d)(2), including wastes that contain free cyanides, complexed cyanides, and cyanide salts. Isocyanides contain a true cyanide triple bond. Because of their toxicity and reactivity, the Agency is proposing to also include isocyanides in the definition of cyanides, and requests comment on this approach.

To determine whether a cyanide-containing waste is subject to the land disposal restrictions under section 3004(d)(2), the Agency proposes that the owner/operator of a disposal facility must analyze the waste using the Toxicity Characteristic Leaching Procedure (TCLP) with a zero-headspace extractor. The owner/operator must then determine the concentration of cyanide in the leachate. For this purpose, the Agency recommends using Method 9010 for Total Cyanide in "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods," EPA Publication No. SW-846.

4. Alternative Approaches

Because strong metal cyanide complexes do not appear to dissociate in the environment, we are also proposing and requesting comment on several alternative analytical methods that could be used for the purposes of defining cyanide concentration in this rulemaking:

1. Cyanides detectable as "Weak and Dissociable Cyanide," Method 412H, *Standard Methods*;
2. Cyanide amenable to chlorination, Method 9010, SW-846; and
3. Non-complex cyanides, as detected by direct titration without distillation (see *Standard Methods*, Method 412).

These tests vary in the degree to which they will measure complexed cyanides by causing dissociation prior to measuring the solution cyanide strength. One or more of these tests may provide a more accurate determination of the potential for dissociation of complex cyanides in the environment than would a total cyanide test.

Specifically, the Agency requests comments on its proposed interpretation of section 3004(d)(2) and on the alternatives to that interpretation

discussed above. The Agency also requests comment on the analytical method that should be used to determine the cyanide concentration in the leachate of a waste for the purposes of this section. The Agency also solicits comments on the dissociation of complex cyanides and data demonstrating the extent to which free cyanides are present in wastes containing complex cyanides.

C. California List Metals

1. Characterization

The 1984 HSWA amendments to RCRA, in section 3004(d)(2) statutorily prohibit (among other things) the land disposal of liquid hazardous wastes containing concentrations of certain metals greater than or equal to specified levels unless the waste complies with EPA-established treatment standards or is the subject of a successful petition. This group of metals is shown below in Table 1.

Table 1.—California List Metals and Concentrations

Arsenic and/or compounds (as As)—	500 mg/l
Cadmium and/or compounds (as Cd)—	100 mg/l
Chromium (VI) and/or compounds (as Cr VI)—	500 mg/l
Lead and/or compounds (as Pb)—	500 mg/l
Mercury and/or compounds (as Hg)—	20 mg/l
Nickel and/or compounds (as Ni)—	134 mg/l
Selenium and/or compounds (as Se)—	100 mg/l
Thallium and/or compounds (as Tl)—	130 mg/l

These metals were selected because their effects have been widely studied and their toxicities generally recognized. Additional discussion on the toxicities of these compounds, their persistence in the environment, and their occurrence in wastes is presented in the background document for this proposed rule.

2. Two Approaches to Limit the Land Disposal of California List Metals

The Agency has considered two approaches to limiting the land disposal of metal-bearing wastes. Both of these approaches are discussed below.

a. *Proposed approach: codification of statutory levels.* In the absence of data showing it is necessary to lower the statutory concentrations limits, the Agency is today proposing to codify the statutory land disposal restriction levels found in section 3004(d)(2).

Congress intended the California list compounds and their respective restriction levels to serve as a starting point in a national effort to prohibit the land disposal of hazardous wastes. The Agency may substitute more stringent restrictions levels; however, the Agency is authorized to lower the California list restriction levels only if EPA determines that the statutory levels are not protective of human health and the environment. In order to promulgate restriction levels that are lower than those provided in the statute, the Agency must have adequate data indicating that, considering the persistence, toxicity, mobility and potential for bioaccumulation of the California list metals, wastes below the statutory restriction levels are of such concern that they should be considered in this rulemaking rather than later pursuant to the schedule established under section 3004(g). However, at this time, the Agency lacks adequate data to indicate that such a determination is necessary. Therefore, the Agency is proposing to codify the land disposal restriction rules for the California list wastes at the statutory levels, and solicits comment on this approach.

b. *Reduce to the extraction procedure (EP) toxicity characteristic levels.* As discussed earlier, Congress authorizes the Administrator to establish standards below those specified in the California list if he concludes that lower levels are necessary to protect human health or the environment. In order to make these findings, the Agency must conclude that the concentrations of the metals should be reduced to some lower level, determine the concentrations for metals that would be protective, and be able to provide a rational basis for such a reduction.

The extraction procedure toxicity characteristic (EP) has been defined as a maximum contaminant concentration level which, when exceeded, will render a waste hazardous and, therefore, subject to Subtitle C regulation. Disposal of these wastes in a sanitary landfill or other type of Subtitle D facility is then prohibited.

The Agency believes that wastes that meet the toxicity characteristic may present a hazard to human health and the environment when disposed in a Subtitle D environment. This is demonstrated by the language contained in 40 CFR 261.10(a)(1) (i) and (ii) which state that a waste may be considered characteristically hazardous when it can "cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness"; or, "pose a

substantial present or potential hazard to human health or the environment when it is improperly treated, stored, transported, disposed of or otherwise managed."

The EP toxicity values were based on the National Interim Primary Drinking Water Standards (NIPDWS) (see 40 FR 59566). The NIPDWS, which must be met by public drinking water systems, are considered to be the levels at which chronic exposure to drinking water contaminants will not cause adverse health effects. However, the Agency does not have adequate data to demonstrate that land disposal of the California metals at concentrations below the statutory levels poses a degree of hazard that necessitates accelerating the schedule for consideration of wastes below the statutory level.

The EP levels were developed by using a scenario that was based on the co-disposal of the metal-bearing wastes with municipal waste in a Subtitle D facility. Since they are lower than the statutory levels, they are more conservative than the statutory levels. However, it is not clear that lowering the levels to the EP levels is required to protect human health and the environment for a waste disposed of in a Subtitle C hazardous waste disposal facility.

The Agency is soliciting comment and data that would support lowering the restriction levels for metals to the EP levels or to concentrations other than the EP levels for the California list metals. The Agency has not promulgated EP toxicity characteristic levels for nickel and thallium. Since the Agency has no data that would support lower levels for these metals to any other level, one approach would be to adhere to the statutory requirements. Another approach would be to follow the apparent rationale used by California which, since no NIPDWS standards had been developed, multiplied the Ambient Water Quality Criteria (AWQC) for nickel and thallium by a factor of 10,000. Since the EP levels for the California list metals are 100 times less than the statutory requirements, the Agency, in order to be consistent, would also consider lowering the restriction levels for nickel and thallium to 1.34 and 1.30 mg/l, respectively, if this approach were to be adopted. The Agency solicits comments or data that would support this approach or that would suggest a different approach.

D. Corrosives

1. Characterization of Corrosive Wastes

Congress mandated that liquid hazardous waste having a pH less than or equal to two be prohibited from land disposal effective 32 months from the date of enactment of the HSWA. The EPA has identified the principal corrosive hazardous waste as EPA hazardous waste D002. D002 wastes are hazardous by virtue of exhibiting the characteristic of corrosivity. Corrosive wastes are generated primarily by the Chemical and Allied Products Industry (SIC 28) and the Primary Metal and Fabricated Metal Products Industries (SICs 33 and 34). Additionally, many corrosive wastes also contain other California list constituents, such as metals and cyanides. An example of such a corrosive waste is hydrofluoric acid etch from the semiconductor industry. Similarly, EPA hazardous waste K011 was identified as a potential California list waste for both its potential acidic nature and the occurrence of cyanide.

2. Effect of Corrosives on Liners

Corrosive wastes are acutely toxic and damaging to living tissue. However, in addition to hazards associated with toxicity, corrosive wastes also present risks to human health and the environment as a result of their reactivity with other wastes and liner materials. The Agency has conducted studies to assess the impact of these wastes may result in the formation of reaction of acids with codisposed wastes may result in the formation of toxic and flammable gases and in the solubilization of toxic substances from the waste matrix. Acidic wastes may also degrade clay liners and contribute to the mobility of other hazardous constituents in the environment, but are not generally incompatible with synthetic liner materials. (refs: Goldman and Tatch, May 1985) (Ref. 13). While these data are not pH-specific, they indicate, nonetheless, that strong acids are potentially hazardous or may contribute to increased hazards from other materials when land disposed.

3. Proposed Approach and Rationale for the Statutory Level

EPA is proposing to impose the statutory level of less than or equal to a pH of two (2.0). This level is consistent with EPA's current approach to defining waste as hazardous based on the characteristic of corrosivity, and in the absence of data indicating that weaker acids present a hazard to human health and the environment when disposed of in a Subtitle C facility, EPA is not

considering modifying the statutory level at this time. The Agency is requesting comment on pH-specific data regarding the effects of corrosive wastes on both clay and synthetic liners and codisposed wastes.

4. Treatment Standards

The Agency is proposing that treatments which neutralize corrosive wastes to above two (2.0) are considered to be BDAT treatment for the characteristic of corrosivity. Wastes so treated will no longer be considered California list wastes (in fact, wastes with a pH of above two are not considered characteristically hazardous, and may be land disposed in a Subtitle D facility).

The Agency requests comment on whether this type of treatment should be codified as a treatment-method (§ 268.42), or performance-based standard (§ 268.41).

E. Polychlorinated Biphenyls (PCBs)

1. RCRA section 3004(d)(2)(D) Requirements

Effective July 8, 1987, RCRA section 3004(d)(2)(D) prohibits the land disposal of liquid hazardous wastes containing polychlorinated biphenyls at concentrations greater than or equal to 50 ppm.

a. *Definition of polychlorinated biphenyls (PCBs)*. For the California list restrictions, the Agency is proposing to define PCBs consistent with the definition in 40 CFR 761.3. That provision defines PCBs for purposes of regulation under the Toxic Substances Control Act (TSCA) as "any chemical substance that is limited to the biphenyl molecule that has been chlorinated to varying degrees or any combination of substances which contain such substance." In addition, inadvertently generated PCBs are defined as "the total PCBs calculated following division of the quantity of monochlorinated biphenyls by 50 and dichlorinated biphenyls by 5." This was inserted in the TSCA regulations in recognition that monochlorinated biphenyls are less toxic and persistent than dichlorinated biphenyls, which are themselves less toxic and persistent than polychlorinated biphenyls with greater than two chlorines.

In the absence of an alternative definition of PCBs specified in RCRA, EPA believes that it is reasonable to adopt the existing definition as stated in the TSCA regulations. The definition is intended to account for differing degrees of hazard associated with different compounds. Such a determination

appears to be consistent with the intent of Congress in section 3004(d) to concentrate on wastes that are known to create substantial risk. Moreover, the Agency believes that an alternative definition would add confusion to an already complex and overlapping framework for regulating PCBs. An alternative definition being considered would not employ the use of division factors for inadvertently generated PCBs. Under this definition, PCBs would be defined as "the biphenyl molecule that has been chlorinated to any degree." EPA does not believe that this interpretation is consistent with the intent of Congress.

b. Hazardous waste requirement. Since PCBs are not listed as hazardous wastes under RCRA, PCB-containing wastes are only subject to the section 3004(d)(2)(D) prohibition if they are mixed with wastes which are listed as hazardous under 40 CFR Part 261 or exhibit one or more of the characteristics of hazardous waste identified in Part 261.

For example, transformers often contain both PCBs and hazardous constituents listed at 40 CFR Part 261, Appendix VIII. However, if the waste containing these constituents is not a listed or characteristic hazardous waste, the section 3004(d)(2)(D) prohibition will not apply. For example, some transformers contain isomers of tetrachlorobenzene and trichlorobenzene. Although several of these isomers (e.g. 1,2,4,5-tetrachlorobenzene and 1,2,4-trichlorobenzene) are listed as Appendix VIII hazardous constituents, EPA has not listed wastes containing these isomers as hazardous where the source of the waste is a spent dielectric fluid. Consequently, these PCB-containing spent dielectric fluids will be subject to the section 3004(d)(2)(D) land disposal prohibition only if they are mixed with a listed hazardous waste or if they exhibit a characteristic identified in Part 261.

c. Proposed approach. The prohibition in section 3004(d)(2)(D) applies only to liquid hazardous wastes containing PCBs at concentrations greater than or equal to 50 ppm. EPA is proposing to codify the 50 ppm prohibition specified in HSWA. This level is consistent with the comprehensive PCB regulations existing under the Toxic Substances Control Act (TSCA), and EPA does not have information to suggest that a different level is necessary.

2. Existing Regulation of PCBs

Regulations promulgated pursuant to TSCA currently address the land disposal of PCB wastes. The TSCA

requirements at 40 CFR Part 761 vary depending on the concentration of PCBs in the waste and the physical form in which the waste is disposed, i.e., whether the waste is disposed in bulk liquid form, as a containerized liquid, or as a non-liquid. Disposal of PCBs at concentrations below 50 ppm are not regulated under TSCA unless they were created by diluting a higher concentration of PCB or are used in specified ways, i.e. as a sealant, coating, dust control agent, pesticide carrier, or as a rust prevention agent on pipes. Liquid PCBs at concentrations greater than or equal to 50 ppm but less than 500 ppm may be incinerated or burned in a high efficiency boiler. This may also be land disposed pursuant to the TSCA regulations, but with certain limitations, some of which are summarized below. Liquid wastes containing PCBs at concentrations greater than or equal to 500 ppm must be incinerated according to TSCA regulations or disposed of by any other approved alternate methods (40 CFR 761.60(e)) that can achieve a level of performance equivalent to the technical standards set in 40 CFR 761.70. Such wastes cannot be land disposed without prior treatment.

3. Relationship Between HSWA and Existing Regulations

Several provisions in HSWA impose restrictions on the land disposal of PCB wastes which are not contained in the existing TSCA or RCRA regulations. The TSCA regulations at 40 CFR 761.1(e) clearly state that where there is an inconsistency between TSCA and RCRA standards, the more stringent regulations govern. In addition, the legislative history to an unrelated provision (H. R. Rep. No. 198, Part I, 98th Cong., 1st Sess. 56 (1983)) suggests that allowing the more stringent provisions to govern is also consistent with Congress' understanding of the regulatory scheme.

a. Disposal of bulk liquids containing PCBs. Under 40 CFR 761.75(b)(8)(ii), bulk liquids containing PCBs at concentrations below 500 ppm may be disposed in a TSCA approved landfill only if such waste is pretreated and/or stabilized to eliminate the presence of free liquids prior to final disposal. This regulation is superseded in part by RCRA section 3004(c)(1) (codified at 40 CFR 264.314 and 265.314) which prohibits the placement of bulk liquid hazardous wastes in landfills even where absorbents have been added. Therefore, if the bulk liquids containing PCBs are a hazardous waste or are mixed with a RCRA hazardous waste, the resulting liquid waste is prohibited from being placed in any landfill,

regardless of the concentration of PCBs (even if below 50 ppm), unless the waste is rendered non-liquid by means other than the use of absorbents (e.g. chemical stabilization and certain types of solidification). However, if the concentration is greater than or equal to 50 ppm, all types of land disposal are prohibited under RCRA section 3004(d)(2)(D).

Even where the PCB-containing waste is not a RCRA hazardous waste, section 3004(c)(3) of RCRA (which is codified at 40 CFR 264.314 and 265.314) prohibits liquid wastes from being placed in a hazardous waste landfill that is regulated under RCRA unless the only reasonably available alternative is placement in a landfill or surface impoundment which contains or may reasonably be anticipated to contain hazardous waste and such disposal will not present a risk of contamination of any underground source of drinking water. However, because the TSCA regulations at 40 CFR 761.75(b)(8)(ii) require the elimination of free liquids from wastes containing greater than or equal to 50 ppm PCBs prior to placement in a landfill, obtaining an exemption under section 3004(c)(3) will not relieve an owner or operator of the obligation to solidify such wastes prior to landfilling.

b. Disposal of containerized liquids containing PCBs. The TSCA regulations allow containerized liquids with less than 500 ppm PCBs to be disposed of in an approved landfill if each container is surrounded by an amount of inert sorbent material capable of absorbing all of the liquid contents of the container. RCRA section 3004(c)(2) directs EPA to promulgate regulations minimizing the disposal of containerized liquid hazardous wastes in landfills and to minimize the presence of free liquids in containerized hazardous waste to be disposed of in landfills. Until such regulations are promulgated, existing RCRA regulations at 40 CFR 264.314 and 265.314 apply to the disposal of containerized liquid hazardous wastes. Those regulations require the waste to either be placed in very small containers, such as an ampule, or require any free standing liquid to be eliminated through solidification, mixture with absorbents, decantation, or other methods.

Where the containerized liquid hazardous waste is mixed with PCBs and the PCBs are present in concentrations greater than or equal to 50 ppm, section 3004(d)(2)(D) supersedes the existing RCRA regulations mentioned above and all types of land disposal are prohibited. If the concentration of PCBs in the

containerized liquid hazardous waste is below 50 ppm, the RCRA regulations for disposal of liquid wastes at 40 CFR 264.314 and 265.314 apply. Where the containerized liquid PCB waste is not mixed with a RCRA hazardous waste, the TSCA regulations requiring that each container be surrounded by absorbents apply to land disposal in TSCA approved landfills. RCRA section 3004(c)(3), however, prohibits the disposal of such liquids in RCRA hazardous waste landfills in most cases despite the fact that PCBs are not regulated as hazardous under RCRA and are containerized in this instance.

4. Treatment Technologies (BDAT)

EPA is proposing to establish treatment standards for liquid hazardous wastes containing greater than or equal to 50 ppm PCBs. The Agency has determined that thermal treatment (i.e., treatment in incinerators or high efficiency boilers) of PCBs pursuant to the requirements set forth in 40 CFR 761.60 and 761.70 is generally the best demonstrated available technology for such wastes. As described in The Solvent and Dioxin Final Rule (§ 268.42) (51 FR 40572, November 7, 1986), the Agency proposes to allow, upon approval by the Administrator, the use of alternate methods that can achieve a level of performance equivalent to the high efficiency boiler standards at § 761.60 or the incinerator standards at § 761.70. See section IV.G for a further discussion of PCB treatment technologies.

5. Nationwide Variance From Statutory Effective Date.

EPA has determined that there is inadequate thermal treatment capacity for the liquid hazardous wastes containing PCBs subject to today's proposed prohibitions, therefore the Agency is proposing a 2-year nationwide variance from the statutory effective date. See Unit V for a further discussion of capacity determinations.

F. Halogenated Organic Compounds (HOCs)

1. RCRA Section 3004(d)(2)(E) Requirements

Effective July 8, 1987, RCRA § 3004(d)(2)(E) prohibits the land disposal of hazardous wastes containing halogenated organic compounds in total concentration greater than or equal to 1,000 mg/kg.

a. *Definition of Halogenated Organic Compounds (HOCs).* HOCs are compounds containing a carbon and a halogen in the molecular formula. Halogens include the five nonmetallic

elements in Group VIIA of the periodic table: Fluorine (F), chlorine (Cl), bromine (Br), iodine (I), and astatine (At). For purposes of the RCRA section 3004(d)(2)(E) land disposal prohibition, the Agency proposes that the definition of HOC would require the compound to contain a carbon-halogen bond. The Agency believes that compounds lacking such a bond, but that have a halogen attached to an atom such as nitrogen, which is subsequently bonded to carbon (e.g., aniline hydrochloride) is not a true organohaline compound. The proposed carbon-halogen definition of HOCs presents a potential problem in that it would include a number of polymerized compounds that are generally considered non-hazardous because of their relative immobility.

However, EPA does not believe that Congress meant to include in the prohibition every possible HOC such as polymers that comprise solid plastics and vinyls. Instead, EPA believes that Congress was concerned with constituents that are mobile (e.g., liquids) and/or potentially hazardous to human health and the environment. Therefore, the Agency is proposing to limit the definition of HOCs included under the section 3004(d)(2)(E) prohibition to those HOCs which are identified or listed as either hazardous wastes under 40 CFR Part 261 or as hazardous constituents under Part 261, Appendix VIII. The prohibition paragraph in section 3004(d)(1) supports this approach in its explicit concern for the migration of "hazardous constituents" from the land disposal unit or injection zone for as long as the waste remains hazardous. The term "hazardous constituent" is a term of art referring to compounds listed in Appendix VIII. As previously stated, the Agency is today proposing that organic compounds containing a halogen atom that is not bound directly to a carbon atom (such as the organic salt aniline hydrochloride) would not be included in the universe of restricted halogenated organic compounds. However, the Agency solicits comment and data on this proposal, and on a possible alternative to that definition, which would include compounds where the chlorine is not directly attached to a carbon atom, but attached to an atom such as nitrogen or sulfur, which is subsequently attached to a carbon atom.

An alternative interpretation would bring all hazardous wastes containing HOCs under the section 3004(d)(2)(E) prohibition regardless of whether the HOC was identified or listed as a hazardous waste or hazardous constituent. This approach may be more suitable to halogenated wastes that are

determined to be liquids under the Paint Filter Liquids Test (and therefore are more likely to be mobile in the environment), but this approach would bring many innocuous non-liquid HOCs (e.g., plastics) within the scope of the California list prohibitions. The Agency does not believe that Congress intended to regulate these HOCs, but solicits comments on the definition of HOCs covered under the section 3004(d)(2)(E) land disposal prohibition.

Unlike the other constituents specified in the section 3004(d) prohibitions, HOCs are prohibited in either liquid or non-liquid form. Because HOCs are the only California list wastes for which Congress specified both liquid and non-liquid wastes for prohibition, the Agency must identify a practical test method for detecting HOCs and determining the concentration of these constituents in non-liquid hazardous waste. The Agency is proposing to require use of the Toxicity Characteristic Leaching Procedure (TCLP) to generate the analyte for both liquid and non-liquid hazardous wastes. However, EPA is soliciting comment on other methods for defining and evaluating non-liquid wastes for HOCs.

b. *Hazardous waste requirement.* Wastes containing HOCs are only subject to the section 3004(d)(2)(E) prohibition if the waste is listed as hazardous under 40 CFR Part 261 or exhibits one or more of the characteristics of hazardous waste identified in Part 261. However, the waste listing or characteristic need not be related to the HOC content of the hazardous waste for it to be covered.

c. *1,000 mg/kg requirement.* The prohibition in section 3004(d)(2)(E) applies only to hazardous wastes containing HOCs in total concentration greater than or equal to 1,000 mg/kg. Although EPA is proposing to codify the 1,000 mg/kg prohibition specified in RCRA, the Agency will be evaluating each HOC regulated as hazardous under Part 261 in accordance with the final schedule for implementing land disposal restrictions (51 FR 19300). At that time, prohibitions on land disposal and treatment standards will be established to the extent necessary for individual HOCs or groups of related HOCs.

2. Relationship to RCRA section 3004(d)(2)(D) Prohibition on PCBs

RCRA section 3004(d)(2)(D) prohibits the land disposal of liquid hazardous wastes containing PCBs at concentrations greater than or equal to 50 ppm. EPA interprets this provision as placing an upper limit of 50 ppm on the concentration of PCBs that may be

contained in a hazardous waste containing HOCs which is land disposed. The limitation of 50 ppm, however, is only applicable to liquid hazardous wastes containing PCBs, therefore a non-liquid hazardous waste containing PCBs at concentrations above 50 ppm may be land disposed without violating the section 3004(d)(2)(E) prohibition on HOCs as long as the total concentration of HOCs does not exceed 1,000 mg/kg. For example, a non-liquid hazardous waste containing 200 mg/kg (ppm) PCBs and 700 mg/kg (ppm) other HOCs can be land disposed because the 50 ppm prohibition does not apply to non-liquids and because the 900 mg/kg total HOC concentration does not exceed the 1,000 mg/kg threshold specified in HSWA section 3004(d)(2)(E).

If the total concentration of HOCs in either a liquid or non-liquid hazardous waste is greater than or equal to 1,000 mg/kg, the waste is prohibited from land disposal even if the concentration of PCBs is below 50 ppm. For example, a liquid hazardous waste containing 25 mg/kg (ppm) PCBs and 980 mg/kg HOCs other than PCBs is prohibited from land disposal under section 3004(d)(2)(E) despite the fact that the section 3004(d)(2)(D) prohibition on PCBs would allow up to 50 ppm PCBs to be land disposed. Also, a non-liquid hazardous waste containing 400 mg/kg (ppm) PCBs and 700 mg/kg HOCs other than PCBs is prohibited from land disposal despite the fact that existing regulations promulgated under TSCA would allow such non-liquid PCB wastes to be disposed in an approved landfill.

3. Treatment Technologies (BDAT)

EPA is proposing to establish treatment standards for most hazardous wastes containing HOCs in total concentration greater than or equal to 1,000 mg/kg. Incineration is proposed as BDAT for many of these wastes. The Agency is not proposing BDAT for wastewaters with less than 10% TOC. See Section IV.G for further discussion of these technologies.

4. Nationwide Variance From Statutory Effective Date

EPA has determined that there is inadequate treatment capacity for the HOC wastes covered by today's proposed treatment standards, therefore, the Agency is proposing a 2-year nationwide variance from the statutory effective date for HOCs for which BDAT has been proposed. See Unit V for a further discussion of capacity determinations.

G. Applicable Treatment Technologies

The following section discusses treatment standards for the California list wastes. EPA is proposing BDAT for HOC-containing hazardous wastes (except for HOC-containing wastewaters), for PCB-containing hazardous wastes, and for corrosive hazardous wastes. Where BDAT is not proposed, this section includes a discussion of those technologies that may serve as the basis for setting BDAT when wastes containing these constituents are addressed later in accordance with the final schedule promulgated at 51 FR 19300.

1. Proposed BDAT Treatment Technologies

a. *Halogenated organic compounds.* Technologies applicable to hazardous wastes containing HOCs in concentrations greater than 1000 mg/kg are similar to those identified for solvent-containing hazardous wastes F001-F005. These technologies include incineration, batch distillation, thin film evaporation, fractionation, biological degradation, activated carbon adsorption, and steam stripping.

As explained in the November 7, 1986 Final Solvents and Dioxins rule (51 FR 40572), EPA believes that data from the solvents rulemaking under section 3004 support a determination that incineration represents the best demonstrated available technology for most organic liquid and organic and inorganic sludges and solids (e.g., soils). In that rulemaking EPA also found that wastewater treatment technologies, such as biological treatment, activated carbon, and steam stripping should be the basis for determining performance standards for solvent-containing wastewaters containing less than 1% total organic carbon or less than 1% F001-F005 solvents.

However, the wide variety of wastes included within the term "halogenated organic compounds," even as limited along the lines proposed by EPA in this notice, and the wide variation in their physical properties and waste matrices, makes it impractical for EPA to develop wastewater treatment standards expressed either as concentration levels or as treatment technologies at this time. EPA will be addressing all of the wastes included in today's HOC proposal (except for the solvent- and dioxin-containing wastes for which EPA has already established concentration-based treatment standards on November 7, 1986) pursuant to the schedule published in the Federal Register on May 28, 1986 (51 FR 19300).

EPA has identified the incineration as the treatment technology that is BDAT for all hazardous waste containing HOCs in concentrations greater than 1000 mg/kg except wastewaters, and is proposing to promulgate treatment standards for HOCs expressed as a specified technology under 40 CFR 268.42. Treatment technologies specified as a method, however, are only applicable to those HOCs that are not covered by other Agency rulemakings under §§ 268.41, 268.42, or 268.43. For example, a waste containing only F001 trichloroethylene (an organic hazardous waste containing the halogen chlorine) is already subject to a concentration-based treatment standard which was published in the Federal Register on November 7, 1986 and is to be codified at 40 CFR 268.41. As discussed in that final rule, the Agency prefers to establish concentration-based treatment standards rather than treatment standards expressed as specified technologies because EPA believes that this approach will provide the regulated community with greater flexibility in meeting treatment standards and will encourage the development of more efficient and innovative technologies. In order to maintain this flexibility, EPA intends that any treatment standards established for individual HOCs will supercede today's proposed standards, which are expressed as specified technologies. Therefore, the F001 trichloroethylene waste mentioned above need only be treated in accordance with § 268.41. In other words, the waste must be treated to the specified level and the technologies specified in § 268.42 do not necessarily have to be utilized in reaching this level. However, if the waste also contains an HOC for which no treatment standard is established, the specified concentration level for trichloroethylene must be achieved and the method specified for the other HOC must be utilized, at least with respect to that portion of the waste which is not F001 trichloroethylene. This would allow the separation of the waste in order to provide flexibility in meeting the trichloroethylene level. However, as a practical matter, the Agency anticipates that in most cases waste managers will treat the entire waste using the methods specified in § 268.42.

Since the California list was intended only as a starting point in prohibiting land disposal and the group of California list wastes known as HOCs is very broad and diverse, the Agency may revise the treatment standards established under section 3004(d) when it develops further data to support treatment standards for individual

HOCs in future rulemakings under section 3004(g).

For hazardous wastes containing HOCs with a total organic carbon (TOC) content of greater than 1%, including liquids organic and inorganic solids and sludges, and non-liquid HOC-containing hazardous wastes at greater than or equal to 1000 mg/kg BDAT is proposed to be incineration in accordance with the requirements of 40 CFR 264.343 or 265.343. Because of the wide variety of chemical compounds that are included as HOCs (even in the limited universe of HOCs that the Agency has proposed), EPA does not believe that it can set treatment standards for HOC-containing wastewaters.

Application of technologies such as biological treatment, activated carbon adsorption or steam stripping may be effective for these materials, but a generalization that one or all of them constitutes BDAT for the wide variety of chemicals included as HOCs is not possible. EPA intends to pursue the applicability of these technologies to specific wastes in much greater detail in subsequent rulemakings for the wastes scheduled to be considered under section 3004(g). As part of those regulations, EPA plans to develop concentration-based treatment standards and reduce reliance on treatment standards defined as use of a specific technology or group of technologies.

EPA's analysis of available capacity for treatment of F001-F005 solvent wastes indicates that virtually all available incineration capacity and organic wastewater treatment capacity will be used up in complying with the solvent regulations promulgated on November 7, 1986. Based on this analysis and on the similarity of treatment required, EPA is proposing a two-year national variance for HOCs requiring incineration. However, because EPA is not able to specify BDAT for HOC-containing wastewaters, the Agency is not able to propose an extension of the effective date, which must be based on an estimate of the earliest date by which treatment capacity capable of meeting the treatment standard can be made available. EPA requests comment on its proposal of incineration as BDAT for all HOCs except wastewaters. The Agency also requests comment and data relevant to its proposal to extend the effective dates for these wastes. Finally, EPA requests comment on its decision not to propose BDAT for HOC-containing wastewaters and the related interpretation that it must not extend the

effective date when it does not establish BDAT.

b. *Polychlorinated biphenyls*. The Agency is proposing to establish BDAT for liquid hazardous wastes containing greater than or equal to 50 ppm PCBs as thermal treatment pursuant to the technical requirements in 40 CFR 761.60 (high efficiency boiler standards) and § 761.70 (incinerator standards). Note that the TSCA regulations require the incineration of liquid PCB wastes in concentrations greater than or equal to 500 ppm. Such wastes cannot be treated in high efficiency boilers. EPA is not proposing to modify this determination in today's proposal.

Under the PCB regulations at § 761.60(e), any person who is required to thermally treat PCB wastes may obtain approval to use alternate equivalent methods as long as such methods do not present an unreasonable risk of injury to health or the environment.

EPA will also accept such petitions for equivalent treatment for mixed PCB/Hazardous wastes. (Note that this is not the same as the variance from the treatment standard as described in the November 7, 1986 final rule for solvents and dioxins). Such petitions should be submitted to the Administrator, with copies to the Director, Exposure Evaluation Division, Office of Toxic Substances and to the Chief, Waste Treatment Branch, Office of Solid Waste.

The Agency recognizes that its regional offices have developed a certain degree of expertise in evaluating alternate treatment methods for PCB wastes. However, the PCB wastes subject to today's proposal are mixed with hazardous wastes and, in many cases, may contain as little as 50 ppm PCBs and as much as 200,000-300,000 (or 20-30%) ppm as hazardous wastes regulated under RCRA. Since many of these wastes may not be comprised of predominantly PCBs, the Agency believes that EPA headquarters is better suited to handle petitions for these mixed wastes at the present time.

c. *Corrosive wastes*. BDAT for liquid hazardous wastes with a pH less than or equal to 2.0 (corrosives) is proposed to be neutralization to a pH above two. When the pH of the waste is above 2.0, it will no longer be subject to the California list land disposal prohibitions. Further, it will not be regulated as hazardous under RCRA Subtitle C, if it is hazardous solely because it exhibits the characteristic of corrosivity. Therefore, neutralization of corrosive wastes to levels above a pH of 2.0 is appropriate for purposes of the

California list prohibitions, and the Agency proposes to consider such treatment BDAT for the purposes of the land disposal restrictions.

2. Other Applicable Treatment Technologies

In this section, EPA presents available data on treatment for those California list wastes for which the Agency lacks sufficient data to establish BDAT. The Agency solicits comment and data that would support establishing BDAT for these wastes.

a. *Cyanides*. While not proposed as BDAT under today's approach, the treatment most often used for cyanides is alkaline chlorination. This treatment consists of adding chlorine gas, under alkaline conditions, to convert cyanides to cyanates. The cyanates can then be converted to carbon dioxide and nitrogen by adding sodium hydroxide. Two alternative treatments are chlorination by sodium hydroxide and chlorination by sodium hypochlorite. Available data indicate that these treatments can reduce cyanide concentrations from as much as 12,000 ppm to as low as 5 ppm. However, the effectiveness of alkaline chlorination depends on the extent to which other constituents of the waste are more readily oxidized than cyanide. In cases where there are competing constituents, the addition of chlorine in amounts consistent with normal operating practice may not result in optimal levels of cyanide oxidation. The presence of metals, which will complex cyanides into metalocyanides, may also affect the performance of cyanide oxidation.

At this time, the Agency does not have adequate data to define BDAT either as a concentration-based standard or as a treatment technology for the wide variety of cyanide wastes included in the California list. It also should be noted that solidification to convert liquid cyanide wastes to non-liquid cyanide wastes meets the statutory requirement to exclude waste from consideration under today's proposed rule. While this method of treatment may satisfy the requirements of this proposed rulemaking, generators are cautioned that performance standards that will be established under later rulemakings are likely to be based on more effective technologies such as alkaline chlorination.

b. *Metals*. The treatment technology most often applied to liquid hazardous wastes containing California list metals is chemical precipitation. For cadmium, chromium, lead, nickel and selenium, the most common reagents are sodium or calcium hydroxide. When chromium is

present as hexavalent chromium (Cr VI), it is first reduced to trivalent chromium (Cr III) by using sulfur dioxide at low pH levels. Arsenic, mercury and thallium generally require the use of sulfide to effect precipitation. Frequently, these wastes are treated by filtration to remove fine particles that did not settle out in the clarifier. The precipitated material is often dewatered and/or stabilized with lime, kiln dust, portland cement or other materials after removal from the clarifier or the filter in order to further reduce the mobility of the waste.

Given the variety of wastes that may be covered by this category, and the lack of adequate data on the performance of stabilized materials, the Agency does not believe that it is in a position to specify BDAT at this time. While it is known that precipitation is frequently used as treatment for these types of wastes, EPA's analysis of the available stabilization data indicate that waste matrix effects can play a substantial role in the type and quantity of stabilizing agents needed. In particular, the overall organic content and the presence of oils and chlorinated solvents will influence the effectiveness of most stabilization processes.

EPA does not have adequate data to characterize all waste streams that the California list metals restrictions may cover at this time, and because of the role that composition of the waste stream plays in the effectiveness of the treatment, EPA cannot at this time establish BDAT either as a concentration-based standard or as a treatment technology or series of technologies. Unlike the case for incineration of HOCs, "normal" operation of the system may not result in substantial treatment.

H. Comparative Risk and Available Treatment Alternatives

As EPA recognized in establishing a framework for implementing the statutorily mandated land disposal restrictions, Congress did not intend that risks to human health and the environment be increased as a result of such restrictions. To help prevent these increased risks, the Agency conducted comparative risk assessments for the first category of wastes subject to the land disposal restrictions, i.e. certain dioxin-containing and solvent-containing hazardous wastes. (See the solvents and dioxins final rule of November 7, 1986 51 FR 40572, which establishes the framework for implementing the land disposal restrictions).

The Agency is conducting comparative risk assessments in conjunction with establishing section

3004(m) treatment standards for several of the California list wastes. The methodology being employed is similar but not identical to that utilized in the November 7, 1986 solvents and dioxins final rule. The RCRA Risk-Cost Analysis (WET) Model continues to be the primary tool for assessing comparative risks; however, the WET Model has been revised on the basis of detailed case studies performed for the November 7, 1986 final rule and public comments responding to the Agency's approach in that rulemaking.

Results of the comparative risk analysis will not be used to allow continued land disposal of hazardous waste. Instead, treatment technologies that are determined to pose greater risks than land disposal of untreated wastes will be considered "unavailable" as a basis for establishing the section 3004(m) BDAT treatment standard for the waste. If the best or most efficient treatment technology for a waste is determined to be riskier than land disposal, the decision to classify it as unavailable will have a direct impact on the level or method established as the section 3004(m) treatment standard. The treatment standard, which must be based on the capabilities of the best demonstrated available treatment technologies for a waste, would then be based upon the capabilities of the best demonstrated treatment technology that does not pose greater risks than land disposal. To the extent that the next best treatment technology performs less efficiently than the best technology (in terms of the fate of its residuals in the environment), the resulting section 3004(m) treatment standard will be less stringent.

As noted in the November 7, 1986 final rule, treatment technologies classified as "unavailable" due to their greater risks may, however, continue to be used by waste managers to comply with treatment standards expressed as constituent concentrations. Accordingly, EPA intends to develop sufficient regulatory controls or prohibitions over the design and operation of these technologies to ensure that their use in complying with concentration-based treatment standards does not result in increased risks to human health and the environment. The analyses conducted in support of these comparative risk assessments will provide a basis for developing such controls or prohibitions, however they will most likely need to be augmented by additional data. Where, as in today's proposed rule, the section 3004(m) treatment standards are expressed as specific methods which must be utilized, a determination to classify a treatment alternative as

unavailable will prohibit the use of that technology in complying with the BDAT standards applicable to the restricted wastes in question.

Preliminary results indicate that the best demonstrated treatment methods for PCBs and other HOCs are not clearly riskier than land disposal. Whenever treatment is less risky or it is uncertain that a given treatment technology or treatment train is clearly riskier than land disposal, as in today's proposed rule concerning California list wastes, the Agency will consider the treatment available for determining BDAT and will develop the necessary data to support any additional regulatory controls which may be appropriate.

A comparative risk assessment for the corrosive wastes subject to today's proposal was not performed because the Agency's establishment of a BDAT standard at the statutory threshold does not impose any new requirements for treatment. In both cases, in order to be rendered non-hazardous, liquid hazardous wastes having a pH less than or equal to two (2.0) must be treated to a level above 2.0 before being land disposed. Therefore, EPA believes that a comparative risk assessment for corrosives is not necessary for the California list restrictions. However, the Agency is requesting comments and data on whether neutralization is riskier than land disposal of corrosive wastes.

I. Dilution Prohibition

In establishing a framework for implementing the congressionally mandated land disposal prohibitions, EPA prohibited as a dilution substitute for adequate treatment of restricted wastes (51 FR 40572, November 7, 1986). In the November 7, 1986 Federal Register notice, the Agency promulgated a final rule (to be codified at 40 CFR 268.3) which prohibits the regulated community from diluting restricted wastes "as a substitute for adequate treatment to achieve compliance with Subpart D of this part."

Subpart D of 40 CFR Part 268 establishes treatment standards for restricted wastes pursuant to RCRA section 3004(m). Subpart C identifies those wastes that are prohibited from land disposal according to RCRA, along with the respective effective dates of such prohibitions. Since the dilution prohibition promulgated on November 7, 1986 is only applicable to wastes treated "to achieve compliance with Subpart D", the prohibition does not apply to dilution for the purposes of meeting the concentration limits established under section 3004(d). The Agency believes that this is contrary to congressional

intent as expressed in H. R. Rep. No. 198, Part I, 98th Cong., 1st Sess. 34-35 (1983), which states that:

The [Energy and Commerce] Committee intends that dilution to a concentration less than the specified [California List] thresholds by the addition of other hazardous waste or any other material during waste handling, transportation, treatment, or storage, other than dilution which occurs as a normal part of a manufacturing process, will not be allowed; such hazardous waste would still be prohibited from land disposal.

Therefore, EPA is today proposing to amend the § 268.3 dilution prohibition to include dilution to avoid a prohibition in Subpart C of Part 268 (e.g., dilution to below the restrictions levels for the California list wastes). In addition, section 268.3 as amended covers those situations where wastes are diluted in order to circumvent the effective date of a Subpart C prohibition on land disposal. Capacity determinations are based on estimates of quantities of waste at the point of generation. Allowing dilution to a lower concentration in order to qualify for a nationwide variance undermines this determination. As stated in the preamble to the November 7, 1986 final rule, section 268.3 is intended to prohibit dilution as a means of circumventing the requirements imposed by the land disposal prohibitions. EPA does not intend to prohibit dilution which is necessary to facilitate proper treatment.

J. Evaporation Prohibition

The Agency is soliciting comment on the issue of whether evaporation should be prohibited as a means of treatment under the 40 CFR 268.4 treatment in surface impoundment exemption. The Agency is considering this action because of its particular concern that the hazardous constituents in wastes be treated to reduce toxicity or mobility, and not just moved from one media to another. This prohibition is not intended to cover evaporation that occurs along with other treatment, such as an active biological treatment process with mechanical aeration. Where the restricted liquid hazardous waste contains volatile or semi-volatile constituents, evaporation, whether as a dewatering process or a constituent reduction process, would result in the volatile components being transferred to the air. This may increase the mobility of the toxic constituent and may increase the associated risk.

The Agency is requesting comment on the risks posed by treatment processes that simply transfer hazardous constituents from one environmental component to another.

K. Facilities Operating Under a Permit or Interim Status

The Agency is proposing to amend Part 270 to give facilities more flexibility to handle restricted wastes. First, the Agency is proposing to add a new paragraph (p) to § 270.42 to allow permitted facilities to use the minor modification process, under certain conditions, to obtain approval to change their facilities to treat or store restricted wastes in tanks or containers as necessary to comply with Part 268 land disposal restrictions. Second, EPA is proposing to amend § 270.72(e) to allow interim status facilities to expand their operations by more than 50 percent (in terms of capital expenditures) to treat or store restricted waste in tanks or containers as necessary to comply with Part 268 land disposal restrictions. These changes are in addition to the amendment to § 270.42, promulgated in the November 7, 1986 final rule establishing land disposal restrictions for solvents and dioxin-containing wastes, that allows permitted treatment facilities to use the minor modification process, under certain conditions, to manage restricted wastes not previously listed in their permits.

1. Minor Modifications

Under the current rules, permitted facilities desiring to change their operations to treat or store restricted wastes in tanks or containers are required to seek approval to make these changes through the major permit modification process of § 270.41 with the exception of facilities treating new wastes in accordance with § 270.42(o). (See 51 40752, November 7, 1986.) The major modification procedures, which are the same as the permit issuance procedures, require a draft permit, public notice and comment, an opportunity for a public hearing, and administrative approval before the owner or operator is allowed to make the requested changes. These procedures are time consuming and could seriously delay treatment of restricted wastes in accordance with Part 268. In addition, the major permit modification process may seriously inhibit the ability of facilities to add short-term storage capacity to handle restricted wastes as treatment proceeds.

In contrast, under § 270.42, minor modifications to a permit can be made by the permitting authority upon consent of the permittee without formal notice and comment procedures. The Agency believes that the major modification process may seriously reduce the flexibility needed by facilities to respond to the land disposal restrictions

in a timely fashion. Given the critical need to expand treatment capacity for restricted wastes and the significant environmental benefits that result from treatment instead of land disposal, EPA believes that expanding the current minor modification provisions to provide greater flexibility for the treatment or storage of restricted wastes is necessary and appropriate.

The Agency is proposing that owners or operators seeking to use the proposed minor modification process of § 270.42(p) comply with three conditions. First, the owner or operator must submit a complete major permit modification application pursuant to §§ 124.5 and 270.41. Second, the applicant must demonstrate that changes in a unit to treat or store restricted wastes in tanks or containers is necessary to comply with the land disposal restrictions of Part 268. Third, the applicant must ensure that such unit complies with the applicable Part 264 standards pending final administrative disposition of the major permit modification request. For example, any tanks used to treat or store restricted wastes would be subject to the tank system standards of Part 264, Subpart J, which include secondary containment requirements (see 51 FR 25422, July 14, 1986). The authorization to continue in operation with the changes terminates upon final administrative disposition of the major modification request or the termination of a permit.

In proposing this amendment to § 270.42, the Agency recognizes that the Part 124 public participation requirements will be deferred until a permittee's major modification request is processed. However, EPA believes that this approach represents a reasonable balance between its policy in favor of public participation and the need to provide facilities managing restricted wastes with the flexibility to respond to the land disposal restrictions in a timely and effective manner.

The proposed change to the minor modifications requirements does not apply to storage or treatment other than in containers or tanks. EPA believes that the addition of other treatment processes, such as incineration, is likely to raise issues that would be best addressed through the major modification process. However, the Agency is exploring these issues as part of an overall review of the permit modification regulations. The EPA is now conducting regulatory negotiations on permit modifications, (announced on July 16, 1986 in the Federal Register (51 FR 25739)) and expects to issue a proposed rule during the next year. The

Permit Modification Negotiating Committee will be invited to submit comments on today's proposed rule. Furthermore, the language in today's proposal is not intended to limit the Permit Modification Negotiating Committee's independent consideration of changes in the overall permit modification process. Rather, the Agency has proposed to amend § 270.42 at this time because of the need to ensure that the provisions are in place when land disposal restrictions on the California list wastes become effective. If adopted, these permit modification provisions would be used until the permit modification process is further amended.

2. Reconstruction Limits

The Agency is also proposing to allow interim status facilities to modify their operations to treat or store restricted wastes in tanks or containers as necessary to comply with the land disposal restrictions of Part 268, without being required to obtain a permit even if such facility modifications amount to "reconstruction." Under existing 40 CFR 270.72(e), EPA prohibits any modifications to an interim status facility that amount to the reconstruction of the facility. For the purposes of this prohibition, EPA considers reconstruction to occur when the capital value of the changes to the facility exceeds fifty percent of the capital costs of a comparable new hazardous waste management facility.

EPA believes that the current regulations generally provide reasonable flexibility to interim status facilities to comply with the land disposal restrictions. Under certain circumstances, however, an owner or operator of an interim status facility that manages restricted wastes may need to expand the facility by more than 50 percent (in terms of cost) to comply with the Part 268 land disposal restrictions. In these circumstances under the existing regulations, the owner or operator would have to delay the changes or discontinue operations until the changes could be approved in connection with the issuance of a permit. EPA believes that, in light of the limited availability of hazardous waste treatment facilities, the time-consuming process necessary for permitting, and the clear evidence of congressional intent to allow interim status facilities to make the specific changes necessary to comply with new regulatory requirements, this result would be unacceptable.

To address this problem, EPA is proposing to amend § 270.72(e) to allow owners or operators to modify interim status facilities to handle wastes

restricted from land disposal necessary to comply with Part 268 without being subject to the fifty percent capital expenditure limit in § 270.72(e). Under the proposed regulation, interim status facilities would be required to file a revised Part A application prior to such changes. The applicant would have to demonstrate that the changes were necessary to comply with the land disposal restrictions of Part 268. In addition, the only allowable changes would be for treatment or storage in containers or tanks. EPA believes that the addition of other processes that amount to reconstruction, such as incineration, is likely to raise issues that would be addressed best through the permitting process.

Facilities allowed to expand their operations by more than 50 percent (in terms of cost) under the proposed change would be subject to Part 265 standards. For example, any tanks used to treat restricted wastes would be subject to the tank system standards of Part 265, Subpart J, which include secondary containment requirements (51 FR 25422, July 14, 1986).

L. Procedures for Obtaining a Variance From Treatment Standards

As a result of comments on the Agency's proposed BDAT standards, the Agency has provided a procedure to allow interested parties to obtain a variance from the treatment standards. See 40 CFR 268.44, 51 FR 40572 (November 7, 1986). This procedure may be used by those whose wastes cannot be treated to meet the treatment standard issued by EPA. Essentially, the Agency will establish a separate treatment standard for a waste if the interested party presents data which, if properly considered by the Agency at the time the standards were promulgated, would have required that a separate subcategory be created for the waste. The procedure allows the Agency to fine-tune the regulations by considering the full range of current practices to which the treatment standards should apply.

Section 268.44 establishes a variance procedure in the form of a rulemaking that amends the regulatory treatment standards each time a variance is granted. The preamble to that rule lists a number of factors that the Agency believes will be relevant to the variance application. However, as noted in the preamble to the final rule, the Agency believes that the statute does not preclude establishing a more streamlined variance procedure. The Agency has construed the statute to allow the setting of treatment standards applicable to specific treatability groups;

the same result could be achieved by issuing a variance in a case where EPA did not have sufficient data to establish treatability groups at the time of the final rule.

EPA received comments both for and against providing a more streamlined petition procedure but did not have enough time before the final rule was issued to consider these comments carefully. EPA therefore requests further comments on the advisability of modifying the current procedure. Specifically, are there disadvantages that would outweigh the benefits of a simplified procedure? Should the Agency allow any interested party to apply? Should the procedure allow the Agency to adjust the treatment standards to be more stringent as well as less stringent? Should the Agency establish a deadline for applications, e.g., 3 or 6 months after the effective date of the treatment standards that apply to the waste? What public notice procedures should apply? Are the factors cited in the preamble to the final rule published on November 7, 1986, the appropriate factors for the Agency to consider? EPA also solicits comments on any other relevant aspect of the treatability variance procedure.

V. Alternative Capacity and Ban Effective Date

RCRA section 3004(h)(2) states that the Agency may grant a nationwide variance of up to 2 years from the statutory effective date if adequate alternative treatment, recovery, or disposal capacity which protects human health and the environment is not available. Congress, however, intends for the land disposal restrictions to "go into effect immediately upon promulgation whenever and wherever possible." (S. Rep. No. 284, 98th Cong., 1st Sess. 19 (1983).) The legislative history also states that "[t]he Agency should expend every effort to assure that unsafe practices are terminated as quickly as possible." Therefore, "[e]xtensions based on capacity shortfalls should be infrequently granted. Given consistent regulatory and economic incentives, adequate capacity will be quickly developed." (S. Rep. No. 284, 98th Cong., 1st Sess. 19 (1983).) EPA will consider several factors when calculating alternative capacity and when determining the length of any variance from the effective dates mandated by RCRA. These factors, which were also used for determination of alternative capacity for the solvents and dioxins rule, are discussed below.

A. Agency Authority With Respect to Effective Dates

EPA will develop estimates of treatment capacity needed versus capacity available to determine if current capacity for alternative treatment, recovery, and disposal technologies is adequate to manage restricted wastes. These estimates will be developed from currently available data on capacity requirements and technology capacity.

If capacity is available, the restrictions will go into effect immediately. If capacity is not available, RCRA section 3004(h)(2) requires that the effective date of the restrictions shall be established on the basis of the earliest date on which adequate alternative treatment, recovery, or disposal capacity which protects human health and the environment becomes available. Establishment of the ban effective date will not be affected by the processing of petitions under RCRA section 3004 (d), (e), and (g). The interaction between the variance to the effective date and the case-by-case extension under section 3004(h)(3) is discussed later in this unit.

B. Regional and National Capacity

The Agency will determine both the quantity of restricted waste generated and the capacity of alternative treatment, recovery, and disposal technologies on a nationwide basis. If there is a significant shortfall in capacity to treat all of the restricted waste, the Agency will extend the effective date of the restrictions. If national capacity is sufficient, the restrictions will become effective immediately. If national capacity is only slightly lacking, EPA may grant case-by-case effective date extensions while allowing the nationwide restrictions to go into effect immediately.

C. The Nationwide Variance and the Case-by-Case Extension

In cases where EPA has not granted a nationwide variance, it is not precluded from granting case-by-case effective date extensions. For instance, if alternative capacity exists to manage most of the restricted wastes, but appears to be slightly inadequate, the Agency might choose not to grant a nationwide variance. In these cases, it is more desirable to grant case-by-case extensions to specific applicants who lack alternative capacity than to allow everyone, even those for whom alternatives are available, to continue to land dispose of their wastes. This approach is consistent with

congressional intent to restrict land disposal at the earliest possible time.

For the same reasons, EPA may grant a variance of less than 2 years, even though some facilities may require more time to be completed. These facilities could be completed under a case-by-case extension, if all applicable criteria are met, without allowing continued land disposal nationwide.

D. Determination of Capacity Requirements by Waste Treatability Group

In general, EPA will develop treatment technologies for waste groups derived from the physical/chemical characteristics of the banned wastes. Where possible, EPA will also determine the quantities of wastes that require specific treatment or recovery methods by waste treatability group. These treatability groups will enable EPA to compare required capacity (capacity demand) with available capacity (capacity supply). The quantities of wastes land disposed will be grouped according to the description of their characteristics. In addition, EPA will consider other increases in capacity demand generated by emergency and remedial responses. EPA also will include, to the extent possible, the impact of other final rulemakings such as the regulation of small quantity generators, that have occurred since EPA's capacity data were collected.

E. Definition of Available Capacity

In estimating available capacity, the Agency will consider (1) current on-line facilities, which include permitted facilities and facilities operating under RCRA interim status and (2) planned facilities and capacity extensions that will be on-line by the time the ban goes into effect.

Current on-line facilities consist of off-site and on-site facilities, as well as stationary and mobile facilities. They are facilities that have been approved to operate and accept pertinent wastes under current regulations by applicable Federal, State, and local agencies. Facilities operating under RCRA interim status meet these criteria, and therefore will be included in the capacity determination.

F. Definition of Alternative Treatment Capacity

RCRA section 3004(h)(2) states that a variance from the effective date of a land disposal restriction "shall be established on the basis of the earliest date on which adequate alternative treatment, recovery, or disposal capacity which protects human health and the environment will be available."

In general, all treatment technologies that are capable of meeting the treatment standards established under 3004(m), are considered to be available treatment capacity under the above standard.

Section 3004(m) directs EPA to establish standards based on treatment that will minimize long- and short-term threats to human health and the environment. The Agency believes that this "minimize" standard generally will be met by technologies classified as BDAT (best demonstrated achievable technology).

In most cases, treatment levels or methods based on BDAT are expected to fully protect human health and the environment. Accordingly, technologies that form the basis for such standards are candidates for the capacity evaluation undertaken pursuant to 3004(h) (2) and (3).

G. Definition of Alternative Recovery and Disposal Capacity

In assessing available capacity, the Agency will consider the capacity of all on-line recovery and disposal facilities "that are more protective than existing land disposal methods" (see 51 FR 40599). Planned facilities, including expansion of existing facilities, also will be considered where appropriate. On-line facilities are defined as those facilities that have received approval from applicable Federal, State, and local agencies to operate a recovery or disposal facility for the waste in question or for a similar waste.

However, alternative land disposal methods (e.g., deep well injection) will not be considered as available capacity for restricted wastes unless EPA has determined that such methods of disposal are fully protective of human health and the environment for the waste in question. This question will arise frequently in the context of assessing underground injection as alternative capacity. RCRA section 3004(f) allows the Agency until August 1988 to study the disposal by deep well injection of solvents, dioxins, and California List wastes and to promulgate any necessary regulations banning these wastes from deep well injection. This deadline occurs after the mandated deadlines for ban decisions concerning disposal of these wastes by other land disposal methods. For wastes scheduled for later banning, the Agency will make decisions to ban from deep well injection concurrently with decisions to ban from other land disposal methods. Accordingly, in evaluating the capacity of alternative protective disposal methods for these wastes prior to a

decision under section 3004(f), EPA will not consider underground injection to be available disposal capacity, since the Agency will not have determined whether the injection of such wastes is fully protective of human health and the environment.

H. Estimation of Capacity

EPA will estimate the annual unused or surplus capacity of alternative treatment, recovery, and disposal facilities that are available nationwide to manage wastes restricted from land disposal. This nationwide capacity (capacity supply) will then be compared with quantities of banned waste generated annually nationwide (capacity demand).

Surplus capacity will be expressed as the throughput capacity, the volume of waste that can be treated per year. Since data on actual unused throughput may be difficult to obtain in some instances, EPA may need to use other available information to calculate this value, such as the difference between a practical maximum design capacity and the capacity currently utilized, to calculate capacity. In turn, practical maximum design capacity represents the theoretical maximum design capacity, minus an estimate of the amount of potential operating time lost to normal maintenance.

Frequently, treatment and recovery technologies consist of a series of unit processes. In these cases, treatment system capacity will be based on the capacity of the unit operation within that system that is most likely to limit the capacity of the whole system, if any. This would occur, for example, if a large metals precipitation system contained a much smaller capacity for chromium reduction. In this case, the capacity for trivalent chromium precipitation (which does not require reduction) would be much greater than for hexavalent chromium precipitation that would require reduction.

For this proposal, capacity estimates are based on currently available information, primarily the 1981 OSW RIA Mail Survey. The Agency is currently working on a new survey of commercial and private treatment facilities and will use the results of this survey when they become available to calculate capacity for future rulemakings.

1. Current Surplus Capacity

Current surplus capacity is defined as present capacity that is not being utilized. Surplus capacity can be any of the following:

- (a) Commercially available.

(b) Private capacity which can be used to process additional wastes produced by the owner.

(c) Private, where the owner will be willing and able to accept wastes from other generators, i.e., to provide commercial services.

EPA will assume that commercial facilities are willing to accept wastes that they are capable of treating. In cases where commercial capacity is inadequate, EPA will consider the likelihood that available private capacity not needed to process additional waste produced by the owner will be converted to commercial capacity. Due to limited information on the availability of private capacity, EPA has only considered commercial capacity for this proposal. The Agency solicits comment on the assumptions used in this analysis (i.e., willingness of commercial facilities to treat California list wastes), and also asks for comment and data on private capacity. Data received during the comment period will be included in the final rule.

2. Planned Capacity

EPA's general methodology calls for EPA to use, if possible, planned capacity estimates in determining available capacity. If EPA finds that current capacity is insufficient for a particular waste, it evaluates the potential for the development of planned facilities and capacity by the statutory ban effective date. If a national variance is granted, planned capacity is considered in determining the length of a variance. Planned facilities and capacity will be considered available only if EPA determines that, by the time the ban goes into effect, the facility will be on-line. However, EPA has not included planned capacity for this proposal due to lack of data. EPA is developing new data on planned capacity. Because these data are not expected to be available in time for promulgation of this rule, the Agency solicits comment on planned capacity not considered in this proposal.

I. Time to Develop Capacity and Length of Variance

According to RCRA section 3004(h)(2), if the Agency determines that sufficient capacity currently exists, or if the necessary additional capacity can be developed by the time of the mandated ban date for each waste, the ban will go into effect on that date. If not, a variance of up to 2 years may be granted at the same time that the final rule is promulgated. The length of the variance will depend on the time required to provide alternative capacity that meets the criteria described above. EPA's analysis of time to provide capacity

indicates that treatment requiring a permit will require at least two years to develop. Treatment not requiring a permit (such as treatment in 90-day accumulation tanks) can be provided in as quickly as 6 months, depending on the complexity of the facilities to be constructed.

J. Wastes for Which Treatment Standards Have Not Been Established

Where EPA does not have sufficient information to establish treatment standards for a waste, the prohibition on land disposal for that waste will generally be immediately effective. EPA believes that, considering the criteria described below, the Agency will generally not be able to establish a nationwide variance for such wastes. As noted above, the purpose of the variance is to allow time for alternative protective capacity to develop. If the Agency cannot determine what specific type of treatment is needed for a waste (as is the case for metals and cyanides in this proposal), it will not be able to define the capacity needs for that waste. For this proposed rulemaking, EPA has been able to calculate alternative capacity for wastes containing HOCs, PCBs, and corrosives because it has been able to specify a technology as BDAT. However, it has not made BDAT determination for cyanides and metals. Therefore, it cannot estimate the capacity needed or available to treat these wastes.

However, EPA has included in the preamble and in the docket information on the capacity of various treatment technologies that may be used to treat metals and cyanides to below the threshold concentrations triggering the applicability of today's rule. Our review of these data suggests that BDAT, when developed, may be significantly more stringent than these threshold concentrations. In the interim, however, generators will be able to utilize the capacity of all of these alternative treatment technologies in complying with the standards. If EPA receives or develops sufficient information to establish BDAT for these wastes, the information in the docket on the specific technologies meeting the definition or performance identified as BDAT will be used to determine whether a variance is needed. The Agency invites comment on its analysis of the statutory requirements and on its capacity information. This unit describes EPA's estimates of the unused capacity that is currently available to treat banned wastes by these methods.

1. Incineration Capacity

The Agency has already determined for the purpose of the solvents rulemaking November 7, 1986 (51 FR 40572) that inadequate capacity exists to incinerate the solvent-bearing wastes. Since this same incineration capacity must be used to dispose of HOC- and PCB-containing hazardous wastes it follows that there is no capacity available for these wastes at this time.

2. Capacity for Other Treatment

Although the Agency is not proposing BDAT for cyanides and the metals, the treatment methods that the Agency believes are applicable are chemical precipitation, chromium reduction and cyanide oxidation. All of these treatment methods are referred to as tank treatment under the RCRA TSDF regulation.

The OSW RIA mail survey is currently EPA's only source of information concerning the unused capacity for these treatment methods. The survey provides information on tank treatment capacity at both commercial and private facilities, although the data at wastewater treatment facilities exempted from RCRA requirements are somewhat limited. As discussed above, EPA will consider only commercial wastewater treatment capacity in this proposed rulemaking. For each facility, the survey provided information on each tank used for treatment, types of wastes managed in tanks, and total tank treatment capacity for the facility. Using this information, EPA estimated this capacity for the specific types of tank treatment. The estimated available capacities for tank treatment are:

- (1) Chemical precipitation— 165×10^6 gal.
- (2) Chromium reduction— 35×10^6 gal.
- (3) Cyanide oxidation— 65×10^6 gal.

Thus, the total capacity available to treat the metal and cyanide containing hazardous wastes restricted from land disposal under section 3004(d) in commercial treatment facilities is approximately 265 million gallons.

Although it has no specific data to substantiate its position, the Agency believes that the relative ease of constructing new 90-day accumulation facilities that may simultaneously provide neutralization solidification capacity (or utilization of the extensive capacity in existing units) argues that there will be much more than 265 million gallons of capacity available by July 8, 1987. We believe that, with the notice provided today, generators will be able to develop the relatively simple treatment facilities needed to meet the threshold concentrations that establish

applicability of this date to wastes containing metals, cyanides, or pH less than 2. In fact, we believe extensive use of solidification already is occurring to meet EPA's regulations limiting the disposal of liquids in landfills. As a result, we believe this regulation only may reinforce the need for facilities to continue to use existing solidification capacity. EPA solicits comment on these judgments and data on the capacity to treat these wastes.

K. Alternative Treatment Capacity Required for California List Wastes

1. Quantities of Wastes Land Disposed

EPA has estimated the total quantities of California list wastes which are land disposed annually, based primarily on data provided in the OSW RIA Mail Survey of Treatment, Storage, and Disposal Facilities regulated in 1981 (Ref. 12). Complete analysis of the data is provided in the background document to support today's proposed rule (Ref. 1).

These estimates required four conservative assumptions because of the limited characteristics provided by the survey. First, EPA assumed all wastes identified in the 1981 survey containing metals or cyanides described as liquids or sludges were liquids using the paint filter test. Only those cyanide and metal wastes described specifically as solids were assumed to not be classified as liquids by this test and exemption from this proposed regulation. EPA believes that many of wastes that are described as sludges by generators contain free liquids and are

actually liquids based on EPA's test definition.

Second, in order to estimate the quantity of corrosive wastes that were acidic rather than basic, EPA also assumed that all corrosive wastes that were not specifically described as basic were acidic with a pH of less than or equal to 2 and subject to this rule. Third, EPA assumed that all metals wastes identified as containing chromium contain chromium in the hexavalent oxidation state and are subject to regulation.

Finally, EPA has assumed that the concentrations of constituents of all wastes identified by waste codes associated with the California list constituents are in excess of the threshold levels set by any of the options in today's proposed rule. Therefore, the entire universe of these California list wastes would be considered subject to the proposed restrictions.

The following table indicates the distribution of the total quantities of wastes that were estimated to be corrosive wastes (pH < 2) or to contain total cyanides, halogenated organic compounds (HOC), or metals (As, Cd, Cr, Pb, Ni, Hg, Se, Tl). The quantity of liquid metal wastes containing hexavalent chromium (Cr+6) is presented separately because of the frequent requirement for treatment separate from other metals to reduce it to trivalent chromium to facilitate precipitation as a hydroxide. Figures in the following table do not include the quantities of those California list wastes that are deep well injected.

Management technique	Quantities in millions of gallons				
	Acidic corrosives pH < 2	Total cyanide wastes	Metal wastes		
			Without Cr+6	With Cr+6	HOC wastes
Surface impoundments:					
Treatment.....	6,387	1,451	822	2,976	52.3
Storage (only).....	3,928	395	111	2,782	463
Disposal.....	316	81.3	57.6	3,785	96.8
Waste piles.....	6.3	22.1	15.5	168	<.1
Land application.....	35.2	<.1	1.2	613	<.1
Landfill.....	70.9	72.8	60.5	286	302
Total land disposed.....	10,743.4	2,022.2	1,067.8	10,610	914.1

The total quantity of wastes containing HOCs in this estimate includes both solid or liquid wastes, consistent with the statutory requirements for HOCs. However, this quantity does not include those wastes containing halogenated waste solvents or dioxins that have already been addressed previously in a final regulation specific to those wastes. It also does not include mixed RCRA/PCB

wastes. EPA has separately estimated in the background document that 7.0 million gallons of mixed RCRA/PCB wastes that are both liquid and that exceed 50 ppm are land disposed per year.

Because data are not currently available on quantities of California list wastes generated by small quantity generators and generated from remedial or removal actions anticipated to be

taken under CERCLA or RCRA corrective action, these have not been included in the total quantity estimates. However, EPA does not anticipate that significantly large quantities result from any of these sources. Small quantity generators produce less than 1% of all wastes generated and were responsible for less than 1% of the waste solvents EPA considered in the previous rulemaking. CERCLA responses and RCRA corrective actions generally produce wastes that contain less than the statutory concentrations of waste constituent, but can include acid wastes. EPA will attempt to develop estimates for all these wastes prior to promulgation of today's proposed rule.

2. Quantities Requiring Alternative Capacity

In order to estimate the alternative treatment capacity required to address the volumes of California list wastes given in the previous section and to determine the effective date for the land disposal restrictions, these wastes must be assigned to potential alternative treatment methods. The technologies identified in this section are those which EPA believes will generally be used to treat these California list wastes.

EPA believes that neutralization generally will be used for acidic liquid wastes. EPA does not believe that capacity will be an issue for waste solely requiring neutralization. Such neutralization can be done rapidly in tanks or even in pipes. However, EPA's limited waste characterization data suggest that the majority of the acidic corrosive wastes also contain significant concentrations of metals that will need treatment to meet the constituent concentrations established by any the options on today's proposed rule. Therefore, EPA is assuming that all acidic wastes also will require chemical precipitation or solidification. This is a conservative assumption because some acidic wastes will require only neutralization. To the extent that neutralization could be used for these wastes, EPA recognizes that it has overestimated the capacity requirements for chemical precipitation or solidification.

EPA also believes that all liquid wastes identified as metal wastes (containing As, Cd, Cr, Pb, Ni, Hg, Se, Tl) will require chemical precipitation, and wastes that contain hexavalent chromium (Cr + 6) will require additional chemical reduction. For the purpose of estimating capacity needs EPA has assumed wastes containing cyanide will require chemical oxidation of the cyanide. Alternatively, solidification to meet the paint filter test definition of

non-liquid may be used for metals or cyanides.

EPA has assumed that all wastes identified as containing HOCs or PCBs will require incineration. EPA also has estimated, based on its economic impact assessment that the majority of the California list wastes treated in surface impoundments will continue to be treated in these impoundments after compliance with RCRA section 3005(j)(11) (A) and (B). However, EPA has assumed that wastes treated in these impoundments will be treated by alternative methods (in tanks, by solidification, etc.), on an interim basis while the impoundments are retrofitted to meet the minimum technology requirements of section 3004(o) as specified in section 3005 (j)(11).

The information presented below represents the Agency's best estimate of the volumes of California list wastes that may require alternative treatment capacity. However, EPA is unable to determine the incremental capacity required for any wastes other than the HOC and PCB wastes.

[Millions of gallons]	
Alternative treatment technology	Quantities requiring capacity
Acid corrosive wastes	6745
Metals wastes without chromium.....	1554
Hexavalent chromium wastes	896
Cyanide wastes	7542
HOC and PCB wastes	458

VI. State Authority

A. Applicability of Rules in Authorized States

Under section 3006 of RCRA, EPA may authorize qualified States to administer and enforce the RCRA program within the state. Following authorization, EPA retains enforcement authority under sections 3008, 3013, and 7003 of RCRA, although authorized states have primary enforcement responsibility. The standards and requirements for authorization are found in 40 CFR Part 271.

Prior to HSWA, a state with final authorization administered its hazardous waste program in lieu of EPA administering the federal program in that state. The federal requirements no longer applied in the authorized state, and EPA could not issue permits for any facilities that the state was authorized to permit. When new, more stringent federal requirements were promulgated or enacted, the state was obliged to enact equivalent authority within specified time frames. New federal requirements did not take effect in an

authorized state until the state adopted the requirements as state law.

In contrast, under RCRA section 3006(g) (42 U.S.C. 6926(g)), new requirements and prohibitions imposed by HSWA take effect in authorized states at the same time that they take effect in nonauthorized states. EPA is directed to carry out these 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, HSWA applies in authorized states in the interim.

Today's rule is proposed pursuant to sections 3004 (d) through (k), and (m), of RCRA (42 U.S.C. 6924). Therefore, it will be added to Table 1 in 40 CFR 271.1(j), which identifies the federal program requirements that are promulgated pursuant to HSWA and take effect in all states, regardless of their authorization status. States may apply for either interim or final authorization for the HSWA provisions in Table 1, as discussed in the following section. When this rule is promulgated, Table 2 in 40 CFR 271.1(j) will be modified also to indicate that this rule is a self-implementing provision of HSWA.

B. Effect on State Authorizations

As noted above, EPA will implement today's proposal in authorized states until their programs are modified to adopt these rules and the modification is approved by EPA. Because the rule is promulgated pursuant to HSWA, a state submitting a program modification may apply to receive either interim or final authorization under RCRA section 3006(g)(2) or 3006(b), respectively, on the basis of requirements that are substantially equivalent or equivalent to EPA's. The procedures and schedule for state program modifications for either interim or final authorization are described in 40 CFR 271.21. It should be noted that HSWA interim authorization will expire on January 1, 1993 (see 40 CFR 271.24(c)).

Section 271.21(e)(2) requires that states that have final authorization must modify their programs to reflect federal program changes, and must subsequently submit the modification to EPA for approval. The deadline for the state to modify its program for this proposed regulation will be determined by the date on which this regulation is promulgated in final form. If final rule promulgation occurs before July 1, 1987, state program modifications must be made by July 1, 1989, if only regulatory changes are necessary, or July 1, 1990 if statutory changes are necessary. If this

rule is promulgated in final form after July 1, 1987, state program modifications must be made by July 1, 1991, if only regulatory changes are necessary or July 1, 1992, if statutory changes are necessary. These deadlines can be extended in exceptional cases (see § 271.21(e)(3)).

States with authorized RCRA programs may have requirements similar to those in today's proposal. These state regulations have not been assessed against the federal regulations being proposed today to determine whether they meet the tests for authorization. Thus, a state is not authorized to implement these requirements in lieu of EPA until the state program modification is approved. Of course, states with existing standards may continue to administer and enforce their standards as a matter of state law. In implementing the federal program, EPA will work with states under agreements to minimize duplication of efforts. In many cases, EPA will be able to defer to the states in their efforts to implement their programs rather than take separate actions under federal authority.

States that submit official applications for final authorization less than 12 months after the effective date of these regulations may be approved without including equivalent standards. However, once authorized, a state must modify its program to include standards substantially equivalent or equivalent to EPA's within the time periods discussed above.

C. State Implementation

There are three unique aspects of today's proposal which affect state implementation and impact state actions on the regulated community:

1. Under Part 268, Subpart C, EPA is proposing land disposal restrictions for all generators and disposers of certain types of hazardous waste. In order to retain authorization, states must adopt the regulations under this Subpart since state requirements can be no less stringent than federal requirements.

2. Also under Part 268, EPA may grant a national variance from the effective date of land disposal prohibitions for up to two years if it is found that there is insufficient alternative treatment capacity. Under § 268.5, case-by-case extensions of up to one year (renewable for an additional year) may be granted for specific applicants lacking adequate capacity.

The Administrator of EPA is solely responsible for granting variances to the effective date because these determinations must be made on a national basis. In addition, it is clear

that RCRA section 3004(h)(3) intends for the Administrator to grant case-by-case extensions after consulting the affected states, on the basis of national concerns which only the Administrator can evaluate. Therefore, states cannot be authorized for this aspect of the program.

3. EPA may grant petitions of specific duration to allow land disposal of certain hazardous waste where it can be demonstrated that there will be no migration of hazardous constituents for as long as the waste remains hazardous.

States which have the authority to impose bans may be authorized under RCRA section 3006 to grant petitions for exemptions from bans. Decisions on site-specific petitions do not require the national perspective required to ban waste or grant extensions. In accordance with RCRA section 3004(i), EPA will publish notice of the State's final decision on petitions in the **Federal Register**.

States are free to impose their own disposal bans if such actions are more stringent or broader in scope than Federal programs (RCRA section 3009 and 40 CFR 271.1(i)). Where States impose bans which are more stringent than an EPA action, such as granting a case-by-case extension or petition, the more stringent State ban governs as a matter of State law.

VII. Effects of the Land Disposal Restrictions Program on Other Environmental Programs

As an alternative to using BDAT treatment, the regulated community might dispose of restricted California list wastes using non-RCRA disposal options. Two options regulated under the Marine Protection, Research, and Sanctuaries Act (MPRSA) (33 U.S.C. 1401 et. seq.) are ocean dumping and ocean-based incineration. EPA is in the process of revising the MPRSA regulations. If the Agency were to relax the current regulations, there could be increased demand for ocean-based waste management due to the impact of the land disposal restrictions. If, for example, the regulations are revised to allow the issuance of permits to applicants whose wastes fail to comply with one or more of the MPRSA environmental criteria but who successfully demonstrate a need for the permit, the demand for ocean disposal could increase substantially.

The Agency conducted an analysis of the potential shift in demand for ocean disposal (ocean dumping or ocean-based incineration) resulting from the restrictions on land disposal of solvent, dioxin, and California list wastes. The results are described in "Assessment of

Impacts of Land Disposal Restrictions on Ocean Dumping and Ocean Incineration of Solvents, Dioxins, and California List Wastes." (Ref: U.S. EPA, 1986) This assessment was based on a methodology to score and rank waste streams for relative acceptability for ocean disposal, supplemented with an analysis of cost factors and capacity constraints.

The scoring/ranking methodology was based on technical requirements (e.g., physical form and heating value) and MPRSA environmental criteria (e.g., constituent concentrations, toxicity, solubility, density, and persistence of the waste) associated with ocean disposal of hazardous waste. The capacity analysis assumed that those wastes least acceptable for ocean disposal will be treated or disposed of by land-based methods. The cost analysis assumed that additional land-based treatment capacity would be built to treat waste streams for which the costs of land-based treatment would be less than the costs of ocean disposal (including on land transportation to a port located on the East coast).

The results of the cost/capacity analysis indicated that, as a result of the land disposal restrictions, approximately 20.3 million gallons per year of hazardous wastes containing HOCs, 15.1 million gallons per year of liquid hazardous wastes containing metals, and 8.2 million gallons per year of liquid hazardous wastes containing PCBs potentially could create demand for ocean dumping and ocean-based incineration. Such demands result from capacity shortfalls of land-based treatment (incineration and chemical precipitation) and the relatively lower cost of ocean dumping and ocean-based incineration, taking into account the costs of transportation on land. These results estimate the demand that may be created if the MPRSA regulations are revised to allow the issuance of permits for wastes that do not comply with MPRSA environmental criteria, because the analysis did not take into account technical requirements or environmental criteria.

The Agency expanded the cost/capacity analysis to eliminate those wastes that do not meet technical requirements or MPRSA environmental criteria. The results of that analysis indicated that none of the California list waste streams identified as likely to create potential demand for ocean disposal in the cost/capacity analysis would be acceptable for ocean dumping, based on existing ocean dumping regulations. Conversely, some of the PCB-containing wastes (4.4 million

gallons per year) identified by the cost/capacity analysis would be acceptable for ocean-based incineration, based on technical requirements and the proposed ocean incineration regulations. The other potential waste stream candidates (HOC-containing wastes, liquid metal-containing wastes, and the remaining PCB-containing wastes) would fail one or both of the technical requirements for ocean-based incineration (i.e., physical form and heating value).

VIII. Regulatory Requirements

A. Regulatory Impact Analysis

Executive Order 12291 requires EPA, to assess the effect of contemplated Agency actions during the development of regulations. Such an assessment consists of a quantification of the potential benefits and costs of the rule, as well as a description of any beneficial or adverse effects that cannot be quantified in monetary terms. In addition, Executive Order 12291 requires that regulatory agencies prepare an analysis of the regulatory impact of major rules. Major rules are defined as those likely to result in:

1. An annual cost to the economy of \$100 million or more; or
2. A major increase in costs or prices for consumers or individual industries; or
3. Significant adverse effects on competition, employment, investment, innovation, or international trade.

The Agency has performed an analysis of the proposed regulation to assess the economic effect of associated compliance costs. Total costs of proposed restrictions on affected wastes are expected to amount to approximately \$100 million. The proposal thus constitutes a major rule under Executive Order 12291, and EPA has prepared a formal regulatory impact analysis of today's proposal.

The remainder of Unit VIII describes the economic analysis performed by EPA in support of today's proposed rule affecting all California list wastes identified in section 3004(d)(2) of RCRA.

1. Cost and Economic Impact Methodology

EPA has assessed the costs and potential economic effects of this proposed rule and of major regulatory alternatives to it.

EPA is proposing to codify the levels specified by Congress in section 3004(d)(2) of RCRA. In addition to assessing the proposed regulation, the Agency has examined major regulatory alternatives to it. In this preamble, EPA presents results for the proposed rule only. Each of the alternatives is

explored in detail in the regulatory impact analysis. The methodology for establishing total costs and economic impacts of the rule has three steps. First, EPA estimates the population of facilities and waste management practices which will be affected. Next, total social costs of the regulation are derived by adding costs for individual facilities. Finally, economic impacts on affected facilities are assessed.

a. *Affected population and practices.* The affected population is the total number of hazardous waste treatment, storage and disposal facilities (TSDFs) and generators land disposing of California list wastes either directly at the generation site or indirectly through the purchase of off-site commercial land disposal services. Four distinct types of plants comprise this population: non-commercial TSDFs, which generate and dispose of their own wastes; commercial TSDFs, which manage wastes generated elsewhere; generators that send large quantities of wastes off-site for management; and small quantity generators, who generate between 100 and 1000 kg of hazardous waste per month. Waste management practices for each of these groups are assessed to identify current costs of managing wastes and incremental cost increases attributable to today's rule.

The number of facilities that land dispose affected wastes was determined using the EPA's 1981 Regulatory Impact Analysis Mail Survey.² Waste quantities and management costs for facilities responding to the Mail Survey are scaled up to represent the national population by means of weighting factors developed for the survey. EPA estimates that 495 facilities comprise the total national population of commercial and non-commercial facilities land disposing of California list wastes on-site, excluding facilities disposing of PCB containing waste. This estimate is based on 1981 survey data adjusted for intervening regulatory requirements. Because the 1981 survey was a statistical sample and not a census, updating it with more current information available to the Agency from other sources is difficult. Based on these sources, however, EPA believes that this estimate may overstate the actual number of TSDFs now land disposing of California list waste.

² EPA conducted the RIA Mail Survey of hazardous waste generators and TSDFs to determine waste management practices in 1981. Facilities that handled less than 1000 kilograms of waste per month were not regulated in 1981 and thus are not included in the data. For more information see the "National Survey of Hazardous Waste Generators and Treatment Storage and Disposal Facilities Regulated under RCRA in 1981."

EPA estimates that an additional 3,279 plants generate more than 1,000 kilograms per month of wastes that are sent off-site for management. The waste is disposed of by either non-commercial TSDFs (e.g. owned by the firm generating the waste but at a different location) or by a commercial TSDF.

Generators of less than 1,000 kilograms per month were not included in the 1981 survey because they were considered exempt at that time. However, the 1984 amendments to the Solid Waste Disposal Act direct EPA to lower the exemption for small quantity generators (SQGs) from 1,000 to 100 kilograms per month by March 31, 1986, so SQGs generating between 100 and 1000 kilograms of waste per month for off-site disposal are also included in the affected population. The Agency estimates that SQGs add 2,131 plants to the affected population. Plant and waste specific data on this group are derived from EPA's Small Quantity Generator Survey.³

Because of the design of the Mail Survey, generators of PCBs mixed with hazardous wastes regulated under RCRA were not represented in it. Data on this group have been developed more recently, and indicate approximately 63 generators of mixed PCB/RCRA hazardous wastes.⁴

EPA's characterization of management practices for these groups includes the cost of compliance with regulations which have taken effect since the 1981 survey was conducted. In particular, EPA adjusted waste management practices reported to reflect compliance with the provisions of 40 CFR Part 264 of RCRA. In making this adjustment, the Agency assumes facilities elect the least costly legal methods of compliance. This adjustment defines not only current management practices and costs associated with them, but also the number of waste streams in the affected population. For example, for 55 facilities, the costs of land disposing of certain wastes are driven so high by regulations predating this proposal that other management modes are less likely to resolve disposal of these wastes and, therefore, that these wastes are no longer part of the population of waste streams that may be affected by any restrictions on land disposal. No aggregate models have been developed for the population of

³ Office of Solid Waste, "National Small Quantity Hazardous Waste Generator Survey," February 1985.

⁴ Office of Solid Waste, "Characterization of Mixed PCB/RCRA Hazardous Wastes," February 1985.

treatment, storage and disposal facilities and small quantity generators examined in this analysis. Instead, individual case observations in the data sources have been weighted to represent the national population of wastes and management practices. For generating plants disposing of large quantities of California list wastes off-site, "model" plants representing average, maximum and minimum waste quantities were developed to assess the range of potential economic effects. For generators of mixtures of PCBs and RCRA hazardous wastes, economic effects were assessed using "model" plants representing typical waste quantity and plant size characteristics.

b. *Development of costs.* Once waste quantity, type and method of treatment are known for the affected population, EPA developed estimates of costs of compliance for individual facilities. The analysis detailed in this section is based on cost estimates for surveyed facilities representing the affected population. Wastes amenable to similar types of treatment were grouped to identify economies of scale available through co-treatment and disposal.

EPA developed current waste management costs by adjusting 1981 waste management practices to reflect compliance with regulatory requirements predating restrictions on land disposal. Estimated costs for disposal in surface impoundments assume compliance with Part 264 of RCRA, which requires surface impoundments to have double liners and leachate collection systems between liners, subject to certain exemptions. This assumption could lead to an overestimate of current disposal costs and, thus, to an underestimate of incremental costs for surface impoundments exempted from these requirements. Existing requirements under RCRA are also considered in developing costs for disposal in landfills and waste piles.

Facilities face several possible options if they may no longer land dispose of their wastes. EPA applies the same rationale in predicting facility choice among these options as it does in establishing the affected population: facilities are assumed to elect the least costly method of complying with the requirements of this proposal. Costs of compliance are derived by predicting the minimum-cost method of compliance with land disposal restrictions for each facility and calculating the increment between that and current disposal costs. As in the analysis of current costs, economies of scale in waste management are considered.

Shipping costs for wastes sent off-site for management are also considered. In the development of current waste management costs, the transportation distance assumed for off-site waste treatment and/or disposal is 100 miles. Most plants now sending wastes off-site do so for disposal. Although the likely effect of restrictions will be to require pretreatment in addition to disposal, the Agency has not increased the assumed transportation distance. This assumes that plants now sending wastes off-site for disposal only can also purchase treatment services from the same commercial facilities. But even if the assumption of no increase in transportation distance does not accurately predict the effects of this rule, our examination of the sensitivity of results to this assumption found that varying the assumption in travel distances, even by as much as a factor of eight, has a minimal effect on results. This is because many plants that send wastes off-site send small amounts, and thus economies of scale (reflected in per unit prices of waste disposal at large commercial facilities) outweigh even major increases in shipping costs.

EPA developed facility-specific compliance costs in two components, which are weighted and then summed to estimate total national costs of the proposal. The first component of the total compliance cost is incurred annually for operation and maintenance (O&M) of alternative modes of waste treatment and disposal. The second component of the compliance cost is a capital cost, which is an initial outlay incurred for construction and depreciable assets. Capital costs are restated as annual values by adjusting them into equivalent yearly payments using a capital recovery factor based on a real cost of capital of 7 percent. These annualized capital costs are then added to yearly O&M costs to derive an annual equivalent cost. The result is EPA's estimate of the impact of the regulation on annual firm cashflow.

c. *Economic impact analysis.*

i. *Non-commercial TSDFs and SQGs.* Economic impacts on non-commercial TSDFs and SQGs are assessed in several steps. First, a general screening analysis compares facility-specific incremental costs to financial information about firms, disaggregated by Standard Industrial Classification (SIC) and number of employees per facility. This comparison generates two ratios, which are used to identify facilities likely to experience adverse economic effects. The first is a ratio of individual facility compliance costs to costs of production. A change exceeding

five percent is considered to imply a substantial adverse economic effect on a facility. The second is a "coverage" ratio, relating cash from operations to costs of compliance. For this ratio, a value of less than 20 is considered to represent a significant adverse effect. The coverage ratio is the more stringent of the two ratios, but exceeding the critical level in either one suggests that a facility is likely to be significantly affected. Both of these ratios implicitly assume that facilities will be unable to pass on compliance costs to consumers of their products and services in the form of higher prices. This analysis considers only pre-tax costs, because census data are stated in before-tax terms.

Once facilities experiencing adverse economic effects are identified using the two screening ratios, more detailed financial analysis is performed to verify the results and to focus more closely on affected facilities. For this subset of facilities, the coverage ratio is adjusted to allow a portion of costs to be passed through. Economic effects on individual facilities are examined assuming that product price increases of one and five percent are possible. Those facilities for which the coverage ratio is still less than two are considered likely to close.

ii. *Commercial TSDFs.* Commercial TSDFs are defined here as those facilities which accept fees in exchange for management of wastes generated elsewhere. For this group of facilities, there exists no Census SIC from which to draw financial information. Two SICs which we might use as proxies, 4953 and 4959, do not distinguish between financial data for hazardous waste treatment firms and for firms managing municipal and solid wastes. Consequently, our analysis of economic effects on commercial facilities is qualitative. This analysis includes an examination of the quantity of waste each facility receives from the waste group restricted by today's proposal. EPA also examines the ability of each facility to provide the additional treatment required once these restrictions are promulgated, and thus to retain or expand that portion of its business generated by restricted wastes.

iii. *Generators of large quantities of wastes.* EPA's analysis of the economic effects of this proposal on generating plants disposing of large quantities of affected wastes off-site assumes that commercial facilities can entirely pass on to them the costs of compliance with this regulation in the form of higher prices for waste management services. Because of data limitations in the Mail Survey, EPA has not developed plant-

specific waste characterization, treatment methods, and compliance costs for generators, as it has for TSDFs. Our analysis of the economic effects of the proposed regulation on this group uses RIA Mail Survey data to develop model plants generating average, maximum and minimum waste quantities. This allows EPA to assess the range of possible effects on generating plants.

2. Costs and Economic Impacts

Total costs of regulating California list wastes qualify today's proposal as major under Executive Order 12291, since total annualized costs of restricting land disposal of these wastes are estimated at \$97 million. These costs are not adjusted for the effect of taxation, which is merely a transfer from one sector of the economy to another. Costs are stated in 1985 dollars.

The proposed regulation and alternatives will affect entities in a variety of four-digit SICs, including chemicals and allied products, petroleum products, and metals industries. Among non-commercial TSDFs, three sectors account for approximately 61 percent of all land disposal restriction compliance costs likely to be incurred by sectors land disposing of California list wastes. SIC 28, chemicals and allied products, alone accounts for 40 percent. Two other sectors also contribute significant amounts, although much less: SIC 33, primary metals, accounts for 16 percent; and SIC 34, fabricated metal products, accounts for 5 percent. In the aggregate, non-commercial TSDFs account for 65 percent of the costs of this proposed rule. Commercial TSDFs, included predominantly in SIC 4953, account for the balance.

Economic effects have been assessed for both non-commercial and commercial facilities. Non-commercial facilities are those that generate and manage their own wastes, as distinct from facilities that accept fees in exchange for management and disposal of wastes generated by others. Of 457 (weighted) non-commercial facilities nationally, 84 may experience financial distress because of this rule, and 9 of these appear likely to close. Five of the 9 likely closures belong to the chemical industry (SIC 28), and the primary (SIC 33) and fabricated metals (SIC 34) industries. Employment effects associated with these 9 closures amount to 188 jobs lost.

We estimate that 38 commercial facilities incur incremental costs as a result of the restriction on land disposal of California list wastes. Forty-two percent of these commercial facilities

offer a range of hazardous waste management services, including land-based disposal, storage and treatment. The increased demand this rule will create for highly-priced treatment services may actually strengthen the financial position of these firms by allowing them to increase market share. For the 16 percent of commercial facilities that offer solely land-based management of restricted wastes, on the other hand, the increased emphasis on treatment prior to land disposal may prove economically disadvantageous. It was not possible to characterize the remaining 42 percent of commercial facilities based on services offered.

Turning to effects on generators, EPA found that based on average waste quantities, the 187 sectors generating California list waste include 3,279 plants. Of these, 133 plants may experience significant financial distress based on costs imposed by restrictions on land disposal. This represents nearly four percent of all the waste-generating plants that may face increased waste management prices. Most significantly affected plants belong to either the chemical or primary or fabricated metals products industries. Based on further analysis, 14 of the 133 distressed plants appear likely to close. Employment effects associated with these closures amount to 264 jobs.

Total annualized national costs for the 2,131 small quantity generators of California list wastes are \$5.1 million. Based on engineering estimates of prices for off-site waste management services, costs for SQGs generating the maximum of 1,000 kilograms per month of nothing but hazardous wastes named in the California list would incur less than \$13,200 annually in incremental compliance costs. Economic ratios for all plants in each 4-digit sector represented in the SQG survey were examined, and in 66 cases plants seemed likely to experience some financial distress, and two of these plants appear likely to close. Thus, restricting land disposal of California list wastes may have substantial adverse economic effect on approximately 3 percent of all generators of small quantities of wastes.

Economic effects on generators of mixed PCB/RCRA wastes are also not expected to be significant, although because of data limitations no plant-specific analysis could be undertaken. Further information on economic effects on all groups mentioned above is available in the regulatory impact analysis supporting this proposed rule.

3. Benefits and Cost-effectiveness of Restricting Land Disposal of California List Wastes

The regulatory impact analysis performed by the Agency evaluated three regulatory alternatives for restricting the land disposal of California list wastes. As with the discussion of cost and economic impacts, this preamble presents results associated with the proposed approach, to codify the statutory levels for the California list as set forth in section 3004(d).

The benefits of today's proposal were evaluated by considering the reduction in the number of cases of human health effects that result from treating California list wastes with alternative technologies rather than management by current land disposal practices. Predicting potential human health effects entails estimating quantitatively the consequences of human exposure to disease causing agents. Human health risk is the probability of injury, disease, or death over a defined time period. To estimate risks of baseline and alternative technologies, the analysis characterizes wastes, technologies, releases, environmental transport, and dose-responses, based largely on comparative risk assessment methodologies. The analysis includes an evaluation of individual risk due to chronic exposure, where the risk determination accounts for the dose, the chronic risk per unit dose, a factor that distinguishes between the dose-response for carcinogens and other types of substances. The analysis also weights the cases by the relative severity of the toxic effect. The individual risk is converted into a number of cases using estimates of the population exposed. For each combination of California list waste, technology, and environment, the model derives estimates of the total number of people affected by the waste management practice.

In assessing the benefits of the proposed approach, the analysis is limited to reductions in human health effects attributed to a reduction in exposure to the toxic constituents in these wastes. As a result, the benefits of the land disposal restrictions for California list wastes may be underestimated. Other benefit considerations such as improvements in environmental quality were not quantified. Furthermore, the assessment may underestimate benefits since the effects of the comparative risk analysis were not included. Therefore, negative benefits resulting from a technology

considered riskier than land disposal (which would be designated not available as an alternative to land disposal) were included in the analysis. Although this assessment does not estimate potential increases in risk from increased transportation and handling of California list wastes, an initial analysis indicates that increases are not likely to be significant.

Based on this benefits analysis, implementing the statutory levels and defining BDAT technologies for HOCs and PCBs are estimated to result in a net reduction in health risks equal to 2853 weighted cases (e.g., cancer, fetal toxicity, decreases in reproductive capacity, etc.) over seventy years, or a 33.9 percent reduction from baseline practices. As mentioned earlier, the total increase in annualized cost of restricting land disposal of California list wastes is estimated at \$97 million. This yearly incremental cost represents a 250 percent increase in costs over current land disposal practices. Division of the total increase in annualized cost by the annualized reduction in health risks, 40.76 cases, determines that the cost of the proposed regulatory approach is \$2.38 million per case avoided.

B. Regulatory Flexibility Analysis

Pursuant to the Regulatory Flexibility Act, 5 U.S.C. 601 *et seq.*, whenever an agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small governmental jurisdictions). This analysis is unnecessary, however, if the agency's administrator certifies that the rule will not have a significant economic effect on a substantial number of small entities.

EPA has examined the rule's potential effects on small businesses as required by the Regulatory Flexibility Act and has concluded that today's proposed rule will not have a significant economic effect on a substantial number of small entities. As a result of this finding, EPA has not prepared a formal Regulatory Flexibility Analysis document in support of this rule. The following discussion summarizes the findings on which the conclusions above are based. More detailed information is available in the record and in technical background documents prepared in support of this rulemaking.

EPA evaluated the economic effect of the proposed rule on small entities, defined here as firms employing fewer than 50 people. Because of data limitations, this small business analysis

excludes generators of large quantities of California list wastes. The "small business" population examined therefore includes only two groups: all treatment, storage and disposal facilities employing fewer than 50 persons, and all small quantity generators that are also small businesses. 158 TSDFs are small businesses. Of these, 5 exceed threshold values on the cost of production ratio, a figure that represents 3 percent of this small business population.

Of the total of 2,131 small quantity generators examined in this analysis, the vast majority (1,914 or 97 percent of the total population of SQGs) are also small businesses. A total of 5 SQGs (or less than one percent of all small businesses) exceeded threshold values on the cost of production ratios. According to EPA's guidelines for conducting Regulatory Flexibility Analysis, if over 20% of the population of small business are likely to experience financial distress based on the costs of a rule, then the Agency is required to consider that the rule will have a significant effect on a substantial number of small entities and must perform a formal Regulatory Flexibility Analysis.⁵ Economic impacts on small entities are not expected to exceed three percent of the total small business population, and thus EPA has not prepared a formal RFA.

C. Review of Supporting Documents and Request for Public Comments

1. Review of Supporting Documents

The primary source of information on current land disposal practices and industries affected by the proposed regulation is EPA's National Survey of Hazardous Waste Generators and Treatment, Storage and Disposal Facilities. Waste stream characterization data and engineering costs of waste management are based on the Mail Survey and on reports by the Mitre Corporation, "Composition of Hazardous Waste Streams Currently Incinerated," (April 1983), and U.S. EPA, "The RCRA Risk-Cost Analysis Model," (March 1984). The survey of small quantity generators has been the major source of data on this group. Data used to characterize generators of mixed PCB/RCRA hazardous wastes were taken from an EPA study, "Characterization of Mixed PCB/RCRA Hazardous Wastes," (February 1985).

For financial and value of shipment information for the general screening analysis, 1982 Census data were used,

⁵ See U.S. EPA, "Guidelines for Compliance with the Regulatory Flexibility Act," February 1982.

adjusted by 1983 Annual Survey of Manufactures data. Producer price indices were also used to restate 1983 dollars in 1985 terms.

2. Request for Public Comments

EPA recognizes that due to constraints of time and data availability, this analysis has significant limitations. Specifically, EPA requests comment on the following:

a. EPA would like to refine the assumption that costs imposed on commercial hazardous waste facilities can entirely be passed through in the form of higher prices. The Agency requests any estimates of typical profit margins in the commercial hazardous waste industry, data on waste management fees, and on the percent price increase in waste management fees that may force substitution on generators.

b. The Agency requests public comment and data on the feasibility of small business waste recycling, reclamation, or in-process reduction.

c. The Agency requests comment and data on the technical feasibility of, and costs associated with, waste segregation.

IX. References

Background Documents

(1) U.S. EPA. "Background Document for Land Disposal Restrictions of Hazardous Wastes Listed in section 3004(d) of the Resource Conservation and Recovery Act." U.S. EPA, OSW, Washington, DC, 1986

(2) U.S. EPA. "Comparative Risk Assessment of Selected California List Wastes for the RCRA Land Disposal Restrictions." U.S. EPA, OSW, Washington, DC, 1986

Regulatory Impact Analysis

(3) U.S. EPA. "Regulatory Analysis of Proposed Restrictions on Land Disposal of California List Wastes." U.S. EPA, OSW, Washington, DC, 1986

Other References

(4) American Public Health Association, American Water Works Association, Water Pollution Control Federation. *Standard Methods for the Examination of Water and Wastewater*. 16th edition, 1985

(5) American Society of Testing and Materials. *Annual Book of ASTM Standards*. Philadelphia, PA, 1984

(6) Cherry, K.F., 1982. *Plating Waste Treatment*. Ann Arbor Science

(7) Kelada, N.P., Lue-Hing, C., and Lordi, D.T., 1978. "Cyanide Species and Thiocyanate Methodology in Water and Wastewater," Chapter 20, In: *Chemistry of Wastewater Technology*. Ann Arbor Science

(8) Lowenheim, F.A., 1978. *Electroplating*. Sponsored by the American Electroplating Society, McGraw-Hill Book Company, New York, New York

(9) U.S. EPA. "Assessment of Impacts of Land Disposal Restrictions on Ocean Dumping and Ocean Incineration of Solvents, Dioxins, and California-List Wastes." U.S. EPA, OSW, Washington, DC, 1986

(10) U.S. EPA. "Characterization of Mixed PCB/RCRA Hazardous Wastes." U.S. EPA, OSW, Washington, DC, 1985

(11) U.S. EPA. "National Small Quantity Hazardous Waste Generator Survey." U.S. EPA, OSW, Washington, DC, 1985

(12) U.S. EPA. "National Survey of Hazardous Waste Generators and Treatment, Storage and Disposal Facilities Regulated Under RCRA in 1981." U.S. EPA, OSW, Washington, DC, 1984

(13) Goldman, L.J. and Tatsch, C.E., "Compatibility of Corrosive Acids with Codisposed Wastes," 1985

List of Subjects in 40 CFR Parts 260, 261, 262, 264, 265, 268, 270, and 271

Administrative practice and procedure, Confidential business information, Environmental protection, Hazardous materials, Hazardous materials transportation, Hazardous waste, Imports, Indian lands, Insurance, Intergovernmental relations, Labeling, Packaging and containers, Penalties, Recycling, Reporting and recordkeeping requirements, Security measures, Surety bonds, Waste treatment and disposal, Water pollution control, Water supply.

Dated: November 28, 1986.

Lee M. Thomas, Administrator.

Therefore, it is proposed that Chapter I of Title 40 be amended as follows:

PART 260—HAZARDOUS WASTE MANAGEMENT SYSTEM: GENERAL

1. The authority citation for Part 260 continues to read as follows:

Authority: Secs. 1006, 2002(a), 3001 through 3007, 3010, 3014, 3015, 3017, 3018, and 3019, Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6905, 6912(a), 6921 through 6927, 6930, 6934, 6935, 6937, 6938, and 6939).

2. In § 260.11, paragraph (a) introductory text is revised to read as follows:

§ 260.11 References.

(a) When used in Parts 260 through 268 of this chapter, the following publications are incorporated by reference:

PART 268—LAND DISPOSAL RESTRICTIONS

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

Authority: Secs. 1006, 2002(a), 3001, and 3004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and

Recovery Act of 1976, as amended (42 U.S.C. 6905, 6912(a), 6921, and 6924).

2. The Table of Contents for Subpart C is amended by adding an entry for § 268.32 to read as follows:

Subpart C—Prohibitions on Land Disposal

268.32 Waste specific prohibitions—California list wastes.

Subpart A—General

3. Section 268.3 is revised to read as follows:

§ 268.3 Dilution prohibited as a substitute for treatment.

No generator, transporter, handler, or owner or operator of a treatment, storage, or disposal facility shall in any way dilute a restricted waste or the residual from treatment of a restricted waste as a substitute for adequate treatment to achieve compliance with Subpart D of this part, to circumvent the effective date of a prohibition in Subpart C of this part, or to otherwise avoid a prohibition in Subpart C of this part.

4. In § 268.4, paragraph (a)(2) is revised and paragraph (b) is added to read as follows:

§ 268.4 Treatment surface impoundment exemption.

(a) * * *

(2) The residues of the treatment are analyzed, as specified in § 268.7, to determine if they meet the applicable treatment standards in Subpart D of this part, or, where no treatment standards have been established for the waste, the applicable prohibition levels specified in Subpart C of this part. The sampling method, specified in the waste analysis plan under § 264.13 or § 265.13, must be designed such that representative samples of the sludge and the supernatant are tested separately rather than mixed to form homogeneous samples. The treatment residues (including any liquid waste) that do not meet the treatment standards promulgated under Subpart D of this part, or the applicable prohibition levels promulgated under Subpart C of this part (where no treatment standards have been established), or which are not delisted under § 260.22 of this chapter, must be removed at least annually. These residues may not be placed in any other surface impoundment for subsequent management. If the volume of liquid flowing through the impoundment or series of impoundments annually is greater than the volume to the impoundment or impoundments, this flow-through constitutes removal of the supernatant for the purpose of this requirement. The procedures and

schedule for the sampling of impoundment contents, the analysis of test data, and the annual removal of residue which does not meet the Subpart D treatment standards, or Subpart C prohibition levels where no treatment standards have been established, must be specified in the facility's waste analysis plan as required under § 264.13 or § 265.13 of this chapter.

(b) Evaporation of hazardous constituents is not considered treatment for purposes of an exemption under this section.

5. In § 268.5, paragraph (a)(2) is revised to read as follows:

§ 268.5 Procedures for case-by-case extensions to an effective date.

(a) * * *

(2) He has entered into a binding contractual commitment to construct or otherwise provide alternative treatment, recovery (e.g., recycling), or disposal capacity that meets the treatment standards specified in Subpart D or, where treatment standards have not been specified, such disposal capacity is protective of human health and the environment.

Subpart C—Prohibitions on Land Disposal

6. In Subpart C, § 268.32 is added to read as follows:

§ 268.32 Waste specific prohibitions—California list wastes.

(a) Effective July 8, 1987, the following liquid hazardous wastes are prohibited from land disposal (except in injection wells):

(1) Liquid hazardous wastes, including free liquids associated with any solid or sludge, containing cyanides at concentrations greater than or equal to 1,000 mg/l;

(2) Liquid hazardous wastes, including free liquids associated with any solid or sludge, containing the following metals (or elements) or compounds of these metals (or elements) at concentrations greater than or equal to those specified below:

(i) Arsenic and/or compounds (as As) 500 mg/l;

(ii) Cadmium and/or compounds (as Cd) 100 mg/l;

(iii) Chromium (VI and/or compounds (as Cr VI)) 500 mg/l;

(iv) Lead and/or compounds (as Pb) 500 mg/l;

(v) Mercury and/or compounds (as Hg) 20 mg/l;

(vi) Nickel and/or compounds (as Ni) 134 mg/l;

(vii) Selenium and/or compounds (as Se) 100 mg/l; and

(viii) Thallium and/or compounds (as Tl) 130 mg/l;

(3) Liquid hazardous wastes having a pH less than or equal to two (2.0); and

(4) Liquid hazardous wastes containing halogenated organic compounds in total concentration greater than or equal to 1,000 mg/kg but less than 1%.

(b) The requirements of paragraph (a) of this section do not apply if:

(1) The wastes are treated to meet the standards of Subpart D of this part; or

(2) The wastes are disposed at a facility that has been granted a petition under § 268.6; or

(3) An extension has been granted under § 268.5; or

(4) The wastes are treated in surface impoundments pursuant to § 268.4.

(c) The requirements of paragraph (a) of this section do not apply until November 8, 1988 where the wastes are contaminated soil or debris resulting from a response action taken under section 104 or 106 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 or a corrective action required under RCRA Subtitle C.

(d) Effective July 8, 1989, the following wastes are prohibited from land disposal (subject to any regulations promulgated with respect to disposal in injection wells):

(1) Liquid hazardous wastes containing polychlorinated biphenyls at concentrations greater than or equal to 50 ppm;

(2) Non-liquid hazardous wastes containing halogenated organic compounds in total concentration greater than or equal to 1,000 mg/kg;

(3) Liquid hazardous wastes containing halogenated organic compounds in total concentration greater than or equal to 1%.

(e) The requirements of paragraph (d) of this section do not apply if:

(1) The wastes are treated to meet the standards of Subpart D of this part; or

(2) The wastes are disposed at a facility that has been granted a petition under § 268.6; or

(3) An extension has been granted under § 268.5; or

(4) The wastes are treated in surface impoundments pursuant to § 268.4.

(f) To determine whether or not the waste is a liquid under paragraphs (a) or (d) of this section, the following test must be used: Method 9095 (Paint Filter Liquids Test) as described in "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods," EPA

Publication No. SW-846 (incorporated by reference, see § 260.11(a)).

Subpart D—Treatment Standards

7. Section 268.42 is amended by adding paragraphs (a)(1) and (a)(2) and by revising paragraph (b) to read as follows:

§ 268.42 Treatment standards expressed as specified technologies.

(a) * * *

(1) Liquid hazardous wastes containing polychlorinated biphenyls (PCBs) at concentrations greater than or equal to 50 ppm but less than 500 ppm must be incinerated in accordance with the technical requirements of 40 CFR 761.70 or burned in high efficiency boilers in accordance with the technical requirements of 40 CFR 761.60. Liquid hazardous wastes containing polychlorinated biphenyls (PCBs) at concentrations greater than or equal to 500 ppm must be incinerated in accordance with the technical requirements of 40 CFR 761.70.

(2) Non-liquid hazardous wastes containing halogenated organic compounds (HOCs) in total concentration greater than or equal to 1,000 mg/kg and liquid hazardous wastes containing HOCs in total concentration greater than or equal to 1% must be incinerated in accordance with the requirements of § 264.343 or § 265.343.

(b) The applicant must submit information demonstrating that his treatment method is in compliance with all federal, state, and local requirements and will not present an unreasonable risk to human health or the environment. The applicant must submit information demonstrating that his treatment method will not present an unreasonable risk to human health or the environment. On the basis of such information and any other available information, the Administrator may approve the use of the alternative treatment method if he finds that the alternative treatment method provides a level of performance equivalent to that achieved by methods specified in paragraph (a) of this section. Any approval must be stated in writing and may contain such provisions and conditions as the Administrator deems appropriate. The person to whom such certification is issued must comply with all limitations contained in such a determination.

8. 40 CFR 268.43 is added to read as follows:

§ 268.43 Treatment standards expressed as waste concentrations.

(a) Liquid hazardous wastes having a pH less than or equal to two (2.0) must

be treated in order to raise the pH of the waste to a level above two (2.0).

(b) [Reserved]

PART 270—EPA-ADMINISTERED PERMIT PROGRAMS: THE HAZARDOUS WASTE PERMIT PROGRAM

1. The authority citation of Part 270 continues to read as follows:

Authority: Secs. 1008, 2002, 3005, 3007, 3019, and 7004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6905, 6912, 6925, 6927, 6939 and 6974).

Subpart D—Changes to Permits

2. In § 270.42, paragraph (p) is added to read as follows:

§ 270.42 Minor modifications of permits.

* * * * *

(p) Allow changes at a permitted facility to treat or store in containers or tanks hazardous wastes subject to land disposal restrictions imposed by Part 268, provided that the permittee: requests a major permit modification pursuant to § 124.5 and § 270.41; demonstrates in the major permit modification request that the treatment or storage is necessary to comply with the land disposal restrictions of Part 268; and ensures that the added units comply with the applicable Part 264 standards pending final administrative disposition of the major permit modification request. The authorization to make changes conferred herein shall terminate upon final administrative disposition of the permittee's major modification request under § 270.41 or termination of the permit under § 270.43.

Subpart G—Interim Status

3. In § 270.72, paragraph (e) is revised to read as follows:

§ 270.72 Changes during Interim status.

* * * * *

(e) In no event shall changes be made to an HWM facility during interim status which amount to reconstruction of the facility. Reconstruction occurs when the capital investment in the changes to the facility exceeds fifty percent of the capital cost of a comparable entirely new HWM facility. Changes prohibited under this paragraph do not include changes to treat or store in containers or tanks hazardous wastes subject to land disposal restrictions imposed under Part 268, provided that such changes are made solely for the purpose of complying with Part 268.

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