ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 261, 264, 265, 270, and 775

[SWN-FRL 2701-3]

Hazardous Waste Management System; Dioxin-Containing Wastes

AGENCY: Environmental Protection Agency.

ACTION: Final rule.

SUMMARY: The Environmental Protection Agency (EPA) is today amending the regulations for hazardous waste management under the Resource Conservation and Recovery Act (RCRA), by listing as hazardous wastes certain wastes containing particular chlorinated dioxins, -dibenzofurans, and -phenols, and by specifying management standards for these wastes. These wastes are being listed as acute hazardous wastes. Because of this action, we are removing several commercial chemical products from the list of hazardous wastes contained in 40 CFR 261.33, since these listings are duplicative. For the same reason, EPA is revoking the regulation concerning the disposal of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD)-contaminated wastes under the Toxic Substances Control Act (TSCA) when the regulation under RCRA becomes effective. The effect of this rule will be to subject these dioxin-containing wastes to the hazardous waste regulations issued under RCRA.

DATES: *Effective date:* The RCRA hazardous waste regulation becomes effective on July 15, 1985 while the TSCA rule concerning the disposal of TCDD-contaminated wastes is revoked on July 15, 1985.

Compliance dates: All persons (including those who have previously notified the Agency under Section 3010 of RCRA) who generate, transport, treat, store, or dispose of the wastes listed today are required to notify EPA or a State authorized by EPA to operate the hazardous waste program of their activities under Section 3010 no later than April 15, 1985. Notification instructions are set forth in 45 FR 12746 (February 26, 1980).[1]

All existing hazardous waste management facilities (as defined in 40 CFR 270.2) which treat, store, or dispose of wastes listed in these regulations and which qualify to manage these wastes under interim status under Section 3005(e) of RCRA must file with EPA or a State authorized by EPA to operate the hazardous waste program a notification by April 15, 1985 and a Part A permit application by July 15, 1985. Facilities which have already qualified for interim status will not be allowed to manage the wastes listed in these regulations after July 15, 1985 unless: (1) The regulation allows them to handle such wastes under interim status, (2) they file a notification with EPA or an authorized State by April 15, 1985 and (3) they submit an amended Part A permit application with EPA or an authorized State by July 15, 1985 (see 40 CFR 270.10(g)).

ADDRESSES: Public Docket: The public docket for 40 CFR Parts 261, 264, 265, and 270 is located in Room S-212A, U.S. Environmental Protection Agency, 401 M Street SW., Washington, D.C. 20460, and is available for viewing from 9:00 a.m. to 4:00 p.m., Monday through Friday, excluding holidays.

The public docket for 40 CFR Part 775 is located in Room E-107 at the same address, and is available for viewing during the same hours.

FOR FURTHER INFORMATION CONTACT: RCRA Hotline, toll-free at (800) 424-9346 or (202) 382-3000. For technical information contact: Dr. Judith S. Bellin, Office of Solid Waste (WH-562B), Environmental Protection Agency, 401 M Street SW., Washington, D.C. 20460, (202) 382-4787.

SUPPLEMENTARY INFORMATION:

---

[1] Under the Solid Waste Disposal Amendments of 1980 (Pub. L. 96-452 (October 21, 1980)). EPA was given the option of waiving the notification requirement under Section 3010 of RCRA, following revision of the Section 3001 regulations, at the discretion of the Administrator. In this instance, we believe that all persons handling or managing these wastes need to notify the Agency because of the extreme toxicity of these wastes. Therefore, *all* persons, including those individuals who have previoulsy notified EPA that they generate or handle other hazardous wastes, must notify EPA that they are generating or handling these dioxin-containing wastes.

I. Background

On April 4, 1983, EPA proposed to amend the regulations for hazardous waste management under RCRA by listing as acute hazardous wastes[2] certain wastes containing particular chlorinated dioxins, -dibenzofurans, and -phenols, and by specifying certain management standards for these wastes (see 48 FR 14514–14529). Some of these materials already are hazardous wastes under 40 CFR 261.33(f), a provision which lists discarded commercial grade, technical grade, off-specification products, and discarded formulations when the toxicant is present as the sole active ingredient. Since we proposed to list these wastes as acute hazardous wastes, we also proposed to delete several commercial chemical products (i.e., EPA Hazardous Waste Nos. U212, U230, U231, U232, U233, and U242) from the list of hazardous wastes contained in 40 CFR 261.33(f) in order to avoid listing the same waste under two different (and inconsistent) provisions. Finally, EPA proposed to revoke its regulation concerning the disposal of 2,3,7,8–TCDD contaminated wastes under TSCA when the RCRA regulation becomes effective.

EPA requested comments on all aspects of the proposed regulation. The agency has evaluated these comments and has accordingly modified the regulations as well as the supporting documentation. This notice finalizes the regulation proposed on April 4, 1983, and outlines EPA's response to many of the comments received on that proposal. (The Agency's response to the other comments are set forth in the revised Background Document for this listing.) The Agency also notes that the proposed regulation was validated by Congress in the Hazardous and Solid Waste Amendments of 1984 (HSWA). In particular, the bill requires EPA to finalize the "dioxin-containing hazardous waste numbered FO20, FO21, FO22, and FO23 (as referred to in the proposed rule published by the Administrator in the **Federal Register** on April 4, 1983)" within six months of the bills enactment (Section 222(a)). In addition, Section 201(e) of the law requires EPA to consider prohibiting the land disposal of the proposed listings. (The prohibition on land disposal is rebuttable under certain circumstances.)

II. Summary of the Regulation[3]

This regulation designates as RCRA acute hazardous wastes process wastes from the manufacturing use of tetra-, penta-, or hexachlorobenzenes under alkaline conditions; wastes from the production and manufacturing use of tri-, tetra-, and pentachloro-phenols and their chlorophenoxy derivatives;[4] and discarded unused formulations containing tri-, tetra-, and pentachlorophenols or formulations containing compounds derived from these chlorophenols. Also listed are wastes that are generated in the course of a manufacturing process performed on equipment previously used for such operations, except where the equipment was used only for the manufacture or formulation of pentachlorphenol (PCP) or its derivatives. The wastes covered by this rule include reactor residues, still bottoms, brines, spent filter aids, spent carbon from product purification, and sludges from wastewater treatment, but do not include untreated wastewater or spent carbon from hydrogen chloride purification.

As a consequence, these wastes will all be subject to the 1 kg per month small quantity generator exclusion limit. See 40 CFR 261.5(e) and 261.30(d). Residues in containers that contain these listed wastes are also regulated under subtitle C of RCRA, unless the container has been triple-rinsed using a solvent capable of removing the waste, or the container has been otherwise cleaned by a method that thas been shown to achieve equivalent removal. See § 261.7(b)(3)[5] In addition, soils contaminated with these wastes are also regulated since soils contaminated by hazardous wastes spills are defined as being in the RCRA system.

These wastes also will be subject to special standards when land disposed, incinerated, or stored. Since these wastes will now be subject to regulation under RCRA, we are also revoking the TSCA dioxin rule.

III. Wastes Subject to This Regulation

EPA proposed to list as acute hazardous wastes process wastes from the manufacture of tetra-, penta-, or hexachlorobenzenes under alkaline conditions; wastes from the production and manufacturing use of tri-, tetra-, or pentachlorophenols and their chlorophenoxy derivatives; and discarded unused formulations containing tri-, tetra-, and pentachlorophenols or formulations containing compounds derived from these chlorophenols. We also proposed to list wastes resulting from the production of materials on equipment previously used for such operations. This section of the preamble discusses the comments received on the listing of these wastes as acute hazardous wastes, as well as our response.

A. Wastes Containing Tetra- and Pentachloro-dibenzo-p-dioxins and -dibenzofurans

In listing these wastes as acute hazardous wastes, EPA relied principally upon the presence, in significant concentrations, of CDDs and CDFs in the wastes, and to a lesser extent on the presence of certain chlorophenols and chlorobenzenes. The CDDs and CDFs are, for certain animal species, the most potent man-made toxicants known. These wastes also have been associated with some of the most serious hazardous waste damage incidents known, including those at Love Canal (NY), and at Times Beach (MO).

The levels of TCDD in these wastes are of concern in terms of the potential for serious harm to human health if they are released to water or air, either in soluble form or adsorbed to soil particulates. Based on its carcinogenic potential, the Water Quality Criterion for 2,3,7,8-TCDD is 10^{-8}-10^{-7} ppb (U.S. EPA, 1978b). This value is a very small fraction (about 10^{-12}) of the concentration of TCDDs in the listed wastes.

---

[2] The RCRA definition of acute hazardous waste is set forth at 40 CFR 261.11(a)(2). Under that definition, a material is not necessarily "acutely toxic" in the way that term is used by toxicologists. Rather, the term is intended by EPA to identify wastes that are so hazardous that they may, either through acute or chronic exposure "cause, or significantly contribute to an increase in serious irreversible, or incapacitating reversible illness" regardless of how they are managed. Wastes with particularly low LD50 or LC50 toxicities, or wastes containing substantial concentrations of potent carcinogens, are the most likely candidates for listing as acute hazardous wastes (see 45 *FR* 33106–33107, May 19, 1980).

[3] The following acronyms and definitions are used in this document (and in the Background Document for this regulation):

PCDDs = all isomers of all chlorinated dibenzo-*p*-dioxins.

PCDFs = all isomers of all chlorinated dibenzofurans.

CDDs and CDFs = all isomers of the tera-, penta-, and hexacholoro-dibenzo-*p*-dioxins and -dibenzofurans, respectively.

TCDDs and TCDFs = all isomers of the tetrachlorodibenzo-*p*-dioxins and -dibenzofurans, respectively.

TCDD and TCDF = the respective 2,3,7,8,-isomers.

The prefixes D, Tr, T, Pe, and Hx denote the di-, tri-, tetra-, penta-, and hexachlorodioxin and -dibenzofuran congeners, respectively.

[4] The proposed regulation specified these derivatives as the chlorophenoxy acids, esters, and amine salts, but omitted reference to ether derivatives and other (e.g., alkaline) salts. This inadvertent omission is rectified in the final regulation.

[5] If the container is cleaned, the container would be considered empty and no longer subject to regulation. However, the rinsate that is generated would be an acute hazardous waste, and, thus, subject to regulation. See 45 *FR* at 78528 (November 25, 1980).

Commenters did not seriously challenge that production wastes containing TCDDs and TCDFs were properly listed. We therefore are adopting these listings as final today. Challenges to EPA's decision to list wastes generated on equipment previously used to produce wastes containing TCDDs and TCDFs are discussed in Section C. of this section of the preamble.

Several respondents, however, did comment on EPA's use of structure/activity relationships in its decision to list all CDDs and CDFs as toxicants of concern, stating that it is not scientifically valid to consider all the CDDs and CDFs as having the same toxicologic properties, and that there are species-specific exceptions to the correlations cited between biochemical endpoints and toxicity. Several commenters also suggested that EPA's reliance on the case of *EDF* v. *EPA* (598 F.2d 62 (D.C. Cir., 1978)), cited in partial support for EPA's determination, is incorrect. The commenters stated that the court's determination in the case of *EDF* v. *EPA* (which involved polychlorinated biphenyls) (PCBs) allowed EPA to infer toxicity based on structure-activity relationships because the congeneric composition of the PCB mixture was not known, and because the toxic characteristic of all the congeners was not known.

EPA agrees with the commenters that there is considerable variation in the acute and chronic toxicity, as well as in the biochemical activity of the various CDD and CDF congeners and isomers. We alluded to these differences in the preamble to the proposal. See 48 *FR* 14515, April 4, 1983. In addition, these differences were noted both in the background document and in the health and environmental effects profiles. However, we continue to judge that, because most of the isomers of the listed CDDs and CDFs are very toxic, albeit to different degrees, and because the Agency believes that most of these wastes contain a certain percentage of the most toxic (TCDD) component, it is appropriate and permissible to rely, in part, on the known structure/activity relationships to establish the potential toxicity of these wastes.[6]

It should also be noted that the Agency is not evaluating the toxicity of the HxCDD and HxCDF congeners—the chlorinated dioxins and -dibenzofurans most prevalent in wastes from PCP production and manufacturing use—solely by reference to structural similarity with TCDD and TCDF. Rather, we have made an independent assessment of the toxicity of the HxCDDs, and believe that they are also very potent carcinogens, albeit less potent than TCDD. We are, however, relying on structure/activity relationships in stating that all forms of HxCDDs and HxCDFs are constitutents of concern.

B. Pentachlorophenol (PCP) Manufacturing Wastes

1. *Standards for Determining if Wastes Are Acute Hazardous Wastes*

Before challenging the Agency's substantive determinations, some commenters argued that EPA does not have the authority to regulate the designated wastes as acute hazardous wastes under 40 CFR 261.31. In particular, these commenters argue that the criteria cited in the regulation for listing acute hazardous waste (see 40 CFR 261.11(a)(2)) allows EPA to classify as acute hazardous wastes only those wastes which meet *all* of the criteria set forth, and that the criterion that such a waste be "capable of causing or significantly contributing to an increase in serious irreversible, or incapacitating reversible illness" is impermissibly vague.

We believe that the commenters have misinterpreted the cited regulation. The regulation (40 CFR 261.11(a)(2)) clearly states that a waste is considered to be an acute hazardous waste if its acute toxicity meets the criteria for acute lethality as defined in 40 CFR 261.11(a)(2), *or* if it can cause or contribute to serious irreversible illness. The regulations do not state that an acute hazardous waste must meet *all* of the listed criteria; the conjunction "or" is employed. As to the lack of definitiveness of the qualitative criterion, the regulation quotes the statutory standard verbatim. No one has challenged the statutory provision (Section 1004(5)(A)) as impermissibly vague, nor did we receive any comments on this criteria during the comment period following the promulgation of § 261.11(a)(2) on May 19, 1980. Furthermore, in the preamble to that regulation, EPA stated its intent to apply this standard to wastes "containing substantial concentrations of potent carcinogens . . ." (See 45 *FR* 33107). TCDD and several HxCDDs are among the most potent carcinogens tested in rodents, and are present in these wastes in substantial concentrations. We therefore believe that neither the statute nor the regulations are impermissibly vague, and that we have fully articulated the reasons for our conclusion that these wastes meet the criterion for listing as acute hazardous wastes.

2. Whether Wastes From the Production and Manufacturing Use of Pentachlorophenol (PCP) Should Be Classified as Acute Hazardous Wastes

EPA proposed to list wastes from the production and manufacturing use of PCP, discarded unused formulations containing PCP, and wastes from equipment previously used for the production or manufacturing use of PCP as acute hazardous waste. Generators of these wastes questioned whether the wastes should be classified as acute hazardous wastes. They argued that these wastes do not contain the most toxic dioxin or dibezofuran congener (2,3,7,8-TCDD or TCDF), and went on to argue that the dioxin congeners they do contain—HxCDDs—are not carcinogenic or otherwise toxic enough to justify the acute hazardous waste classification. They also maintained that there are no other reasons to justify listing these wastes as acute hazardous wastes.

As already explained, wastes are listed as acute hazardous waste under the criteria for listing contained in 40 CFR § 261.11(a)(2). The principal basis for listing the PCP wastes as acute hazardous wastes is the presence of substantial concentrations of HxCDDs and HxCDFs, and of PCP, which has potential chronic systemic effects.[7] [8] While TCDDs are very rarely found in PCP or in wastes resulting from the production or manufacturing use of PCP (Buser and Bosshardt (1976) reported 0.50–0.25 ppm of an unidentified "TCDD" isomer), HxCDD concentrations range from 1–39 ppm (USEPA, 1981a; Miles et al., 1984). In addition, an isomer-specific analysis determined that the carcinogenic 1,2,3,6,7,8-HxCDD constitutes about 20–60% of the HxCDDs present (USEPA, 1978; Miles et al., 1984). Moreover, PCP contains about 0.12 ppm each of TCDFs and PeCDFs, and from 9–99 ppm of

---

[6] We also believe that the identification of individual isomers in the waste (*i.e.*, analyze the waste for the specific dioxin and dibenzofuran isomers) would be quite costly and unnecessary because of the toxic nature of the dioxin and dibenzofuran isomers.

[7] Fetotoxic and teratogenic effects (statistically significant skeletal and soft tissue anomalies, fetal growth retardation, and increased embryonic resorptions) have been reported in rats exposed to commercial and purified PCP (USEPA, 1981a).

[8] These wastes also contain hexachlorobenzene (HCB), a compound identified by the Agency's Carcinogen Assessment Group as a potential human carcinogen. Because the Agency has no data on the concentration of HCB in these manufacturing wastes, HCB is not at this time cited as a toxicant of concern (Appendix VII constituent). If data warrant, these listings may accordingly be amended.

HxCDFs (USEPA, 1978). As discussed below (Section III. B. 3.), these levels are of regulatory concern.

Several commenters disputed EPA's determination that the two HxCDDs are carcinogenic. They submitted an expert's review of the bioassay conducted by the National Cancer Institute (NCI) of a mixture of two HxCDDs (Squire, 1983).[9] The expert reviewer reported a lower incidence of neoplastic nodules in female rats than that reported by NCI (and originally accepted by EPA). He evaluated several of the lesions diagnosed as tumors by NCI as non-neoplastic regenerative nodules, but concluded that there is "equivocal" evidence that these HxCDDs are potential human carcinogens.

As a result of these comments, scientists from EPA's Carcinogen Assessment Group (CAG) and the National Toxicology Program (NTP) have reviewed both the reviewing expert's comments and the underlying data (histology slides) gathered in the original NCI study. Their re-evaluation confirms the original conclusion that there is sufficient evidence that the mixture of HxCDDs studied by NCI is carcinogenic as indicated by a statistically significant increased incidence of liver tumors in female rats and in mice of both sexes (Haberman and Bayard, 1984; Hildebrandt, 1983, McGaughy, 1984). This review led EPA to estimate that the carcinogenic potency of the two HxCDD isomers ranged from 0.59 (male rat) to 11 (male mouse) per μg/kg/day. The CAG recommended that 6.2 per μg/kg/day, derived from hepatocellular carcinoma and adenoma data in the male mice and female rats (the test systems in which the response was most strongly evident) be used as the best estimate of the upper limit potency estimate for HxCDD (McGaughy, 1984).

Even the lowest of these estimates, however, makes HxCDD one of the most potent carcinogens identified by the Agency. For example, this mixture of HxCDDs, although about 1/25 as potent as TCDD, is as potent a carcinogen as Aflatoxin B_1 (a well recognized potent carcinogen), and is about a thousand times more potent than ethylene dibromide (EDB).

Commenters also submitted an epidemiologic study of the effects of several chemical preservatives, including PCP, on the health of woodworkers, as evidence that no deleterious health effects can be ascribed to these chemicals (AWPI, 1983).[10] EPA reviewed this study, and notes that it has severe limitations (Erdreich, 1983; Ris, 1983). First, a cross-sectional study design is not a suitable method for detecting a cancer effect, because in such a study persons with cancer who are currently employed are not likely to be identified as having the disease. In addition, other deficiencies were pointed out, *viz.*, small sample size; insufficient follow-up period following the onset of exposure; and lack of exposure definition. EPA, therefore, concludes that the submitted epidemiological study is not adequate for assessing the presence or absence of a cancer risk or other health effects in wood treaters exposed to PCP (Erdreich, 1983; Ris, 1983). In addition, reports have been accumulating in the open literature which indicate that workers in occupations associated with PCP exposure are at increased risk of nasal and nasopharyngeal cancer, stomach cancer, and non-Hodgkins lymphoma (Grufferman et al., 1976; Bishop and Jones, 1981; Hardell et al., 1982; Gallagher and Threlfall, 1984). Since these are reports of studies of occupational exposure, it is of course unclear whether the etiologic agent is PCP or its associated CDD or CDF impurities. However, these reports reinforce EPA's decision regarding the capability of these wastes to cause or contribute to serious irreversible, or incapacitating reversible, illness.

Several commenters also suggested that the toxicity of HxCDDs at the levels found in PCP are not of regulatory concern. The commenters argue that, because the amount of HxCDDs which, they estimate, is contained in the median rat lethal dose of PCP is less than the teratogenic lowest observed effect level (LOEL) noted for HxCDDs, EPA should be more concerned with the acute toxicity of PCP than with the chronic toxic effects of its HxCDD contaminants. They further state that no increased risk of oncogenicity will result from HxCDD exposure resulting from exposure to PCP at its NOEL for reproductive effects.

EPA disagrees with these statements. When we consider cancer, daily exposure even at one hundredth of the LD_{50} of PCP containing 15 ppm of HxCDDs would result in exposure to 18 ng HxCDD/kg/day.[11] Lifetime exposure at this level could entail a potential excess cancer risk as high as one in a hundred. With respect to reproductive toxicity, the Allowable Daily Intake (ADI) is estimated as one hundredth (NAS, 1977) of the reproductive NOEL, or 1 ng HxCDD/kg/day. Someone exposed to a dose approaching the median LD_{50} established in the rat (120 mg PCP/kg/day) therefore would receive a dose 1800 [12] times larger than the ADI anticipated for the reproductive effects of HxCDD. Therefore, the reproductive effects of HxCDD potentially occur at doses three orders of magnitude lower than those at which the lethal effects of PCP are expected.

Additionally, the levels of HxCDDs in PCP wastes are of concern in terms of the potential for serious harm if they are released to water or air, either in soluble form, or absorbed to soil particulates. Based on its carcinogenic potential, the Water Quality Criterion for 2,3,7,8-TCDD has been set as $10^{-8} - 10^{-7}$ μg/l (USEPA, 1984b). Since a mixture of two HxCDDs is about 4% as potent a carcinogen as TCDD (McGaughy, 1984), and because the water solubility, soil sorption characteristics, and bioaccumulation potential of HxCDDs and TCDD are very similar (see Background Document for this listing), an appropriate estimate for a similar criterion for HxCDDs is about 25 times as large as that for TCDD, *viz.*, 10^{-7}–10^{-6} μg/l. This value is a minuscule fraction (10^{-10}) of the concentration of HxCDDs in the PCP wastes.

We therefore conclude that the potential toxicity of HxCDDs at the levels found in PCP are of regulatory concern and that these wastes contain significant concentrations of potent carcinogens. These wastes therefore meet the criteria of 40 CFR 261.11(a)(2), justifying the listing of these wastes as acute hazardous wastes.

3. Toxicity of PCP as a Measure of the Wastes' Toxicity

One commenter noted that PCP, which is contaminated with carcinogenic HxCDDs, was not carcinogenic in several bioassays, and therefore questioned the Agency's conclusion that the two HxCDDs are potential human carcinogens.

We do not believe that the PCP bioassays are adequate to support a conclusion concerning the potential carcinogencity of PCP and HxCDD-containing wastes. The carcinogenic risk

---

[9] This review was submitted well after the close of the comment period, but the Agency chose to consider it as part of the rulemaking record.

[10] This review also was submitted well after the close of the public comment period, but the Agency again chose to consider it as part of the rulemaking record.

[11] 1/100 × LD50 × 15 ppm HxCDD/PCP × 1/body weight = 10^{-2} × 120 mg PCP/kg/day × (15 × 10^{-6} mg HxCDD/mg/PCP) × 10^6 ng/mg = 18 ng HxCDD/kg/d = 0.018 μg HxCDD/kg/day.

[12] Exposure/ADI = (15×10^{-6} mg HxCDD/mg PCP ×120 mg PCP/kg/d × 106 ng/mg) / 1 ng HxCDD/kg/day = 1800.

of PCP containing ppm concentrations of HxCDD is not expected to give positive results at the dosages used in these bioassays. At the lowest dose used in the HxCDD oral bioassay (1.25 ug HxCDD/kg/day), tumor rates of 0 and 20% were noted in groups of 50 female and male Osborne Mendel rats (USDHHS, 1980). For a dose of 0.3 ug HxCDD/kg/day (the amount of HxCDD contained in the *highest* PCP dose used in the PCP study) a 0–5% response rate would be expected in the same rat strain. This rate is far too low for reliable detection. Moreover, the two best PCP bioassays (USDHHS, 1980 and Schwetz, 1978) were conducted in rats of different strains, that may differ in response. A review of these and other PCP bioassays also noted procedural deficiencies, such as an inadequate observation period, the use of only one animal species per test, and inadequate numbers of animals (Williams, 1982). Therefore, we believe that these studies do not permit a conclusion as to the potential carcinogencity of PCP. In addition, as outlined above, there are several reports showing increased cancer risk (of unknown etiology) in occupations associated with PCP exposure. Moreover, the fact that HxCDDs are potential human carcinogens of very high potency renders them of great regulatory concern.

We therefore conclude that, because these wastes contain the potent carcinogen HxCDD at levels of regulatory concern, they meet the criteria of 40 CFR 261.11(a)(2), and are properly listed as acute hazardous wastes.

4. Changing the Regulatory Status of Discarded PCP Formulations

Several respondents commented that EPA does not have the authority to regulate tetra- and pentachlorophenol containing wastes as acute hazardous wastes. These persons called attention to prior RCRA rulemaking involving these compounds.

More specifically, in the hazardous waste regulations published on May 19, 1980, PCP was listed as an acute hazardous waste (§ 261.33(e)) because the Agency was under the mistaken impression that its oral LD50 in the rat was less than 50 mg/kg. When this error was pointed out, the Agency's determination was rectified, and PCP was listed as a hazardous waste under § 261.33(f) (see 45 *FR* 78533, November 25, 1980). However, EPA's evaluation considered only the acute oral toxicity of PCP, and did not consider its known contamination with CDDS and CDFs. It would not be in the best interests of the public if EPA allowed a previous determination to go unaltered when additional data show that prior rulemaking was in error. Thus, the regulatory classification of PCP was initially rectified when data seemed to warrant it. In the current regulation, that status is once more changed, because reconsideration of additional data warrant such action.

5. Alternative Basis for Establishing a 1 kg per Month Small Quantity Generator (SQG) Exclusion Limit

In response to the arguments that these wastes are not acute hazardous wastes, we note that we also have an alternative (and independent) justification for a small quantity generator limitation of 1 kg per month for these (PCP) wastes. Under § 261.11(c) of these regulations, EPA may consider the criteria for listing contained in § 261.11 (a)(2) and (a)(3) of the regulations to establish small quantity generator limitations for particular wastes that are lower than 1000 kg per month. EPA will do this where "the general exclusion limits of 1000 kg per month is insufficient to protect human health or the environment." (See Background Document to Section 261.11, May 19, 1980, at p. 60.) That situation is the case for these wastes. As explained in the preamble and the Background Document for the proposed rule, and restated here, these wastes contain significant concentrations of potent carcinogens, and high concentrations of other compounds (HxCDFs and PCP) that are also very toxic. These contaminants have proven to be mobile and persistent in the environment. There also have been many damage incidents involving PCP formulation wastes (see Background Document for this listing). For all these reasons, we believe that these wastes could (and have) cause(d) substantial harm to human health and the environment when managed at unregulated facilities, and that a 1000 kg per month SQG limit is inappropriate for these wastes. In order to ensure that these wastes will be managed at Subtitle C facilities, the appropriate exclusion limit established in the 40 CFR Part 261 regulations is 1 kg per month. This same reasoning applies, with equal force, to the other wastes covered by this listing. The legislative history of the newly enacted HSWA also states unequivocally that these wastes (*i.e.*, all of the wastes covered by the April 4 proposal) are not to be excluded from regulation by virtue of the small quantity generator exemption. See S. Rep. No. 98–284, 98th Cong. 2nd Sess. at 34.

We are making a conforming change to § 261.30(d) of the regulations to indicate that these wastes are subject to the 1 kg. per month small quantity generator limitation. (It should be noted, however, that we read § 261.30(d) as a provision for designating toxic as well as acute hazardous wastes as subject to the lower small quantity generator limits).

6. Regulation of Wastes from Equipment Previously Used in the Production or Manufacturing Use of PCP

Based on the arguments presented above, the commenters also believe that wastes from equipment previously used in the production or manufacture use of PCP should not be regulated as acute hazardous waste. Although we generally disagreed with the specific points of toxicology made by the commenters, we nevertheless have decided not to finalize this provision at this time. In reviewing our data base, we determined that, unlike wastes that are generated on equipment previously used in the production or manufacture use of tri- and tetrachlorophenols or their derivates, we have insufficient information on the concentration of HxCDDs and HxDCFs in wastes generated on equipment previously used in the production or manufacture use of PCP to determine whether these wastes contain HxCDDs and HxCDFs in sufficient concentrations to be regulated generically as acute hazardous or hazardous waste. As a result, EPA expects to further investigate the wastes that are generated on previously contaminated equipment; based on those findings, we will take appropriate regulatory action. In the meantime, these wastes may still be hazardous waste if they either exhibit one or more of the characteristics of hazardous waste, or if the waste is already listed (or contains a waste listed) in Subpart D of Part 261.

C. Wastes Generated on Equipment Previously Used in the Production and Manufacturing Use of Tri- and Tetrachlorophenols

Several respondents commented on EPA's proposal to regulate, as acute hazardous wastes, wastes resulting from manufacturing processes conducted on equipment previously used to produce tri- and tetrachlorophenols (proposed EPA Hazardous Waste No. F022). These wastes were listed based on sampling and analysis data which show that wastes generated on equipment previously used in the production and manufacturng use of tri- and tetrachlorophenols are contaminated with CDDs even after production shifts to other products; in many cases, these toxicants have been found to remain in the wastes years after production shifted. In addition, there is a history of environmental contamination resulting from these contaminated equipment wastes at such places as Verona, Missouri, to justify these regulations. Furthermore, there is precedent for listing these wastes in that some of them are currently regulated under 40 CFR Part 775, a regulation issued under Section 6 of the Toxic Substances Control Act (TSCA), based on a finding that unregulated disposal presents an unreasonable risk of injury to health or the environment.

Nevertheless, a number of commenters questioned the scope and practicality of the regulations and suggested several changes.

1. Scope of the Listing

(a) Several commenters felt that the proposed definition of EPA Hazardous Waste No. FO22 was broader than intended by EPA. In particular, they indicated that EPA Hazardous Waste No. FO21 refers only to the *manufacturing use* of certain chlorobenzenes under alkaline conditions, but does not cover the actual production of the compounds themselves. These commenters argue that the proposed listing of FO22 refers to wastes from the production of materials on equipment previously used for the *production or manufacturing use* of materials listed under FO20 and FO21. Thus, the commenters believe that there is an unintended inconsistency in the rules as proposed.

In reviewing these comments, we agree that the proposal erroneously read to include wastes generated on equipment once used to produce chlorobenzenes. Therefore, we have modified the listing to make it clear that the listing only applies to wastes from equipment used previously in the *manufacturing use* of designated chlorobenzenes (under alkaline conditions) (See new hazardous waste listing FO26.)

(b) One commenter argued that the effect of the contaminated equipment listing is extremely broad, and indicates that, while it is not explicitly stated, storage, treatment, and disposal facilities that have ever managed these chlorophenols and chlorobenzenes will be deemed to be part of the "equipment" used to manufacture these products, and thus, be covered under this listing. Consequently, they argue that all waste management facilities in this category would be shut down until full permit status is achieved.

We disagree with the point made by the commenter. As currently drafted, and as discussed in the supporting documentation, this listing applies and is only meant to apply to equipment used in the *actual* production or manufacturing use of the appropriate products (*i.e.*, reactor vessels, distillation columns, filtration equipment, etc.), and does not apply to equipment used by waste management facilities (*i.e.*, treatment, storage, and disposal facilities). The existing TSCA rule (40 CFR 775.183(g)) is likewise so limited. The commenter raises a valid point, however, that needs to be investigated to determine whether the listing should be expanded. EPA will, therefore, investigate the extent of dioxin contamination in wastes (*e.g.*, incineration residues) generated from waste management facilities that previously managed these dioxin wastes. However, until these investigations are completed and a decision is made, this listing will only apply to wastes generated on equipment used as part of the actual production process.

It has also been argued that like the wastes that are generated from manufacturing operations—namely, the production and manufacturing use of tri- and tetrachlorophenols—that have become contaminated from past production or use, the equipment on which these wastes were generated (*i.e.*, reactor vessels, product storage tanks, etc.) when they are taken from service and scrapped (rather than cleaned) should likewise be regulated under RCRA. In fact, extensive TCDD contamination at a scrap metal salvage facility in Newark (NJ) has been traced to the presence of scrapped reaction vessels which, it is thought, were once used for the production of 2,4,5-T. Scrap metal wipe samples, taken many years after the equipment has been scrapped, showed extensive contamination: 250 ng TCDD/m^2 at the surface of a large reaction vessel in the center of a waste pile. Soil adjacent to cut tanks contained about 3 ppm of TCDD, and low ppb concentrations were detected in surrounding properties (USEPA, 1984). Although situations such as these are of great concern to the Agency, we have decided not to list this equipment, even if discarded, as hazardous (or acute harzardous) waste at this time. EPA has very limited information to define, on a generic basis, *all* equipment which at one time was used to produce tri- or tetrachlorophenols as hazardous (or acute hazardous) waste under RCRA. However, as is the case for residues which are generated from waste management facilities, EPA plans to study the extent of environmental contamination from this equipment if it were discarded prior to decontamination. Once these investigations are completed, we will take the appropriate regulatory action.

(c) One commenter argued that the regulation regarding contaminated equipment waste should be limited to equipment used during the actual synthetic process and the subsequent purification procedures, since these wastes would tend to have the highest concentrations of CDDs and CDFs. The commenter also suggested that EPA should specifically exclude equipment used for subsequent handling of products in ways which are not expected to generate additional CCDs or CDFs.

We cannot agree that the listing should be limited in this way. While it is true that wastes generated on equipment used in synthesis or purification are expected to contain CDDs and CDFs in concentrations several orders of magnitude higher than in waste generated on equipment used only for formulation, (*i.e.*, several hundred ppm *vs.* several ppm), the latter levels are still of regulatory concern. Accordingly, EPA has decided that all wastes that are generated on equipment which has become contaminated from previous manufacturing operations must be managed as acute hazardous wastes, unless a delisting petition establishes that a particular waste is not of regulatory concern or should not be considered an acute hazardous waste.

2. Practicality of the Listing

Several commenters questioned the reasonableness of listing as hazardous, wastes that are generated on equipment that may, at any time in the past, have been used in processes generating CDDs or CDFs. They argued that such a listing is not necessary since current cleaning practices (*i.e.*, triple rinsing or other equivalent cleaning methods) will ensure that any wastes generated from such equipment will not be contaminated. They, therefore, suggest that a person be allowed to make such a demonstration. They believe that such a showing could be accomplished by demonstrating that the equipment has been adequately cleaned (*e.g.*, by vapor phase degreasing, solvent washing, etc.), or by testing the waste to determine if it contains significant concentrations of CDDs/CDFs. (The commenters, however, did not indicate how such a demonstration of adequate cleaning would be made, short of testing the waste.) One commenter felt, in any event, that after some time period during which the equipment has been in another use, the equipment should automatically be considered to no longer be contaminated with CDDs/CDFs. In particular, they suggested a reasonable time period would be three years, as it is common for industry to retain records for this time period.

EPA agrees that persons should be allowed to demonstrate that their waste is no longer contaminated with CDDs/CDFs. However, we believe the only way to make this showing is by testing the waste and submitting an exclusion petition (commonly referred to as "delisting") under 40 CFR 260.20 and 260.22. These procedures have been in use for several years, and we see no reason to set up a special set of procedures. There is no difference between a petition making such a demonstration for these wastes, and petitions to exclude any other waste from the hazardous waste regulations, or petitions to change the regulatory status of a waste from acute hazardous to hazardous.

We do not believe, however, that a showing of equipment cleanliness could easily be made by evaluating the concentration of CDDs and CDFs in equipment rinsate. Such a showing would be very difficult, if not impossible, to make without knowing a great deal of detail for each equipment train, such as its size and complexity, and the amount of rinsate that was used. Even knowing this information, however, may not suffice, because of the many factors that need to be considered to set a standard for CDD/CDF "cleanliness". For example, large equipment trains are difficult to rinse, and the concentration of CDDs and CDFs in the rinsate would depend in part on the amount of solvent used; compliance would therefore be difficult to determine.

In an effort to get additional information on this option, however, we requested the commenter (and several other industrial entities) to provide the Agency with data showing in what manner, and to what extent adequate decontamination of manufacturing equipment might be achieved and demonstrated. We did not obtain a response. Additionally, experience indicates that decontamination is, in fact, very difficult, even if strenuous attempts are made (see, for instance, Bleiberg, 1964; Goldmann, 1973; Dalderup, 1978; Fishbein, 1982; Sambeth, 1983).

We likewise do not believe that enough information is available to set a time period after which wastes that are generated on previously contaminated equipment should be deemed non-contaminated. Quite the opposite: recent sampling and analysis at a facility which used 2,4,5,-TCP almost eight years ago showed ppb concentrations of TCDD in still bottoms from 2,4-DCP manufacture (where the presence of 2,3,7,8,-TCDD in such concentrations is not expected, absent contamination from an outside source). We also requested further information from those commenters who made this last point (*i.e.*, set a time period after which the waste is no longer considered to be contaminated with CDD's/CDF's); however, no response was returned, indicating a lack of information to justify setting any time period at this time.

3. Economic Burden

Several commenters argued that this listing will result in economic hardship by requiring premature discarding of "contaminated" equipment, especially to those who prudently cleaned and are reusing the equipment. They believe that such a requirement bears no relationship to whether or not any contaminants may be present and would preclude the use of some very sophisticated and expensive equipment to establish the absence of hazards in wastes that they claim would present no risk.

We disagree with these comments. As discussed above, generators who have cleaned their equipment can show by analysis of their wastes, and a delisting petition, that their wastes do not contain the toxicants of concern at levels that are of regulatory concern. Generators also can dispose of the wastes generated on this equipment as acute hazardous wastes, rather than discarding the equipment (*i.e.*, nowhere in this regulation does the Agency require (or even suggest) that existing production equipment must be scrapped and discarded). In any case, a regulatory impact analysis conducted for this regulation (see Section IX. A. below) has convinced us that its economic burden will be modest. The details of this analysis are discussed in Section IX. of this preamble.

4. Historical Documentation

As part of the proposal, the Agency also solicited comments on the appropriate recordkeeping time periods and types of historical records that should be considered adequate for a showing that equipment was not used for processes generating CDDs/CDFs. Several commenters suggested that three to four years should be set as the typical document retention period. Otherwise, they argue, the approach will not have much utility, since most corporations will not have the records necessary to make the requisite showing. Regarding the types of records that should be considered adequate, they suggest that production process and product records would supply the necessary information.

In requesting comments in this area, EPA was concerned as to how a generator could legitimately know whether the equipment in question was previously used in these processes If records are kept for only three to four years, as claimed by the commenters, a generator could question how this regulation could be enforced, *i.e.*, will every generator be required to test their waste to determine whether it is contaminated with CDDs/CDFs if records are not available?

Upon re-evaluation of this point, we now believe this to be much less of a problem than originally thought. More specifically, as part of its preliminary investigations conducted as part of the dioxin strategy, EPA has identified most, if not all, of the manufacturers and formulators of tri- and tetrachlorophenols and their derivatives from the list of registrants who have notified the Agency, under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). In addition, the Agency, through its Regional Offices, has contacted many of these companies to verify the Agency's information.

Therefore, we believe that those companies who once made these products, and who still use the equipment, will most likely know that this regulation applies to them. The same is true for those who bought equipment from companies that produced or formulated tri- or tetrachlorophenols (or their derivatives), and who knew what type of equipment they bought (*i.e.*, these buyers know that this equipment is contaminated with CDDs and CDFs, and that the resultant wastes are regulated under RCRA). Therefore, the only group of persons who may not know that the wastes they are generating are regulated under these dioxin rules are those who unknowingly bought equipment used to produce or formulate tri-or tetrachlorophenols or their derivatives. This group of individuals may have difficulty in knowing that they are subject to the regulations. However, as indicated above, the Agency has been able to identify most, if not all, companies that produce or formulate these products.

Therefore, any person who suspects that he may have equipment that is contaminated with CDDs or CDFs should contact EPA for further information. In any event, this list will be useful for any person wishing verification that they are generating dioxin-contaminated wastes. It should also be noted that some of these persons should already be aware of this contamination, since they have been subject to the TSCA rule since May 1980.

D. Hexachlorophene Manufacturing Wastes

One commenter believes that EPA had approximately excluded wastes from the production on Hexachlorophene (HCP) synthesized from highly purified 2,4,5-TCP from the proposed FO20 listing,[13] but added that, because CDDs and CDFs are not generated in that process, HCP production and formulation wastes should similarly be exempted from the proposed FO22 and FO23 hazardous waste listings.

EPA agrees with the commenter that a similar exception is warranted in cases where such HCP is the only ingredient in the discarded formulation. The regulatory language has been changed to reflect this point. It should also be noted, however, that HCP is itself toxic. Therefore, we anticipate listing HCP manufacturing wastes and discarded formulations which contain HCP as hazardous wastes at some future date.

IV. Management Alternatives and Requirements

A. Land Disposal and Storage of These Wastes

The Agency proposed a degree of hazard approach for these wastes. In light of their inherent danger and previous poor management history, EPA proposed that these wastes be prohibited from being managed at most types of interim status facilities, and that land disposal be conducted pursuant to additional special standards implemented during the course of the permit proceeding. We also requested comment as to whether incinerators, and tank and container storage facilities should be subject to additional management standards when they manage these wastes. This section of the preamble describes the comments to these proposals, and the Agency's response and changes in approach made in response to comments.

We also note that all of these wastes are specifically identified as candidates for being banned from land disposal in two years under the HSWA (See RCRA amended Section 3004(e)). Thus, the following discussion describes an interim regulatory regime, insofar as it pertains to land disposal of these wastes.

1. Management of the Dioxin Wastes at Interim Status Facilities

a. *Prohibitions on Management.* Several comments related to EPA's decision prohibiting the management of CDD- and CDF-containing wastes at land disposal, incinerator, and open pile storage interim status facilities. Several commenters suggested that interim-status facilities that are properly equipped and managed (*i.e.*, that meet the Part 264 standards) should be allowed to manage these wastes. Other commenters suggested that the proposed rules should be changed to allow the incineration of dioxin wastes in interim status incinerators that have approval, under TSCA, to burn PCBs. This suggestion was put forth since the process of gaining fully permitted status under RCRA would take some time. The commenters, therefore, fear that the requirement in the proposed rule would lead to a shortage of available management capacity.

The Agency continues to believe that, for these wastes, management in fully permitted facilities is preferable due to the extreme toxicity of these wastes, the persistence of the toxicants of concern, and the wastes' mismanagement history.[14] At the same time, the Agency is concerned about possible shortages in short-term management capacity for these wastes. We thus reject the suggestion that these wastes should be prohibited from all interim status facilities. We believe that certain types of interim status storage facilities can provide adequate management in the short term. Other interim status facilities, we think, can be evaluated for compliance with the Part 264 standards without undue administrative complication, and so also should not be prohibited from managing these wastes.

We do not believe, however, that interim status land disposal facilities should be allowed to manage these wastes. (There is one exception, for interim status impoundments in which these wastes are generated.) Not only are the interim status standards insufficient to prevent an unreasonable risk (see 45 FR 32682), but it is very difficult to evaluate these facilities for compliance with the Part 264 standards in the absence of a permit proceeding, because, under today's rule, land disposal facilities must seek approval of a waste management plan.

The only interim status facilities that may accept these wastes are: (a) Impoundments holding wastewater treatment sludges that are created in those impoundments as part of the plant's wastewater treatment system, (b) waste piles that meet the requirements of § 264.250(c) (referred to in this preamble as "enclosed waste piles"), (c) tanks, (d) containers, (e) incinerators if certified, and (f) thermal treatment units subject to regulation under Subpart P of Part 265, if certified. (See next Section for more detailed discussion.) However, we believe it appropriate to discuss here the management of sludges in impoundments in which the waste was created.

For surface impoundments, the Agency has determined that this is a situation when a distinction between new and existing facilities may permissibly be drawn. (See RCRA Section 3004 and 48 FR 14519). If the Agency were to ban all interim status impoundments from managing these wastes, facilities generating wastewater treatment sludges in impoundments would have to build and receive a permit for new capacity before they could legally manage these wastes. As a practical matter, this would require halting the manufacturing process for some undetermined period of time. The short-term management of these sludges in interim status impoundments could be protective, since the CDDs and CDFs will adsorb to the sludges, and other mobilizing organics will be present in these wastes at low concentrations due to dilution and biological treatment (USEPA, 1982).[15] It should also be noted that these facilities also must obtain a Part 264 permit (which includes compliance with the waste management plan), so that management at these impoundments will be upgraded as part of the permitting process. This could

---

[13] EPA has re-examined its decision not to list these wastes as acute hazardous wastes, and has developed an engineering analysis for this process. (The document (which contains Confidential Business Information) is available in the docket for this rule making.) Based on this analysis, the Agency believes that wastes from the production of HCP synthesized from highly purified 2,4,5-TCP prepared by the usual route could contain TCDDs. However, since there are no present producers of HCP using this route, the wastes from HCP production are not listed. The Agency is aware of a new route of synthesis for 2,4,5-TCP during which no CDDs or CDFs are formed (CBI information).

[14] We are, however, allowing the residue resulting from the incineration or thermal treatment of dioxin-contaminated soil to go to interim status facilities. See Section VI.C for discussion.

[15] One facility, that used to produce PCP, estimated that process wastewater could contain various chlorophenols at <100 to >1000 ppm. However, these data are estimates submitted to the Agency, and were not verified by sampling and analysis. Because they differ greatly from sampling data at other facilities, they are judged to be too unreliable for use in the present context.

result, for example, in a requirement that the impoundment not be allowed to receive the wastes unless it is lined, if the permit writer concludes that there is potential for leaching from the impoundment. (See text at FN 20 below.) Thus, interim status impoundments in which these wastes are generated might not be able to continue receiving these wastes indefinitely. In addition, under the new legislation, within four years these impoundments must be upgraded to meet the technical permitting standards for new surface impoundments (subject to certain enumerated exceptions). See RCRA amended Section 3005(j). (These impoundments, however, will not be immediately prohibited from receiving these wastes as a result of this rule.) In light of all of these circumstances, we have decided to allow surface impoundments in which wastewater treatment sludges are generated to continue to manage these sludges.

The suggestion that land disposal facilities which meet the requirements for fully permitted facilities be allowed to handle these wastes is reasonable only in theory. The evaluation process presently needed to ascertain whether a facility meets the requirements of Part 264 would need to be thorough, and EPA judged that, in terms of necessary documentation and public participation, the process of ensuring this fact would be equivalent (or virtually equivalent) to the evaluation needed for issuing a Part 264 permit. This is particularly true for preparing and evaluating the waste management plan. This plan must be discussed with the permit writer; there is no way a facility can be evaluated in advance to determine if they meet this standard. EPA thus believes that there is no reason for either applicants or EPA to go through the permitting process twice.

We generally agree that allowing these wastes to be disposed of only at fully permitted facilities (except as discussed below) will, in the short term, lead to a shortage of facilities able to handle these wastes. This problem will be alleviated, as is the case at present, by the possibility of storage in tanks, containers, or enclosed waste piles at interim status facilities. Such storage will not in the short term be harmful to human health or the environment, and will reduce the pressure to permit a facility to handle these wastes immediately without a full evaluation of the facility's performance. Interim status incinerators will also be allowed to burn these wastes if they can demonstrate compliance with the performance standards for fully permitted incinerators (including destruction and removal of principal organic hazardous constituents in the waste). Likewise, interim status thermal treatment units can also be approved to handle these wastes.[16] The Agency also may issue emergency permits (see 40 CFR 270.61) to facilities to store these wastes in situations where there is no other realistically available management capacity. For example, if no management capacity is available following a dioxin waste clean up, an emergency permit could be issued to a facility if the alternative is to leave the wastes in place in an unsecure setting.

B. Interim Status Facilities Allowed To Manage These Wastes

Two persons commented on EPA's proposal to allow interim status facilities to handle these wastes. One of them stated that the Agency should, at a minimum, require submission of a Part B application; a demonstration, with respect to surface impoundments, that the wastes will not migrate; and notification to the Regional Administrator on the part of interim status facilities handling such wastes.[17] The commenter further stated that management in unlined impoundments should not be allowed. In view of the fact that we will require a waste management plan for fully permitted land disposal facilities, one commenter also questioned how EPA can allow interim status land disposal facilities to handle these wastes.

As discussed above, EPA agrees that for these wastes, management at fully permitted facilities is preferable. However, as outlined above, pragmatic as well as environmental considerations motivate the Agency to allow interim status facilities to manage some of these wastes for an interim period under some conditions.

In the case of surface impoundments in which the wastewater treatment sludges are generated, we have determined that the manufacturing facilities now generating the listed wastewater treatment sludges would probably have to close down until they can obtain permits for their impoundments or build alternative treatment facilities. (See 48 FR at 14519.) In addition, and as described above, allowing these interim status surface impoundments to store or treat these wastewater treatment sludges should present a limited risk in the short-term due to the reduced potential of the CDDs and CDFs to migrate into the environment. These impoundments, however, must obtain a Part 264 permit which will include whatever requirements are imposed by the waste management plan.

EPA also judges that interim status tank and container storage facilities provide adequate short term management of these wastes. Although not providing maximum protection, they do provide control of these wastes to prevent them from posing a substantial environmental hazard or an unreasonable risk in the interim; tanks or containers at interim status facilities that will accept these wastes must meet most of the requirements required for fully permitted tank and container facilities. See, e.g., §§ 265.171, 265.173, and 265.174 (containment, management, and inspection of containers) and §§ 265.192 and 265.194 (containment and inspection of tanks).

In addition, the Agency judged that storage in interim status enclosed waste piles also represents a minimal, and acceptable risk. By "enclosed waste pile" we mean a pile that meets the requirements of § 264.250(c)—namely, that the pile is inside a structure that provides protection from run-on, precipitation, and wind disperal, does not generate leachate, and does not contain free liquids. This regulation allows enclosed waste piles to accept these wastes without first obtaining a permit, because enclosure of this type will guard in the short-term against the exposure pathways of concern (run-off, wind dispersal, and leaching). Allowing this type of interim status facility to accept these wastes should help provide necessary management capacity until disposal facilities receive permits to manage these wastes.

The Agency also believes that interim status incinerators that are evaluated by EPA to determine whether they can meet the performance standards for these wastes contained in § 264.343 will provide adequate protection to human health and the environment (see Section IV. B. 2. for detailed discussion on the use of interim status incinerators to burn these dioxin wastes). Similar considerations justify allowing interim status thermal treatment units subject to regulation under Subpart P of Part 265 to

---

[16] The Agency must provide some legal means of handling these materials while disposal capacity is made available through the permitting program.

[17] As already indicated, all persons who generate, transport, treat, store, or dispose of these CDD/CDF-contaminated wastes are required to notify EPA of their activities under Section 3010 of RCRA. It should be noted that the newly enacted HSWA creates statutory deadlines for submission of Part B applications by facilities having interim status. See newly amended Section 3005(e). Under the statute, land disposal facilities must submit applications by November 9, 1985, incinerators must submit applications by November 9, 1986, and all other facilities must submit applications by November 9, 1988. A facility which fails to meet these deadlines will, under the statute, lose interim status.

receive these wastes. (Examples are pyrolysis units not designed as incinerators.) These units will be evaluated the same way as interim status incinerators, and, thus, must be certified as meeting the applicable performance standards in § 264.343 (including the 99.9999% DRE for POHC's in the waste). Procedures for obtaining certification likewise will be the same as for interim status incinerators. Another reason for allowing these interim status thermal treatment facilities to receive these wastes is that there are presently no Part 264 permit standards for these facilities. A prohibition on interim status facilities consequently, would prohibit these facilities from receiving these wastes at all. This result is unwarranted since a means exists to evaluate their compliance with the most important environmental standard, and these facilities may prove to be one of the optimal means of managing these wastes. Managing these wastes at these types of interim status facilities is therefore judged to present minimal risks until final permits are issued.

Several commenters stated that interim status facilities should be allowed to handle wastes containing PCP, since these wastes do not contain TCDD, other CDDs do not pose substantial risks of chronic or acute toxicity, and there is no history of mismanagement of these wastes.

We generally agree that wastes derived from the production or manufacturing use of PCP are unlikely to contain 2,3,7,8-TCDD or other TCDDs or TCDFs at levels of concern. These wastes, however, are likely to contain high concentrations of HxCDDs and HxCDFs—the PCP in these wastes is contaminated with these potent carcinogens. While we agree that these congeners are less toxic than 2,3,7,8-TCDD, we believe them to be sufficiently toxic to warrent the designation of wastes containing these substances as acute hazardous wastes. (The reasons for this determination were outlined earlier in this preamble.)

In addition, there is a substantial history of mismanagement of wastes (including spilled or abandoned formulations) resulting from the use of PCP in wood treatment processes. These wastes, or very similar wastes, have been mismanged repeatedly, causing very serious damage incidents. There have been many actions under RCRA and CERCLA involving wood treatment facilities using PCP solutions and wood preservation wastes; in addition, there are 22 damage incidents involving these chemicals at sites on the National Priorities List for Actions under CERCLA. These mismanagement incidents (outlined in the revised Background Document for this listing) include discharge of process wastes into off-site drainage ditches, storage (in most cases for many years) of such wastes in impoundments which were improperly sited, improper storage of treatment solutions in leaky tanks and containers, etc. These mismanagement incidents resulted in PCP contamination of soil, surface water, and ground water; in several instances, this contamination was at very high levels. In one instance, the soil of a residential area surrounding a wood treating facility that mismanaged these wastes was analyzed for HxCDDs and HxCDFs. In four samples, HxCDDs ranged from 1.5 to 12 (average, 4) ppb, while HxCDFs were present at 1.7 to 21 (average 9.5) ppb. The clean up of these contaminated sites can be quite costly.

Because these wastes are very toxic, because the toxic components of the waste are mobile, persistent and (particularly the HxCDDs and HxCDFs) will bioaccumulate, and because of their history of mismanagement, EPA judges that they must be managed at fully permitted facilities when land disposed, incinerated (except as already discussed), or stored in open piles.

2. Requirement of a Waste Management Plan

Several respondents commented on EPA's proposal to require a waste management plan to specify additional requirements for land disposal facilities intending to manage these wastes. Most agreed that such a requirement is desirable. (In fact, one commenter stated that a waste management plan should be required for all management options for these wastes.) However, several respondents stated that a waste management plan would not be adequate to ensure proper handling of these wastes. Still others stated that interim status facilities which meet the Part 264 requirements should be allowed to submit such a plan (and thus be able to handle these wastes) before receiving a final permit.

After reviewing these comments, the Agency still believes that a waste management plan will help provide assurance, as far as is practically possible, that these wastes are properly managed in a land disposal situation. The waste management plan will be the interim vehicle for assuring individualized consideration that the wastes will be managed safely. The plan must be submitted by the owner or operator of the facility as part of the permit application.[18] Therefore, it will be considered in the normal course of the permitting process, so that no special EPA review procedures are required.

The waste management plan should address the factors mentioned at proposal (see 48 FR at 14520) including waste volume, concentrations of CDDs and CDFs in the waste, aerosol/particulate dispersion, violatilization of the toxicants of concern, soil attenuation properties, waste leaching potential, and anticipated solvent co-disposal. To assist the owner or operator in preparing this document, EPA will provide detailed guidance for the presentation of a waste management plan. This document will discuss the physiochemical properties of the waste constituents, and the specific factors to be addressed for disposal of these wastes at each type of land disposal facility (*i.e.,* land treatment units, surface impoundments, open waste piles, and landfills). The document will explain (1) how the existing Part 264 standards should and can be implemented for these wastes where specific guidance is appropriate (*i.e.* wind dispersal, liner compatibility) and (2) what *new* requirements should be imposed for such wastes (*e.g.* soil types, co-disposal, etc.).

More specifically, this guidance document will address a number of areas where existing regulations already provide adequate control. However, due to the extreme toxicity of the toxicants in these wastes, further guidance is provided to the permit writer and the owner or operator of the land disposal facility on how the existing regulations can be applied to these wastes. For example, the existing management standards under Part 264 are adequate to prevent the dispersion of the CDDs and CDFs by wind dispersal. See §§ 264.221, 264.250, 264.273, and 264.301. However, because of the toxicity of the CDDs and CDFs, the waste management guidance document will provide specific management techniques for controlling this exposure pathway (*i.e.,* immediate cover of wastes when placed in landfills and open waste piles, air monitoring to ensure compliance with this provision, etc.). In addition, the existing regulations already address liner compatibility. See §§ 264.221, 264.251, 264.301, and 264.302. However, the waste management guidance document includes a

---

[18] Sections 270.17, 270.18, 270.20, and 270.21 of the hazardous waste regulations have also been amended to include the specific Part B information requirements concerning the waste management plan that must be included in the permit application for surface impoundments, non-enclosed waste piles, land treatment units, and landfills.

discussion of an advanced liner design system to assist the Region and the owner or operator of the land disposal facility to comply with these provisions.[19]

In addition to the existing standards, we believe that additional requirements (for which the existing rules do not address) also need to be considered in land disposing these dioxin-containing wastes. Therefore, the waste management guidance document will discuss the types, the additional factors the permit writers should consider in approving the waste management plan. In particular:

(1) *Co-disposal*—The appropriateness of disposing of the dioxin-containing wastes with other wastes that may increase the solubility of the CDDs and CDFs. In general, we believe that it is more desirable to mono-dispose these wastes.

(2) *Soil Types*—The appropriateness of using various soil types at land disposal facilities. In particular, we believe these wastes should be disposed of in facilities with underlying soil of high sorptive capacity for organic chemicals (*i.e.*, high organic carbon content) and low permeability; this could be accomplished by bringing soils with high sorptive capacity and low permeability to a particular site.

(3) *In-situ Treatment*—The appropriateness of using in-situ treatment, such as mixing with carbon or other sorbents, to minimize the migration potential of the CDDs and CDFs, and the formation of free liquids.

(4) *Liners*—The appropriateness of disposing of these wastes in unlined units. In general, we believe that these CDD and CDF-containing wastes should not be stored or disposed of in unlined units.[20] This does not mean that owners or operators of existing facilities will need to retrofit the facility to put in liners. Rather, we expect that the permit writer would preclude placing these wastes in unlined units after a specified date. Permittees wishing to continue placing wastes in the unit would have the option of lining the unit.

With respect to the other comments, we believe that it is neither necessary nor appropriate to require incinerators, thermal treatment units, tanks, containers, or enclosed waste piles to submit a waste management plan. For incinerators, the requirement (see below) of a trial burn showing 99.9999% (six 9s) destruction and removal efficency (DRE) is adequate protection for proper incineration of these wastes. The same is also true for thermal treatment facilities. The regulatory requirements for tank, container, and enclosed waste pile storage facilities likewise provide the Agency with sufficient information to evaluate the storage facility's ability to contain these wastes, and the additional requirement for secondary containment for such facilities (see Section IV. A.4. below) provides further protection.

We also do not agree with the suggestion that interim status facilities be allowed to submit a waste management plan and manage these wastes. (See, also, Section IV. A. 1. above rejecting the suggestion that interim status facilities meeting the requirements of fully-permitted facilities be allowed to accept these wastes.) We have determined that interim status facilities, in general, should not be allowed to manage these wastes. In fact, where management at interim status facilities is allowed, EPA expects to issue permits quickly, in order to limit the interim status period. Therefore, the Agency will not allow interim status facilities that have submitted a waste management plan to manage these wastes.

3. Prohibiting Land Disposal of These Wastes

Several commenters suggested that land disposal of these wastes should be prohibited except "in exceptional circumstances." One person, however, felt that a better approach would be to develop a "level of concern" (LOC) above which all dioxin-containing wastes should be prohibited from land disposal; however, the commenter did not specify what such a level should be.

The recently enacted legislation gives the Agency two years to determine whether these wastes should be banned from some or all types of land disposal, except for underground injection in which the Agency has 45 months to make such a decision, and the cicumstances under which they should be banned. The Agency has recently initiated a program to explore whether certain hazardous wastes should be restricted from some or all types of land disposal, what the nature of the restrictions should be, and what treatment and recycling alternatives exist for such wastes. CDD/CDF-containing wastes are currently being examined under this program for possible restriction. For more details on this program, see the Advance Notice of Proposed Rulemaking published on February 15, 1984, at 49 FR 5854. In addition, as discussed in the April 4 proposal for this regulation (48 FR 14521), EPA is considering developing special management standards for CDD/CDF-contaminated wastes in addition to the special standards required by today's rule. It is possible that our investigations may enable us to define concentration limits within which land disposal should be prohibited. However, until these studies are completed, we believe it inappropriate to make any decision with respect to prohibiting these wastes from land disposal.

4. Secondary Containment at Permitted Tank and Container Storage Facilities

EPA solicited comments as to whether secondary containment for tanks that store or treat CDD- and CDF-contaminated wastes should be required as part of their permit. (Interim status facilities would not be subject to this requirement.) As justification, we cited the wastes' toxicity as well as long storage periods, and described mismanagement incidents involving both containers and in-ground and above-ground tanks. Some commenters disagreed with such a requirement and argued categorically that secondary containment requirements at such facilities are not warranted. However, many other commenters argued just as strongly that secondary containment requirements are needed, and urged their adoption.

We have decided that secondary containment should be required as a permit requirement for all tanks that treat or store these wastes presently subject to the existing tank design and operating standards in 40 CFR Part 264, Subpart J, namely above-ground and in-ground tanks, and all underground tanks that can be entered for inspection. It is the Agency's intent to guard against the risks posed by storing or treating these wastes in all types of tanks, including covered underground tanks that cannot be entered for inspection. However, this latter type of tank is not presently subject to the Part 264 Subpart J requirements (see § 264.190(b)) and, as such cannot receive a permit to treat or store these wastes. In addition, the use of secondary containment at such facilities was not explicitly discussed in the April 4, 1983 proposal. Therefore, we believe we must first solicit public comment on our intent to require secondary containment at covered

---

[19] It should be noted that this guidance document may also be appropriate for other hazardous wastes that contain similar hazardous constituents (i.e., chlorophenols).

[20] As already discussed, we will allow sludges that are generated in interim status surface impoundments (even if unlined) as part of the plant's wastewater treatment system to manage these wastes. These impoundments are subject to all Part 264 standards, however. Thus, the permit writer will address whether it is appropriate for unlined impoundments to continue to receive these wastes.

underground tanks that cannot be entered for inspection that handle CDD- and CDF-contaminated wastes. We intend to address this issue in forthcoming regulations dealing comprehensively with management standards for tanks.

We believe that the secondary containment requirement for the storage or treatment of these wastes in tanks is justified based on the following three considerations: (1) When released into the environment, it is well-documented that these extremely toxic wastes present a substantial hazard to human health or the environment; (2) these wastes may be stored for a long time before a disposal or incineration facility is found that is willing or able to accept them (for example, the same wastes at the Vertac facility have now been stored on-site for nearly ten years); and (3) EPA's experience indicates that these wastes are particularly difficult and expensive to cleanup when spilled, and therefore warrant the additional protection afforded by secondary containment.

For the same reasons cited above, we believe that secondary containment should be part of the permit requirements for all facilities that store CDD- and CDF-containing wastes that are not free liquids in containers. (EPA specifically solicited comments on this approach in the proposal, but commenters did not reach a consensus on this issue. Some commenters supported it while others opposed this aspect of the proposal.) Accordingly, all the present requirements for secondary containment will apply to container storage facilities, except for the waiver provision in § 264.175(c). This waiver allows an exemption from the secondary containment requirements for non-liquid wastes, an exception which we believe should not apply to container facilities storing CDD/CDF-contaminated wastes. Rather, we have concluded that all possible releases of these wastes to air, ground water, and surface water from such facilities must be prevented. Therefore, a waiver of secondary containment requirements for containers will not be allowed. A container storage area must have a base which is sufficiently impervious and continuous to prevent spills or leaks of these non-liquid wastes into the environment.

With respect to tanks, we have chosen to implement the secondary containment requirement through a general performance standard. Therefore, the rule does not specify the types of designs for the containment system, but rather requires the owner or operator to choose a design and propose it in the RCRA permit application for EPA review. Under new § 264.200(a), facilities seeking permits for tanks that store or treat these wastes must have a system designed and operated to detect and adequately contain spills or leaks from the tanks. The design of acceptable containment and detection systems can vary considerably according to the type of tank and other factors, as discussed below.

An example of a containment system that might be acceptable for a tank situated above-ground is one with an impervious base (such as concrete, or a synthetic liner) underlying the tank, and walls or dikes around the tanks that provide containment for at least 100% of the design capacity of the largest tank in the containment area. This is to prevent release of CDD- and CDF-contaminated wastes into the environment from the tank in the event of a complete (worstcase) tank failure. The Agency does not believe that the regulations need protect against the extremely remote possibility of simultaneous multiple tank failures in one containment area. Each containment system must also have a method of mechanical or visual detection that will identify leaks of CDD- and CDF-contaminated wastes from the bottom of the tank.

An example of a containment system that might be acceptable for an in-ground tank is one with a synthetic-type liner underlying the tank, or a liner placed inside the tank so that the tank itself provides the secondary containment. In either configuration, the containment system must be compatible with the wastes being stored, and must be installed and have sufficient strength and thickness so as to prevent failure due to abrasion, pressure gradients, or climatic conditions. A method to detect any leaks between the primary and secondary containment system must also be provided.

An example of a containment system that might be acceptable for underground tanks that can be entered for inspection is a vault structure constructed of material impervious to the wastes being stored in the tank or simply compatible with the wastes and lined or coated with an impervious material. This type of containment system must also have a method to detect any leaks from the tank.

As a general alternative to these examples of containment systems, double walled tanks equipped with an interstitial zone monitoring device to detect leaks that enter the space between the walls would also be considered acceptable for meeting the new standard prescribed in §264.200(a).

Today's rule requires tank facilities storing or treating CDD- and CDF-containing wastes to provide EPA with information in its permit application specifying: The precise design of the secondary containment system and its accompanying leak detection method; the choice of construction material and specifications; and whether additional run-on or precipitation controls are needed to preserve the system's integrity. These new technical information requirements are specified in new § 270.16(g) and must be addressed by each individual facility in its RCRA permit application. This information will be evaluated by EPA before a permit is issued.

With the addition of today's secondary containment requirements, we have also decided it is necessary to require tank facilities storing CDD/CDF-containing wastes to address in the facility contingency plan the steps to be taken should a leak be detected. When a leak is detected, the owner or operator must act promptly to prevent release of the hazardous waste into the environment, and wastes must be removed from the secondary containment system as soon as possible. The plan also needs to specify how the tank will be removed from service and repaired, if there is a leak and containment is breached. These new steps are provided in revised § 264.194(c) and build upon the procedures that already must be specified in the contingency plan under existing § 264.194(c).

It should be noted that today's action should not be viewed as a determination by EPA that secondary containment requirements are only appropriate for tanks that store or treat CDD- and CDF-containing wastes. EPA is presently considering whether to require secondary containment for hazardous waste storage and treatment tanks, including tanks that have not yet been permitted and that are presently covered under the existing Part 265 interim status standards. In addition, we are also considering whether to propose several more requirements that we believe are needed to more adequately control the risks posed by all hazardous waste storage and treatment tanks, including those that store or treat CDD- and CDF-containing wastes. For example, EPA is presently evaluating the need for a secondary containment system at all hazardous waste tanks that would provide containment of more than just leaks in the tank's shell. Possible hazardous waste discharges to the environment that EPA believes may also warrant secondary containment include leaks from nearby tank ancillary equipment (*e.g.*, valves, pumps, and flanges in close proximity to the tank) and spills of hazardous waste in the area immediately surrounding the tank from overflows of the top of the tank or from tank in-filling practices (both caused by equipment failure or operator error). An example of another requirement presently being considered by the Agency is secondary containment for all generators storing or treating hazardous waste in tanks or containers for less than 90 days without a RCRA permit under § 262.34. The Agency believes that leaks and spills at such facilities are no less prevalent than at other RCRA tank facilities and therefore may warrant similar secondary confinement requirements.

B. Incineration of Dioxin-Contaminated Wastes

1. Burning at Interim Status Incinerators

As discussed in the April 4, 1983 proposed rule, EPA does not believe that current regulatory controls on interim status incinerators are sufficient to limit the risks associated with dioxins. Interim status incinerators are not required to meet the performance standards for destruction and removal efficiency, HCl removal, and particulate emissions that are necessary to prevent an unacceptable level of risk from burning these wastes. In addition, they are not subject to the rigorous scrutiny of operating and management procedures that result from the RCRA permit review process. Thus, the final regulations prohibit combustion of these wastes in incinerators that have only interim status.

We have decided, however, to allow interim status incinerators to burn these wastes without first obtaining a RCRA permit if they are certified by the Assistant Administrator for Solid Waste and Emergency Response as satisfying the performance standards in Subpart O of Part 264 for RCRA incinerators burning these wastes.[21] In addition, there must be an opportunity for public comment on EPA's determination before the determination becomes final.

We are allowing this exception because we think incinerators meeting these conditions are virtually as protective as those receiving Part 264 permits,[22] and to provide additional incineration capacity for these wastes until there are more fully-permitted RCRA incinerators. Interim status incinerators that have been approved under the Toxic Substances Control Act (TSCA) to burn polychlorinated biphenyls (PCBs) are a type of incinerator that may wish to apply for certification. As pointed out by commenters, PCB incinerators are a logical choice to burn these wastes without first receiving a RCRA permit because they are required to meet the same performance standard (99.9999% destruction and removal efficiency) that we are requiring for the dioxin and dibenzo-furan-containing wastes, and PCB's, in some cases, are more difficult to incinerate than the dioxins and dibenzofurans. (See Section IV. B. 2. b. below.)

We accordingly are promulgating a new § 265.352(a) stating that RCRA interim status incinerators may burn these wastes if they meet the conditions outlined above. Procedures for applying and obtaining a certification are found in § 265.352(b). Applicants should submit information to the Assistant Administrator for Solid Waste and Emergency Response demonstrating that they can meet the performance standards in Part 264. The most pertinent data is that required by § 270.19(b) and (c), and, if a trial burn is necessary, § 270.62. The Assistant Administrator for Solid Waste and Emergency Response will make a tentative finding whether the applicant can meet the Part 264 performance standards. These tentative findings will be submitted for public comment, and persons in the vicinity will be notified by newspaper announcement and radio broadcast (this last requirement is consistent with the § 124.10(c)(2)(ii) notice procedures for RCRA permits). The comment period will remain open for 60 days. At the end of that time, the Assistant Administrator for Solid Waste and Emergency Response will issue a decision whether or not to certify the incinerator. This decision is final Agency action. Any facility receiving a certification, however, must still obtain a Part 264 incineration permit.

A number of commenters stated that the complexity in complying with the standards in Subpart O and the time required to obtain a full RCRA permit would, in the short term, limit the locations where these wastes could be incinerated, creating a capacity short fall. We believe that the potential problem should not become severe. First, the wastes to which this restriction applies are generated in relatively small quantities. Secondly, as discussed above, we are allowing interim status incinerators that have been certified by the Assistant Administrator for Solid Waste and Emergency Response to burn these dioxin wastes. Finally, an owner or operator of an interim status incinerator who wishes to incinerate these wastes can speed up the permit process by voluntarily submitting the Part B of their permit application instead of waiting until the permitting official requests that it be submitted. This should reduce the time lag and give more incinerators the capability of burning these wastes.

2. Burning at Fully-Permitted Incinerators

The proposed rule also discussed the management of these wastes at fully permitted incinerators. It was EPA's initial view that burning these wastes in an incinerator which has a proven capability to assure 99.99% destruction and removal efficiency (DRE) for the principal organic hazardous constituents (POHCs) which are as difficult, or more difficult to incinerate than the CDDs or CDFs, was sufficiently rigorous to ensure the proper management of these wastes. However, we specifically requested comments concerning the possibility of requiring a DRE greater than 99.99% when these wastes are incinerated. The Agency also discussed the possibility of requiring special notification to the Regional Administrator when a facility burns these wastes.

a. Alternative DRE for Dioxin-Contaminated Wastes. While some commenters were opposed to changing the present DRE requirement, most of the comments focused on more stringent standards, *i.e.*, 99.9999% (six 9s) DRE. The commenters pointed out that six 9s DRE is required of incinerators burning polychlorinated biphenyls (PCBs) (40 CFR 761.70) compounds that are less toxic than the CDDs and CDFs. They argue that, since CDDs and CDFs are among the most toxic compounds known, nothing less than the best achievable performance should be required. In addition, they argued that six 9s DRE will result in the lowest achievable emission rate. Furthermore, one commenter submitted risk modelling data indicating that a large incinerator burning wastes containing 20 parts per million of TCDD with a 99.99% (four 9s)

---

[21] It should be noted that some type of test burn data will be required which demonstrates that the incinerator achieves 99.9999% destruction and removal efficiency (DRE) before the incinerator would be certified. See Section IV.B.2.b. below.

[22] The only significant difference is that these incinerators would not yet be evaluated to determine if they meet the facility standards in Subpart A through H of Part 264. (Most of these standards, however, are required by the Part 265 interim status standards.)

DRE could result in ambient air concentrations which could present a public health hazard for residents living in the facility's immediate vicinity.

In evaluating these comments, the Agency conducted its own risk assessment in order to determine the potential risks from burning these wastes at different levels of performance in certain hypothetical situations. As part of this analysis, EPA evaluated the potential risks presented by the TCDD content of the wastes, and by the content of total CDDs and CDFs. The latter analysis assumed that the CDDs and CDFs *in toto* have thirty times the carcinogenic potency of TCDD. (This may not be a very conservative assumption, since, for the soot generated in the Binghamton, NY PCB transformer fire, it was estimated that the CDDs and CDFs present had 56 times the carcinogenic potency of TCDD (Eadon, 1982).) If only the HxCDD components are considered, the potential carcinogenic risks are about one twenty-fifth of those calculated for the TCDD component, since that is the ratio of their carcinogenic potencies. The risk to the maximum exposed individual [23] and the average exposed individual was then estimated. The variables examined were the concentration of the dioxins in the feed, the size of the incinerator, and the DRE (which ranged from 99.00% to 99.9999%).

The conclusions reached from this effort indicated that wastes containing ppm concentrations of TCDDs, HxCDDs or CDDs/CDFs, burned in large incinerators achieving four 9s DRE could result in ambient concentrations that present a lifetime excess cancer risk level of 10^{-4}. With small incinerators, lower feed rates, lower (ppb) dioxin concentrations, or better meteorological conditions, the modelling showed that four 9s DRE provided levels of risk lower than 10^{-4}.

Based on these results, the Agency considered three options. The first was to establish "acceptable" levels of risk and to use risk modelling on a case-by-case basis to set limits on the waste concentration or feed rate for each incinerator; the second option was to leave the standard at 99.99% DRE; the third option was to establish a performance standard of six 9s DRE, the current standard for PCB wastes.

The first option is now effectively precluded by statute. See RCRA amended Section 3004(o)(1)(B) stating that facilities receiving permits after enactment of the Hazardous and Solid Waste Amendments of 1984 must at a minimum meet the 99.99% DRE standard. The Agency also rejected the first option because, while it is theoretically more precise from a conceptual standpoint, and allows for tailoring of the regulation to specific circumstances, it is extremely resource intensive for the government, the regulated community, and the interested public. It also requires agreement on the models, assumptions, and acceptable risk levels. Since such modelling is inherently subject to debate, EPA questions its practicality for case-by-case applications in this context.

As described above, a four 9s DRE could result in risk levels for certain situations that are in a range that is of questionable acceptability. Partly because of this, we have decided to impose a more stringent performance requirement of six 9s DRE for CDD/CDF wastes. In addition, this level of destruction and removal is technically feasible. Incinerators burning PCBs are required to operate under conditions that result in six 9s destruction. Consistent destruction to six 9s have been measured at a number of incinerators (*e.g.,* those of SCA, Inc. in Chicago, IL; Rollins Environmental Services, in Deer Park, TX; the facilities operated by Energy Systems Company in El Dorado, AR; and by the General Electric Corporation in Waterford, NY (MRI, 1983; USEPA, 1981c and 1981d)). Similar DRE's are expected to be achievable for CDDs and CDFs, since PCBs, and CDDs, and CDFs have a similar degree of incinerability. (See Table I below.) The second factor is one of general environmental policy. If one is to incinerate waste containing one of the most toxic substances known, one should use the best incinerators operating at their peak capability. (See, for instance, 46 FR at 7686, January 23, 1981.) Several commenters made this point, including a commenter for a facility that incinerates hazardous waste commercially. In addition, the decision is reinforced by our estimate that, in certain situations, the other principal technological option (four 9s DRE) might not be sufficiently protective of human health.

b. Requirements for Conducting a Trial Burn for These Wastes. One commenter argued that incinerators burning these wastes should be required to demonstrate compliance with the incinerator performance standard for organics by conducting trial burns for dioxins, rather than by using a surrogate Principal Organic Hazardous Constituent (POHC) that is more difficult to incinerate. The commenter also argued that trial burns should be conducted on waste matrices physically similar to those that would be burned.

Although the commenter's point is desirable in theory, determining compliance with a six 9s DRE (or even a four 9s DRE) standard for these wastes would be very difficult, if not impossible, without a system for surrogate POHCs as established in § 264.342. The concentrations of the CDDs/CDFs in these wastes are too low to find measurable amounts in the stack gas (at six 9s DRE) at present limits of detection, and public health considerations preclude, in most cases, "spiking" the waste with higher concentrations of CDDs or CDFs. Therefore, it is not possible to measure and calculate a six 9s DRE using CDDs/CDFs as the principal organic hazardous constituents (POHCs) with the needed accuracy. However, by selecting a POHC in the waste mixture or by spiking the waste with a compound that is more difficult to incinerate than the CDDs and CDFs, and that is present in sufficient concentrations to determine a six 9s DRE, it is possible to use a trial burn to predict compliance with a six 9s DRE for the CDDs and CDFs.

We also agree with the commenter that the waste mixture used for the trial burn should, as nearly as possible, be in the same physical matrix as the wastes to be routinely burned (see § 264.345(b) indicating that incinerator permits will allow variations in the waste feed physical properties so long as the variations will not affect compliance with the incinerator performance standards), and the waste should be fed into the incinerator at the same rate. For example, if the CDD/CDF wastes that are to be incinerated are contained in a sludge, the trial burn should be conducted on a similar sludge containing the POHC selected to prove compliance. Additional information concerning POHC selection and physical state is contained in the "Guidance Manual for Hazardous Waste Incineration Permits", SW-966 (July 1983).

---

[23] A person who spends 24 hours a day, 365 days a year for 70 years at the site of maximum ground level concentration. This person weights 70 kg, breathes 20 m^3 of air per day, and retains 50% of all contaminants inhaled. It was also assumed that the incinerator burns the waste consistently for the 70-year exposure period, and that "worst case" meteorological conditions would prevail. Obviously, these are conservative assumptions. However, this analysis does not consider other sources of exposure, the possible synergistic effects of concurrent exposures to other carcinogens, or the fact that some of the POHCs, such as chlorobenzenes and chlorophenols, can, in the course of incineration, give rise to CDDs and CDFs. Thus, like all risk assessments, this analysis represents a rough balance of factors relevant to potential injuries.

EPA uses heat of combustion as its incinerability hierarchy. Table I lists the heats of combustion of the CDD and CDF homologues, as well as of PCB homologues and a few compounds commonly selected as POHCs. The lower its heat of combustion, the more difficult a compound is to incinerate.

c. Special Notification to the Regional Administrator. In the proposal, EPA considered requiring owners or operators of incineration facilities burning these wastes to notify the Regional Administrator of that fact. Such notification was considered because it was felt that Regional authorities might wish to determine compliance monitoring priorities for facilities incinerating these wastes. Although a few commenters did not believe that a notification requirement is necessary, most of the commenters felt that such a requirement is important, and should be required. The requirement of a six 9s DRE standard for these wastes will, in most instances, require a trial burn and full permit issuance procedures. Thus, the Regional Administrator will, in most instances, be aware that a facility may burn these wastes. However, this is not true in all cases. If an incineration facility has a permit based on trial burn data showing six 9s DRE capability for a substance more difficult to decompose than the CDDs or CDFs (*e.g.*, trial burn data showing six 9s DRE for certain PCBs) there would be no need to inform the Regional Administrator that the facility plans to burn CDD/CDF wastes. EPA will, therefore, require owners or operators of incinerators managing these wastes to notify the Regional Administrator of that fact.

d. Periodic Compliance Tests. A few commenters suggested or implied that incinerators burning CDD/CDF wastes should undergo periodic performance verification. Repeating the trial burn on some periodic schedule might be reasonable in cases where strict operating parameters are not established. For example, under the Clean Air Act, a stack could not emit more than some amount of pollutant per given time. No specific operating parameters are established by the regulators, and, instead, periodic compliance checks are conducted.

TABLE I

Compound	Heat of combustion (kcal/gm)
Chlorinated Dibenzo-*p*-Dioxins	
Tetra	3.46
Penta	3.10
Hexa	2.81
Chlorinated Dibenzofurans	
Tetra	3.66
Penta	3.40
Hexa	3.07
Chlorinated Biphenyls	
Mono	7.75
Di	6.36
Tri	5.10
Tetra	4.29
Penta	3.66
Hexa	3.28
Hepta	2.98
Octa	2.72
Typical POHCs	
Tetrachloromethane	0.24
Tetrachloroethane	1.39
Hexachlorobenzene	1.79
1,1,1 Trichloroethane	1.99
Pentachlorophenol	2.09

In contrast, during the RCRA permit process, very carefully chosen operating conditions are established in the permit. These conditions, measured during the trial burn, establish the range of operating conditions of the incinerator, within which it has been determined to meet the performance standards of Subpart O. Should it operate outside this range, it would not be in compliance with the standards and would have to stop incinerating the waste. In addition, if the owner or operator wishes to change any of the critical operating parameters, they would have to request a permit modification, and have to conduct another trial burn to prove compliance with the standards under different operating conditions. Therefore, we do not believe it necessary to require periodic testing.

3. Amendments to Parts 264 and 265

Today's notice amends § 264.343 to require that incinerators burning the listed CDD/CDF-containing wastes must achieve a DRE of 99.9999% in addition to the other standards contained in Subpart O. The amendments specify that six 9s DRE will be measured on a POHC that is more difficult to incinerate than the particular CDDs or CDFs. For example, using the heat of combustion hierarchy, and burning wastes containing, for example, HxCDD, a POHC would be selected with a heat of combustion less than 2.81 kcal/gm—perhaps 1, 1, 1, trichloroethane. The permit application procedures in Part 270 and permit issuance procedures in Part 124 are not changed by today's amendment. For a new incinerator (or an interim status incinerator seeking certification), the trial burn plan would show how the unit will be operated so as to comply with the standards in Subpart O including the requirement for six 9s DRE. EPA expects that the permit for a new incinerator would not allow any of the listed CDD/CDF-containing wastes to be burned until the trial burn is complete and final operating conditions are established. In addition, none of the listed CDD/CDF-containing wastes should be burned during the pre-trail burn and post-trial burn periods described in §§ 264.344 and 270.62 which provide that the Regional Administrator place limits on the feed to the incinerator until assurance is provided that the unit can meet the standards.

If an incinerator already has a RCRA permit, it may burn CDD/CDF wastes (provided the owner or operator has notified the Agency of this fact) if its previous trial burn, or data in lieu of a trial burn, demonstrates a six 9s DRE on a POHC or compound more difficult to incinerate than the CDDs or CDFs in the waste. This may be the case for incinerators that have TSCA permits for PCB destruction. During the trial burn for PCBs, the unit would have had to ascertain six 9s DRE on a specific chlorinated biphenyl, or a compound that is more difficult to incinerate than the chlorinated biphenyl in the waste. If this chlorinated biphenyl or the surrogate is more difficult to incinerate than the CDDs or CDFs in the waste feed, and if it was in the same physical state, another trial burn may not be required. For example, if an incinerator proved six 9s DRE on PCP, which has a heat of combustion of 2.09 kcal/gm, it could incinerate all the CDDs and CDFs, since the CDD/F compound most difficult to decompose is HxCDD with a heat of combustion of 2.81 kcal/gm. However, if the incinerator has not demonstrated six 9s DRE, or it had shown six 9s DRE on a POHC less difficult to burn than the CDDs or CDFs (*e.g.*, tetrachlorobiphenyl (4.29 kcal/gm)), another trial burn would be necessary, and the permit would need to be modified. For additional information see the "Guidance Manual for Hazardous Waste Incineration Permits" (*op. cit.*).

Today's notice also amends § 265.340 to exclude burning of CDD/CDF wastes in incinerators with interim status, except as previously discussed. An interim status incinerator may not burn these wastes until a permit is issued or the incinerator is certified to burn these wastes.

C. Burning at Other Interim Status Treatment Facilities

The Agency also believes that interim status thermal treatment units subject to regulation under Subpart P of Part 265 are insufficient to limit the risks associated with dioxins, just as they are insufficient to limit risks associated with interim status incinerators (*i.e.*, most of the requirements address administrative rather than technical controls). However, the Agency also believes that means exist to determine their environmental performance. Therefore, we will allow interim status thermal treatment units to be certified if they can demonstrate that they can properly treat these wastes.

Under the existing regulations, these units cannot be permitted since there are no existing RCRA permitting standards. However, such treatment units may provide a very promising way of treating these wastes. In particular, a number of emerging thermal treatment technologies may be used to treat CDD/CDF-containing wastes in order to render them non-hazardous (or at least, less hazardous). Some of these technologies are thought now to be practical, while others are in the pilot stage, and pilot scale field experiments need to be performed. In the absence of RCRA permit standards, such pilot scale research activities would not be allowed. This would stifle and discourage the development of new alternatives and the development of innovative technology for treatment of these very toxic wastes. We believe such an outcome is undesirable.

As a result, we have decided to promulgate a new § 265.383 stating that interim status thermal treatment units may burn these wastes if they are certified by the Assistant Administrator for Solid Waste and Emergency Response that they can properly treat these wastes. These units will be evaluated the same way as interim status incinerators, and thus must be certified as meeting the applicable performance standards in § 264.343 (including six 9s DRE for POHCs in the waste). In addition, the procedures for obtaining certification will be the same as for interim status incinerators (see Section IV. B. 1., above). In particular, the applicant must submit an application to the Assistant Administrator for Solid Waste and Emergency Response which demonstrates that they meet the applicable performance standards in Subpart O of Part 264. The most pertinent data to be submitted is the same as for interim status incinerators, that is the information cited in § 270.19 (b) and (c) and, if a trial burn is necessary, § 270.62. However, since these units are somewhat different than incinerators, additional data and information may be required. See § 270.19 (c)(7). Because the type of additional information that may be required will vary with the type of thermal treatment unit, we suggest that the owner or operator of the thermal treatment unit contact the Agency before submitting their application to determine whether any additional information will be required, and if so, what type of data will be needed. This information will then be evaluated for compliance with the appropriate performance standards. The Assistant Administrator's tentative decision will then be published (after public notification) for a 60 day comment period; at the end of that time, the Assistant Administrator for Solid Waste and Emergency Response will issue a final decision whether or not to certify the thermal treatment unit. As with interim status incinerators, this decision is final Agency action.

V. Relation of This Rule to Regulation of TCDD-Contaminated Wastes Under the Toxic Substances Control Act

Many wastes containing TCDD are presently regulated under 40 CFR Part 775, a regulation issued under Section 6 of the Toxic Substances Control Act (TSCA).[24] The relationship between that regulation and the rule being promulgated today under RCRA, was discussed at proposal (see 48 FR at 14518). At that time, we stated that the regulation of the treatment and disposal of hazardous wastes properly belongs under RCRA, and that the Agency should avoid overlapping and potentially contradictory approaches to the same problem under different regulatory authority, *e.g.*, TSCA and RCRA. In fact, Section 9(b) of TSCA provides that EPA must utilize its authority under the other environmental laws it administers where these laws are adequate to protect against unreasonable risk, and where there is no strong public interest in taking action under TSCA.

In the proposal, we argued that RCRA provides the appropriate long-term solution for controlling the management of TCDD-contaminated wastes. EPA promulgated the TSCA § 6(a) rule based on a determination that the unregulated disposal of TCDD-contaminated wastes presents an unreasonable risk of injury to health or the environment, and determined that removal for disposal of certain TCDD wastes at Vertac's Jacksonville, Arkansas site would present an unreasonable risk (see 45 FR 32680, May 19, 1980). We also determined that disposal of TCDD wastes by other persons without prior notification to EPA would present an unreasonable risk. These determinations were reached, in part, because the then existing RCRA regulations for the treatment and disposal of hazardous waste were not appropriate for TCDD-contaminated waste, since EPA had not yet developed final permit standards for the land disposal or incineration of hazardous wastes.

As explained at proposal (see 48 FR at 14518), the general RCRA regulations are now effective, and provide a means for properly evaluating the land disposal and treatment (*i.e.*, incineration) of TCDD-contaminated wastes, thus ensuring that these wastes are managed in a manner that does not present an unreasonable risk. (This also is true of those interim status incinerators and interim status thermal treatment units that are certified to burn these wastes, since these units must be able to meet the same performance standards as fully-permitted incinerators, and must notify and be evaluated by the Agency before they begin burning.) Therefore, when the RCRA dioxin waste rules are effective and the TCDD-contaminated wastes are controlled under RCRA, their disposal will no longer pose an unreasonable risk finding under TSCA. Consequently, we proposed to revoke the TSCA rule when the rule, under RCRA, becomes effective. No one disagreed with this provision of the proposal; in fact, several commenters explicitly agreed that EPA should revoke the TSCA rule. Today's action, therefore, revokes the TSCA Section 6(a) regulation that applies to the Vertac Chemical Corporation, and those that require a sixty-day notification to EPA on the part of persons wishing to dispose of TCDD-contaminated wastes.

VI. Comments on Other Issues

A. Development of a Toxicity Characteristic for Defining Dioxin-Contaminated Wastes as Hazardous

Several respondents commented on EPA's question regarding the advisability, practicality, and desirability of developing a "characteristic" definition of hazardousness under 40 CFR Part 261 for CDD/CDF-containing wastes. Several commenters agreed with EPA that this might not be a suitable regulatory alternative, adding that to set a lower limit of concern might encourage dilution as a means of circumventing regulation. Several others, however,

---

[24] TCDD wastes are defined as those resulting from the production of 2,4,5-TCP or its pesticide derivatives, or substances produced on equipment that was previously used for the production of 2,4,5-TCP or its pesticide derivatives.

stated that a clear indication of a lower level of concern would be a desirable regulatory goal; one commenter suggested what such a lower limit might be, stating that a 1 ppb level in soil might be a suitable level. One other commenter also suggested that a level of concern should be set as a regulatory threshold, but not as a basis for listing.

On reconsideration of the advantages and disadvantages of setting a lower level of concern (LOC) for the toxicants in these wastes, and of the data needed to perform the needed risk assessments, we have concluded that, with the data presently available, it is not possible to make a determination regarding such a level. The matrix variability of these wastes, ranging from still bottoms to filter aids to contaminated soils, is very great, and their specific isomeric composition is not known. It is also very difficult to judge the bioavailability of the CDDs and CDFs in these different matrices. The development of exposure and risk assessments would therefore be extremely difficult in this case, and even more suspect than is usually the case because it would entail even more assumptions than those usually made in such a procedure. Therefore, EPA has not developed a LOC for the toxicants—in particular, the CDDs and CDFs—in these wastes. EPA, however, will continue to explore this alternative as additional information becomes available.

B. Discarded Unused Formulations

This regulation designates as RCRA hazardous wastes discarded unused formulations containing tri-, tetra-, or pentachlorophenol and their derivatives (EPA Hazardous Waste No. FO27), except those discarded as household wastes. In proposing the regulation, EPA solicited comment as to how generators could identify whether these formulations are subject to this regulation.

Two respondents commented on this problem. One person stated that chemical product labels should contain recommendations for disposal; another recommended that EPA coordinate with OSHA to require that OSHA Form 20 (Material Safety Data Sheet (MSDS)) be amended to require disposal information. In particular, they indicated that Section VII. of the MSDS (Spill and Leak Procedures) provides space for the manufacturer's recommendations for disposal of the chemical or its waste residues. They suggest that manufacturers be required to state in this space that the product, when discarded, is a hazardous waste, list the hazardous waste number, and include a statement concerning the appropriate waste disposal method.

EPA agrees that implementation of these suggestions would go a long way toward solving the problem. If chemical products were identified on the label as an EPA hazardous waste, when discarded, there would be no need to divulge specific (and possibly proprietary) information, and users of such products would not be in doubt that the product in question, when discarded, is subject to RCRA regulation. However, EPA does not have the authority under RCRA to label products and provide disposal information. In addition, form OSHA-20 seldom accompanies a product, and therefore would not solve the problem.

However, EPA possesses authority under other statutes to deal with this problem. Under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), the Agency, under the Label Improvement Program, has sent a notice to all registrants (Notice 81-3) indicating to them that pesticide products that are RCRA hazardous wastes, when discarded, must include a statement which indicates that the pesticide (when discarded) is a hazardous or an acute hazardous waste. This requirement becomes effective on January 1, 1985 for all pesticide products except for pesticides discarded by the householder. This same label provision will be required for those pesticide products covered by today's regulation (*i.e.*, for these pesticide products, the label will indicate that they are acute hazardous wastes (EPA Hazardous Waste No. FO27) when discarded. The label will not provide specific instructions as to its disposal, but rather will refer the user or any other person who handles these specific pesticides to contact the EPA Regional Office or the State environmental office for disposal instructions. Thus, the label on all pesticidal products containing tri-, tetra-, or pentachlorophenol or their derivatives, will identify whether the formulation is hazardous, if discarded, and will provide the user with instructions on who to contact if disposal information is necessary.

C. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Clean Up Activities

Several commenters felt that the proposed rule, while beneficial and important, is predominantly slanted toward prevention of future accidental releases of CDDs and CDFs to the environment, rather than cleanup of existing contaminated areas (*i.e.*, Times Beach, MO). The commenters expressed concern that certain portions of the proposed rules may hinder or prevent remedial action of contaminated sites. For example, incineration of soil with relatively low concentrations of TCDD could be costly to accomplish, and, since the residue of hazardous waste treatment is still a hazardous waste, there would be little incentive to incinerate contaminated soils. Also, permitting a site under RCRA could be very difficult, possibly delaying or preventing remedial action which could be conducted under CERCLA.

While we agree that the proposed rule is slanted toward prevention of future accidental releases of CDDs/CDFs to the environment, we do not agree that this rule will significantly hinder or prevent cleanup of existing contaminated sites. The major waste that is generated at these sites, as implied by the commenter, is soil contaminated with CDDs/CDFs. These soils are acute hazardous wastes, since soil contaminated with hazardous waste spills are defined as being in the RCRA system. See 48 FR 2508, January 19, 1983; see § 261.3(c)(2). Ongoing and anticipated cleanup activities have generated, and will continue to generate, large volumes of soils contaminated with CDDs/CDFs. For instance, it is conservatively estimated that about 500,000 cubic yards of CDD/CDF-contaminated soil will result from CERCLA remedial action activities in Missouri.

The Agency developed a strategy for dealing with dioxin (USEPA, 1983), which, among other things, deals with alternatives for the cleanup of contaminated sites. These alternatives include securing the soil in place, novel remediation techniques (*e.g.*, solvent extraction), incineration, and removal of soil to a secure containment system (*e.g.* a concrete vault). The Agency has indicated that remediation and enforcement measures under CERCLA will be carried out as expeditiously as possible.

In addition, we are also allowing the disposal of residues resulting from the incineration or thermal treatment of dioxin-contaminated soils at interim status land disposal facilities,[25] and to allow treatment, storage, or disposal at facilities pursuant to the usual Part 264 standards (*i.e.*, not meeting the special standards for other dioxin-containing wastes, such as secondary containment or a waste management plan). Although

---

[25] Although the incineration of dioxin-contaminated soils is not practiced to any great extent, EPA plans to investigate this management option for dioxin-contaminated soils, and, in fact, has allocated considerable resources in this area.

there are very few data on the characteristics of the residues resulting from soil incineration, data are available on the incineration of materials such as PCB capacitors and sewage treatment sludges. These data indicate that the residues resulting from such incineration contain PCBs at levels three to four orders of magnitude less than that contained in the original waste before incineration. Most dioxin-contaminated soils contain less than 1 ppm of TCDD. Thus, it is expected that the concentration of this isomer in the residue from the incineration of soils will be less than about 1 ppb. This concentration in soil was determined to be a reasonable level at which to consider limiting human exposure in a residential setting (USDHHS, 1984). We believe the same is true for the other chlorinated dioxin isomers of concern, as well as for the dibenzofurans.

Data on carbon regeneration show similar results. These data indicate that toxicants such as PCBs, that bind strongly to activated carbon or organic carbon can be effectively removed and destroyed from such matrices such that very low levels of the toxicants remain in the resulting residues. There is no reason to doubt that CDDs and CDFs (of similar incinerability) when bound to organic carbon in a soil matrix will behave any differently. We have therefore determined that the residues of incineration or thermal treatment of CDD/CDF contaminated soils, present much less risk than the untreated soils, and thus can be managed at interim status land disposal facilities.[26] We have, therefore, provided a special designation (EPA Hazardous Waste No. FO28) for these wastes.

D. Other Wastes Containing CDDs and CDFs

Several respondents commented on the need to list other wastes which contain CDDs and CDFs, *i.e.*, chlorinated benzenes and PCBs, dichlorophenol process wastes, fly ash and emission control dusts from the low-temperature combustion of chlorophenols, and presently unlisted residues from wood preservation.

The recently enacted HSWA specifically provides additional time to the Agency for evaluating whether to list additional dioxin-containing wastes. See RCRA amended Section 3001(e). As stated in the preamble to the proposed regulation (48 FR 14523), EPA is presently conducting a study on wastes from the production of dichlorophenol. Under EPA's Industry Studies program, the Office of Solid Waste (OSW) has performed engineering analyses, and has gathered sampling and analysis data from several dichlorophenol production facilities, and from facilities that use dichlorophenol. These data are presently being evaluated. In addition, under Tier 4 of the "Dioxin Strategy" (USEPA, 1983), EPA is investigating possible combustion sources of CDDs and CDFs. These materials will be listed if evidence demonstrates that they are indeed hazardous (or acute hazardous) wastes. We also have begun investigating whether additional wastes from wood preservation processes using PCP should be listed as hazardous (or acute hazardous) wastes, and whether CDDs and CDFs should be added as constituents of concern in the wood preservation process waste already listed (EPA Hazardous Waste No. K001, Bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol). After completion of those studies, we will take regulatory action, if warranted.

With respect to wastes resulting from the manufacturing use of chlorobenzenes, such processes are not expected to generate CDDs or CDFs except under alkaline conditions and elevated temperatures. We therefore judge that these processes are adequately covered by the present listings. It is possible that commercial preparations of mono- and dichlorobenzene (which are not covered by today's listing) contain homologues with higher degree of chlorination, and thus could give rise to CDDs and CDFs at levels of concern. If further investigation proves that this is the case, we will list the wastes from such processes.

With respect to PCBs, we agree that CDDs and CDFs may well occur in processes involving these materials. However, PCBs are no longer manufactured in the U.S., and their use and disposal are currently regulated under TSCA (40 CFR Part 761). The major problem at present is the generation of CDDs and CDFs resulting from transformer fires. The regulation of the disposal of the wastes (including soot) from such fires is presently being studied under the dioxin strategy, and EPA recently proposed a regulation intended to control the potential hazards resulting from PCB transformer fires (see 49 FR 39966–39989, October 11, 1984).

E. Wastes Containing Other Halogenerated Dioxins and Dibenzofurans

Two respondents commented that EPA should not limit its consideration to processes which are expected to generate tetra-, penta-, or hexachlorinated dioxins and -dibenzofurans, because the brominated analogues are also of great concern in terms of their potential to harm human health, and because the congeners of higher degree of chlorination can undergo dechlorination in the environment.

We agree that the brominated analogues are a potential threat. EPA has investigated whether there are at present manufacturing processes generating these toxicants. It was determined that there are at present no U.S. manufacturers of the brominated chemicals (bromophenols, bromophenoxy derivatives, brominated biphenyls) which are expected, from knowledge of chemical reaction, to be contaminated with brominated dioxins and -dibenzofurans. We are continuing to investigate, however, whether there are users (formulators) of such compounds. We are also evaluating other organobromine manufacturing processes. If warranted, we will list wastes from such manufacturing operations, and will include brominated dioxins and -dibenzofurans as toxicants of concern.

With respect to the higher chlorinated dioxins, we agree that dechlorination occurs. However, it is very difficult to predict the extent of this process, and the equilibrium composition of the various isomers. Both photochemical synthesis and degradation of CDDs and CDFs can occur under ambient conditions. The photochemical formation of OCDDs from PCP has been shown to occur, both in solution, and on PCP-treated wood (Crosby et al., 1973; Crosby and Wong, 1978; Lamparsky, 1980). Resistance to degradation increases with degree of chlorination (Hutzinger, 1973; Crosby, 1973; Desideri, 1979; Dobbs and Grant, 1979; Nestrick, 1980). In most situations, photodegradation by reductive photodechlorination exceeds photosynthetic processes, and reaction routes and rates are dependent on reaction conditions. Rate constants

---

[26] Other dioxin-containing wastes are expected to contain much higher concentrations of the dioxins and dibenzofurans. Therefore, we would expect the residue from the incineration of these wastes to also contain much higher concentrations of the dioxins and dibenzofurans. Consequently, we believe that all other incineration residues should be managed as acute hazardous wastes and comply with the special management standards. However, any person may petition the Administrator (under §§ 260.20 and 260.22) to exclude their waste from regulatory control (or at least argue that the waste should not be considered an acute hazardous waste) if they can demonstrate such facts in their petition.

show that this process is a relatively minor pathway for the destruction of the octa-, hepta-, and hexachlorodioxins, accounting for less than 10% of octachlorodioxin destruction (Dobbs and Grant, 1979). Unidentified compounds with gas chromatographic retention times longer than that of OCDD are also formed. While photodechlorination can occur rapidly in solution under laboratory conditions, it can be slow in soil, or on leaves (Crosby, 1977). Contradictory results have been obtained in the laboratory experiments on photodegradation in the adsorbed state (Crosby, 1977; Wong, 1978). When degradation does take place, however, the congeners produced are usually those of less toxic concern. Although displacement of chlorine atoms *ortho* to the oxygen atoms does occur (Buser, 1979; Crosby, 1973; Lamparski, 1980), most investigators have noted that the lateral halogen atoms are the most labile (Stehl, 1971; Dobbs and Grant, 1979; Nestrick, 1980). Therefore, the 2,3,7,8-substituted isomers are those most likely to degrade. Thus, the photodegradation of highly chlorinated CDDs and CDFs is not likely to generate the less chlorinated isomers of most toxic concern. We therefore conclude that, in view of present knowledge, the regulation of wastes containing tetra-, penta-, and hexachlorodioxins and -dibenzofurans adequately address our present regulatory concerns.

F. Small Quantity Generator Comments

Several respondents commented that this regulation constitutes an excessive and unwarranted regulatory burden. One commenter stated that because of the limited disposal options small quantity generators now exempt from regulation would need to apply for status as storage facilities. One person argued that EPA must show a "sound basis" for the 1 kg/month small quantity generator limitation for these wastes.

EPA does not agree with the comments stating that this regulation represents an unreasonable burden on the regulated community. The economic impact analysis performed for this regulation (see Section IX.) determined that the costs incurred by this regulation are extremely modest (about eight million dollars per year, maximum).[27] When compared with the costs of cleaning up the mismanaged wastes (more than thirty million dollars for Times Beach, MO, alone) this modest economic burden is entirely warranted. Moreover, the economic analysis did not consider that many generators may already be covered by RCRA or TSCA regulation, and that the disposal of some of the listed formulations (those in which the listed chlorophenols or their derivatives are sole active ingredients) is already regulated under § 261.33 of RCRA. Additionally, because of their inherent value, we do not believe that the regulated community will usually discard substantial quantities of these formulations.

With respect to the comment that EPA must show a basis for the 1 kg/month small quantity generator limitation, this comment was previously discussed in Section III. B. 5. above.

G. Comments on Reuse and Recycling Issue

Several commenters stated that the provisions in the proposed regulation which would list and regulate these wastes as hazardous wastes would prohibit their reuse and recycling. This was said to be at odds with the recycling objectives of RCRA. Two commenters suggested that EPA should allow on-site recycling and reuse of the listed wastes without regulation.

Most of the comments concern issues which are part of a different rulemaking proceeding, amending the existing definition of solid waste and establishing management standards for hazardous wastes that are recycled. See 48 FR 14422, April 4, 1983 proposing these rules. Thus, we will address those comments in finalizing that rulemaking. We note, however, that nothing in this proposal or in existing rules would prohibit recycling of these wastes. Rather, these wastes would remain subject to regulation when they are to be recycled.

H. Applicability of the Mixture Rule

One commenter questioned whether, and to what extent, surface water runoff and plant sweepings would be considered hazardous waste under the mixture rule. As stated in § 261.3(c)(2), precipitation run-off is not automatically considered a hazardous waste, but plant sweepings which contain an acute hazardous waste are residues of cleanup operations, and would be considered to be acute hazardous waste, unless put to direct use as a pesticide or incorporated back into product.

I. Comments on the Analytical Method and the Background Document

Several respondents commented on the proposed analytical method for CDDs and CDFs. In general, these persons commented on specific details of the method, such as the need for sample preservation, the size of the specified extraction vessels, the suitability of the chromatographic substrates, the appropriateness of the calibration standard, and quality control procedures. Several comments were also received on the Background Document for this listing. These comments are responded to in detail in the Background Document for this listing. Where appropriate, the analytical method (see Appendix IX to Part 261 of this notice) and the Background Document have been modified.

VII. Relation of This Regulation to Those Promulgated Under CERCLA Section 102(b) (Reportable Quantities)

All hazardous wastes (or, in this case, acute hazardous wastes) included in today's final rule automatically become hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). (See CERCLA Section 101(14).) CERCLA requires that persons in charge of vessels or facilities from which hazardous substances have been released in quantities that are equal to or greater than the reportable quantities (RQs) immediately notify the National Response Center (NRC) or the release. (See CERCLA Section 103.) Except for those substances already on the list of CERCLA hazardous substances, which will retain the RQ already assigned, all hazardous wastes designated under RCRA will have an RQ of one pound, until adjusted by regulation under CERCLA. See Section 102.

If a waste has more than one constitutent of concern, the lowest RQ assigned to any one of the constituents present in the waste represents the RQ for the waste. If a person completely analyzes the waste, however, and determines that the RQ for each of the constituents of concern are below the RQ established for each of those compounds, no notification is required. Thus, for the dioxin-containing wastes listed today, a one pound RQ shall be assigned upon promulgation of this rule, since a one pound RQ has already been specified by operation of law (CERCLA Section 102) for a number of the constituents of concern.[28] Therefore, if a person were to spill one pound of any of the wastes covered by today's rule, he would need to notify the NRC of the release, unless the person determines

---

[27] This study assumed that all generators would need an RCRA storage permit.

[28] RQs have been assigned for the following constituents of concern: chlorophenols, 2,4,5-TCP, 2,4,6-TCP, 2,3,4,6-TeCP, TCDD: 1 lb; and 2,4,5-T acid, and its salt, amine, and ester derivatives, and Silvex and its esters: 100 lbs.

that there is less than an RQ of each hazardous constituent in the waste.

The one pound RQ is currently the lowest level established for reporting releases of hazardous substances for emergency response reporting. The basis for this RQ level was established under the Clean Water Act (CWA) as the smallest quantity container generally shipped in commerce. Many substances on the CERCLA Section 101(14) hazardous substance list may be extremely toxic, or otherwise extremely hazardous, and, therefore, may need to be controlled at levels well below the RQ levels. For instance, the CDDs and CDFs deserve special note for their extreme toxicity.

The RQ triggers are intended to provide notice of releases so that an On-Scene Coordinator (OSC), pursuant to the National Contingency Plan (40 CFR 300), can assess the hazard and the actions that may be taken by the federal government. It is emphasized that the legal obligation for the responsible party to notify the NRC is independent of actions taken by an OSC. The different RQ levels do not reflect a determination that a release of a substance will be hazardous at the RQ level, or not hazardous below that level. EPA has not attempted to make such a determination because the actual hazard will vary with the unique circumstances of the release, and extensive scientific data and analysis would be necessary to estimate the precise hazard presented by each substance in a number of plausible circumstances. Instead, the RQs reflect EPA's judgment that the Federal government should be notified of releases to which a response might be necessary. The RQs, in themselves, do not represent any determination that releases of a particular size are actually harmful to public health or the environment. See 48 FR 23560, May 25, 1983.

Many other considerations besides the quantity released affect the government's decision concerning whether and how it should respond to a particular release. The location of the release, its proximity to drinking water supplies or other valuable resources, the likelihood of exposure or injury to nearby populations, and other factors must be assessed on a case-by-case basis. The reporting requirement is, however, the trigger for assessments to be made (see 48 FR 23560).

While the one pound RQ is clearly the smallest emergency response notification trigger at the present time for CERCLA and CWA releases, EPA can take response, cleanup, and other actions below RQ levels. The RQ is a level that legally *requires* reporting by the responsible party. There obviously may be instances where EPA would need to know of releases well below the one pound RQ level. While EPA, in future refinements to the RQ scales, may consider lower levels, *this process is independent of today's rulemaking*. The reader is also advised that notification requirements within RCRA may require notification for releases which may be harmful, regardless of RQ determinations under CERCLA or the CWA. Specifically, the responsible party may be required to provide notice to EPA or the National Response Center under RCRA regarding spills and leaks of hazardous waste or hazardous waste constituents that may enter the environment (see 40 CFR 262.34 263.30, 264.56, and 265.56). In addition, each person who generates, transports, treats, stores, or disposes of these wastes must notify EPA of their activities, and thus, EPA will be aware of those persons who handle these extremely hazardous wastes.

VIII. 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 their States. (See 40 CFR Part 271 for the standards and requirements for authorization.) Authorization, either interim or final, may be granted to State programs that regulate the identification, generation, and transportation of hazardous wastes and the operation of facilities that treat, store, or dispose of hazardous waste. Interim authorization is granted to States with programs that are "substantially equivalent" to the Federal program (Section 3006(c)). Final authorization is granted to States with programs that are equivalent to the Federal program, consistent with the Federal program and other State programs, and that provide for adequate enforcement (Section 3006(b)).

Under RCRA, prior to the Hazardous and Solid Waste Amendments of 1984, once EPA authorizes a State program, EPA suspends administration and enforcement within the State of those parts of the Federal program for which the State is authorized. In authorized States, EPA does retain enforcement authority under Sections 3008, 7003, and 3013 of RCRA, although authorized States have primary enforcement responsibility. However, under Section 3006(g) of the Hazardous and Solid Waste Amendments of 1984, any requirement pertaining to hazardous wastes promulgated pursuant to the Amendments is effective in authorized States at the same time it is effective in other States. EPA will administer and enforce the requirements in each State until the State is authorized with respect to such requirements.

The listing and related management standards promulgated in today's rule are applicable in all States since the requirements are imposed pursuant to the Amendments. Thus EPA will implement these standards until authorized States revise their programs to adopt these rules.

B. Effect on State Authorizations

Under RCRA, authorized State programs must be revised to incorporate new requirements imposed by statute or EPA regulations. The procedures and schedule for State adoption of these requirements is described in 40 CFR 271.21. See 49 FR 21678 (May 22, 1984).

States that have final authorization must revise their programs within a year of promulgation of today's regulations if only regulatory changes are necessary. These deadlines can be extended in exceptional cases. See 40 CFR 271.21(e).

States that submit official applications for final authorization less than 12 months after promulgation of today's regulations may be approved without including standards equivalent to those promulgated. However, once authorized, a State must revise its program to include the listing and related management standards substantially equivalent or equivalent to EPA's within the time period discussed above.

Under the HSWA, states revising their programs to adopt new requirements imposed under the HSWA may do so based on state requirements that are equivalent or substantially equivalent to the HSWA requirements. See Section 3006(g)(2). Thus a state seeking authorization for today's amendments may do so based on controls that are equivalent or substantially equivalent to today's rule.

IX. Economic, Environmental, and Regulatory Impacts

A. Regulatory Impact Analysis

Under Executive Order 12291, EPA must determine whether a regulation is "major", and therefore subject to the requirement of a Regulatory Impact Analysis. These amendments, in part, replace regulations under a different statute (Section 6(d) of the Toxic Substance Control Act), and impose an additional regulatory burden on only a small number of manufacturers of chlorophenols, and their chlorophenoxy derivatives. In addition, some manufacturers who use equipment which may be contaminated with CDDs and CDFs may also have an additional regulatory burden.

EPA has analyzed the potential economic impact of these amendments (JRB, 1984). This analysis considered various disposal scenarios; this analysis also assumed that all generators of these wastes would need a permit for their tank or container storage facility, (*i.e.*, none of these generators would qualify for the short storage provision in 40 CFR § 262.34), including the requirement for secondary containment. Based on this analysis, we estimate the cost of this regulation to be between six and eight million. In addition, we also carefully evaluated the impact of these rules on the costs, prices, and markets of these products (dePoix, 1984). Based on this analysis, EPA has determined that major increases in consumer prices are not likely, and since these products have negligible foreign competition, the implementation of these regulations will have little or no adverse impact on the ability of U.S.-based enterprises to compete with foreign-based enterprises in either domestic or export markets.

Therefore, since EPA does not expect that the amendments promulgated here will have an annual effect on the economy of $100 million or more, will not result in a measurable increase in costs or prices, or have an adverse impact on the ability of U.S.-based enterprises in either domestic or export markets, these amendments are not considered to constitute a major action. As such, a Regulatory Impact Analysis is not required.

This amendment was submitted to the Office of Management and Budget (OMB) for review as required by Executive Order 12291. Any comments from OMB to EPA, and any EPA responses to those comments are available for public inspection in S–212 at EPA.

B. Regulatory Flexibility Act.

Pursuant to the Regulatory Flexibility Act, 5 U.S.C. § 601 *et seq.*, whenever an agency is required to publish a general 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 impact of the rule on small entities (*i.e.*, small businesses, small organizations, and small governmental jurisdictions). No regulatory flexibility analysis is required, however, if the head of the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities.

The hazardous waste listed in § 261.31 of this final regulation are rarely generated by small entities. The overall compliance costs associated with the rule are modest. (See report entitled, "Cost Impact Analysis for the Proposed Rule Regulating Certain Waste Containing Certain Chlorinated Dioxins, -Dibenzofurans, and Phenols" for cost estimates.) The only one of these wastes that small entities would discard are the formulating wastes, and EPA does not believe that small entities will dispose of significant quantities of the commercial chemical products. Nor did commenters present any quantified information that significant amounts of these commercial products are discarded by large or small entities. In addition, many of these formulations are already listed wastes. See, *e.g.*, Hazardous Waste No. U242. Thus, today's amendment is unlikely to have a significant economic impact on a substantial number of small entities. This regulation therefore does not require a regulatory flexibility analysis.

C. Paper Work Reduction Act

The information collection requirements contained in this rule have been approved by the Office of Management and Budget (OMB) under the provisions of the Paperwork Reduction Act of 1980, 44 U.S.C. 3501 *et seq.* and have been assigned OMB control number 2050–0012.

X. References

ADL. 1983. Analysis of flexible membrane liner chemical compatibility tests. Draft final report, March 31.

Akermark, B. 1978. Photodechlorination of haloaromatic compounds. *In:* Dioxins: Toxicological and Chemical Aspects. F. Cattabani et al., eds. S.P. Medical and Scientific Books. N.Y. pp. 191–202.

AWPI. 1983. Effects of Chemical Preservatives on the health of wood treating workers in Hawaii, 1981.

Bishop, C.M. and A.H. Jones. 1981. Non-Hodgkins Lymphoma of the scalp in workers exposed to dioxins. *Lancet* (ii) 369.

Bleiberg, J. et al. 1964. Industrially acquired porphyria. *Arch. Dermatol.* 89:793–797.

Buser, H.R. 1976. Preparation of qualitative stantard mixtures of polychlorinated dibenzo-p-dioxins and dibenzofurans by ultraviolet and gamma-irradiation of the octachloro compounds. *J. Chromat.* 129:303–307.

Buser, H.R. and H.P. Bosshardt. 1976. Determination of polychlorinated dibenzo-p-dioxins and dibensofurans in commercial chlorphenols by combined gas chromatography mass spectrometry. *J. Off. Anal. Chem.* 59:562–567.

Buser, H.R. 1979. Formation and identification of tetra- and pentachlorodibenzo-p-dioxins from photolysis of two isomeric hexachlorodibenzo-p-dioxins. *Chemosphere.* 8:251–257.

Choudry et al. 1977. Synthesis of chlorinated dibenzofurans by photolysis of chlorinated diphenylethers in acetone solution. *Chemosphere.* 6:327–332.

Crosby, D.G. et al. 1971. Photodecomposition of chlorinated dibenzo-p-dioxins. *Science.* 173:748–749.

Crosby, D.G. et al. 1973. Environmental generation and degradation of dibenzodioxins and dibensofurans. *Env. Health Persp.* 5:259–266.

Crosby, D.G. and A.S. Wong. 1977. Environmental degradation of 2,3,7,8–TCDD. *Science.* 1337–1338.

Crosby, D.G. and A.S. Wong. 1978. Photolysis of pentachlorophenol in water. *Env. Sci. Res.* 12:19–25.

Dalderup, L.M. 1978. Safety measures for taking down buildings contaminated with toxic materials. T. Soc. *Geneesk.* 52:582–588; 616–623.

de Poix, G., 1984. Memorandum to M. Straus on economic impact analysis of dioxin listing. September 4.

Dobbs, A. and G. Grant. 1979. Photolysis of highly chlorinated dibenzo-p-dioxins by sunlight. *Nature.* 278:163–165.

Desideri, A. et al. 1979. Photolysis of 2,3,7,8–TCDD in isooctane, hexane, and cyclohexane. *Bull. Chem. Farmac.* 118: 274–281.

Eadon, G et al. 1982. Comparisons of chemical and biological data on soot samples from the Binghamton State Office Building. Center for Laboratories and Research, N.Y. State Department of Health. March.

Erdreich, L. 1983. Memorandum to J. Bellin on evaluation of epidemiologic study of wood workers in Hawaii. December 8.

Fishbein, L. 1982. Halogenated contaminants: dibenzo-p-dioxins and dibenzofurans. *In:* Handbook of carcinogens and hazardous substances. Malcolm C. Bowman, ed. Marcel Dekker Inc. New York.

Gallagher, R.P. and W.J.T. Threlfall. 1984. Cancer risk in wood and pulp workers. *In:* Carcinogens and mutagens in the environment. CRC Press. Boca Raton, Fl. (In. press).

Goldmann, P.J. 1973. Schwerste akute Chloracne, eine Masse Intoxikation durch 2,3,4,8-Tetrachlordibenzo-*p*-dioxin. *Hautarzt.* 24: 149–150.

Grufferman, S. et al. 1976. Occupation and Hodgkins disease. *J. Nat. Cancer Inst.* 57: 1193–1195.

Hardell, L. et al. 1982. Epidemiologic study of nasal and naso-pharyngeal cancer and their relationship to phenoxy acid or chlorophenol exposure. *Am. J. Ind. Med.* 3:247–257.

Haberman, B.H. and S. Bayard. 1984. Memo to Judy Bellin (OSW) on qualitative evaluation and unit risk estimate for hexachlorodibenzo-*p*-dioxin carcinogenicity data in animals. *January 3.*

Hilderbrandt, P.K., 1983. Letter to E.E. McConnell (NIEHS) on histology review of liver tissue from HxCDD-treated rats. October 31.

Hutzinger, O. et al. 1973. Photochemical degradation of di- and octachloro dibenzofuran. *Env. Health Persp.* 5:267–271.

JRB Associates. 1984. Cost impact analysis for the proposed rule regulating certain wastes containing certain chlorinated dioxins, -dibenzofurans, and -phenols. April.

Kimbrough, R.D. et al. 1983. Risk Assessment document on 2, 3, 7, 8-Tetrachlorodibenzodioxin (TCDD) levels in soil. USDHHS/CDC/NIEHS. December.

Lamparski, L.L. et al. 1980. Photolysis of pentachlorophenol-treated wood; chlorinated dibenzo-p-dioxin formation. *Env. Sci. Technol.* 14:196–201.

McGaughy, R. (ORD). 1984. Memorandum to A. Rispin (OPP) on carcinogenic potency estimate for HxCDDs. April 19.

Miles, W.F., et al. 1984. Isomer specific determination of hexachlorodioxins in technical pentachlorophenol (PCP) and its sodium salt. *4th. Internl. Symp. Chld. Dioxins and Reld. Cpds.* Ottawa, Oct. 16–19.

MRI. 1983. Determination of the destruction of PCBs at SCA Chemical Services Inc. Chicago incinerator. Final Report, Part I. Technical Summary. MRI Project Number 7302G. January 21.

National Academy of Sciences. 1977. Drinking water and health. National Academy of Sciences, Washington, D.C.

Nestrick, T.J. et al. 1980. Indentification of tetrachlorodibenzo-p-dioxin isomers at the 1 ng level by photolytic degradation and pattern recognition techniques. *Anal. Chem.* 52:1865–1874.

Plimmer, J.R. and U.I. Klingbiel. 1971. Riboflavin photosensitized oxidation of 2, 4-dichlorophenol: assessment of possible chlorinated dioxin formation. *Science* 174:404–408.

Plimmer, J.R. et al. 1973. Photochemistry of dibenzo-p-dioxins. *Adv. Chem.* 120:44–54.

Poiger, M. and C. Schlatter. 1980. Influence of solvents and absorbance on dermal and intestinal absorption of TCDD. *Fd. Cosmet. Toxicol.* 18:477–481.

Ris, C. (EPA/ORD). 1983. Memorandum to J.S. Bellin (EPA/OSW), memorandum on 1981 Hawaii epidemiology study. September 16.

Sambeth, J. 1983. The Seveso accident. *Chemosphere* 12:681–686.

Schwetz, B.A. et al. 1978. Results of two-year toxicity and reproduction studies on pentachlorophenol in rats. *In*: Pentachlorophenol, chemistry, pharmacology, and environmental toxicology (K.R. Rao, ed.), Plenum Press, N.Y.

Squire, R.A. 1983. An assessment of the experimental evidence for potential carcinogenicity of hexachlorodibenzo-*p*-dioxin. June 29.

Sthel, R. et al. 1971. The stability of pentachlorophenol and chlorinated dioxins to sunlight, heat and combustion. *162nd annual meeting. Amer. Chem. Soc.* Sept. (Abstract 92).

USDHHS. 1980. Bioassay of a mixture of 1,2,3,6,7,8- and 1,2,3,7,8,9-hexachlorodibenzo-*p*-dioxins for possible carcinogenicty. 1980. NTP. No. 80–12.

USDDHS. 1984. Health risk estimates for 2, 3, 7, 8-tetrachloro-dibenzodiozin in soil. *Morbility and mortality weekly report* 33:25–8.

USEPA. 1978. Report of the Ad Hoc Study group for pentachlorophenol contaminants. Environmental health advisory committee. Science Advisory Board. December. (EPA/SAB/78/001).

USEPA. 1981a. Creosote, inorganic arsenicals, pentachlorophenol. Position Document No. 2/3. Office of Pesticides and Toxic Substances. January.

USEPA. 1981b. Interim evaluations of health risks associated with emissions of tetrachlorinated dioxins from municipal waste resource recovery facilities. Office of the Administrator. (November 19).

USEPA. 1981c. Incineration of PCBs; Summary of Approval Actions; Energy Systems Company (ENSCO), El Dorado, AR. EPA Region 6. February 6, 1981.

USEPA. 1981d. Incineration of PCBs; Summary of Approval Actions; Rollins Environmental Services, Deer Park, TX. EPA Region 6. February 6, 1981.

USEPA. 1982. Development Document for Effluent Limitations Guidelines and Standards for the Pesticides. EPA 440/1–82–079b. (Proposed).

USEPA. 1983. Dioxin strategy. OWRS; OSWER. November 28. Wipf, H.K. et al. 1978. Field trials on photodegradation of TCDD on vegetables after spraying with vegetable oil. *In:* Dioxins: toxicological and chemical aspects. *Op. Cit.*

USEPA. 1984. Project for performance of remedial response activities at uncontrolled hazardous substance facilities, zone 1. Analytical results from Brady Metals, Newark, N.J. EPA Region 2. NUS Corporation. March 21 (final draft).

USEPA. 1984b. Ambient Water Quality Criteria for 2,3,7,8-Tetrachlorodibenzo-*p*-dioxin. EPA 440/5–84–007.

Williams, P.L. 1982. Pentachlorophenol, an assessment of the occupational hazard. *Am. Ind. Hyg. Assoc. J.* 43:799–810.

Wong, A.S. and D.G Crosby. 1978a. Decontamination of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDDs) by photochemical action. *In:* Dioxins: toxicological and chemical aspects. *Op. Cit.*

Wong, A.S. and D.G. Crosby (1978b). Photolysis of Pentachlorophenol in Water. *Environ. Sci. Res.* 12:19–25.

XI. List of Subjects

40 CFR Part 261

Hazardous materials, Waste treatment and disposal, Recycling.

40 CFR Part 264

Hazardous materials, Packaging and containers, Reporting and recordkeeping requirements, Security measures, Security bonds, Waste treatment and disposal.

40 CFR Part 265

Hazardous materials, Packaging and containers, Reporting and recordkeeping requirements, Security measures, Security bonds, Waste treatment and disposal, Water supply.

40 CFR Part 270

Administrative practice and procedure, Reporting and recordkeeping requirements, Hazardous materials, Waste treatment and disposal, Water pollution control, Water supply, Confidential business information.

40 CFR Part 775

Environmental protection, Hazardous materials, Pesticides and pests, Waste treatment and disposal.

Dated: December 20, 1984.

Alvin L. Alm,

Acting Administrator.

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

PART 261—IDENTIFICATION AND LISTING OF HAZARDOUS WASTE

1. The authority citation for Part 261 reads as follows:

Authority: Secs. 1006, 2002(a), 3001, and 3002 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 6922).

2. In § 261.5, paragraphs (e)(1) and (e)(2) are revised to read as follows:

§ 261.5 Special requirements for hazardous waste generated by small quantity generators.

* * * * *

(e) * * *

(1) A total of one kilogram of acute hazardous wastes listed in §§ 261.31, 261.32, or 261.33(e).

(2) A total of 100 kilograms of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of any acute hazardous wastes listed in §§ 261.31, 261.32, or 261.33(e).

* * * * *

3. In § 261.7, the introductory text of paragraphs (b)(1) and (b)(3) are revised to read as follows:

§ 261.7 Residues of hazardous waste in empty containers.

* * * * *

(b)(1) A container or an inner liner removed from a container that has held any hazardous waste, except a waste that is a compressed gas or that is identified as an acute hazardous waste listed in §§ 261.31, 261.32, or 261.33(e) of this chapter is empty if:

* * * * *

(3) A container or an inner liner removed from a container that has held an acute hazardous waste listed in §§ 261.31, 261.32, or 261.33(e) is empty if:

* * * * *

4. In § 261.30, paragraph (d) is revised to read as follows:

§ 261.30 General.

* * * * *

(d) The following hazardous wastes listed in § 261.31 or § 261.32 are subject to the exclusion limits for acutely hazardous wastes established in § 261.5: EPA Hazardous Wastes Nos. FO20, FO21, FO22, FO23, FO26, and FO27.

* * * * *

5. In § 261.31, add the following waste streams:

§ 261.31 Hazardous waste from nonspecific sources.

Industry	EPA hazardous waste No.	Hazardous waste	Hazard code
* * * * * * *			
Generic	FO20	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- or tetrachlorophenol, or of intermediates used to produce their pesticide derivatives. (This listing does not include wastes from the production of Hexachlorophene from highly purified 2,4,5-trichlorophenol.).	(H).
	FO21	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol, or of intermediates used to produce its derivatives.	(H).
	FO22	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions.	(H).
	FO23	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- and tetrachlorophenols. (This listing does not include wastes from equipment used only for the production or use of Hexachlorophene from highly purified 2,4,5-trichlorophenol.).	(H).
	FO26	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzene under alkaline conditions.	(H).
	FO27	Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chloropheriols. (This listing does not include formulations containing Hexachlorophene sythesized from prepurified 2,4,5-trichlorophenol as the sole component.).	(H).
	FO28	Residues resulting from the incineration or thermal treatment of soil contaminated with EPA Hazardous Wasto Nos. FO20, FO21, FO22, FO23, FO26, and FO27.	(T).
* * * * * * *			

6. § 261.33(f) is amended by revising the hazardous waste numbers for the following substances:

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

* * * * *

(f) * * *

Hazardous waste No.	Substance
* * * * *	
See FO27	Pentachlorophenol.
* * * * *	
See FO27	Phenol, pentachloro-.
Do	Phenol, 2,3,4,6-tetrachloro-.
Do	Phenol, 2,4,5-trichloro-.
Do	Phenol, 2,4,6-trichloro-.
* * * * *	
See FO27	Propionic acid, 2-(2,4,5-trichlorophenoxy)-.
* * * * *	
See FO27	Silvex.
* * * * *	
See FO27	2,4,5-T.
* * * * *	
See FO27	2,3,4,6-Tetrachlorophenol.
* * * * *	
See FO27	2,4,5-Trichlorophenol.
Do	2,4,6-Trichlorophenol.
Do	2,4,5-Trichlorophenoxyacetic acid.
* * * * *	

7. Amend Table 1 in Appendix III of Part 261, by removing the entry "chlorinated dibenzodioxins", and adding the following entries in alphabetical order:

Appendix III—Chemical Analysis Test Methods

TABLE 1.—ANALYTICAL METHODS FOR ORGANIC CHEMICALS CONTAINED IN SW-846

Compound	First edition method(s)	Second edition method(s)
* * * * * *		
Chlorinated dibenzo-*p*-dioxins		8280
Chlorinated dibenzofurans		8280
* * * * * *		

8. Amend Table 3 in Appendix III of Part 261, by adding the following entry under Organic Analytical Methods—Gas Chromatographic/Mass Spectroscopy Methods (GC/MS) after the entry entitled "GC/MS Semi-Volatiles, Capillary:

TABLE 3.—SAMPLING AND ANALYSIS METHODS CONTAINED IN SW-846

Title	First edition		Second edition	
	Section No.	Method No.	Section No.	Method No.
* * * * * *				
Analysis of Chlorinated Dioxins and Dibenzofurans			8.2	8280
* * * * * *				

9. Add the following entries in numerical order to Appendix VII of Part 261:

Appendix VII—Basis for Listing Hazardous Wastes

EPA hazardous waste No.	Hazardous constituents for which listed
* * * * *	
FO20	Tetra- and pentachlorodibenzo-*p*-dioxins; tetra and pentachlorodi-benzofurans; tri- and tetrachlorophenols and their chlorophenoxy derivative acids, esters, ethers, amine and other salts.
FO21	Penta- and hexachlorodibenzo-*p*-dioxins; penta- and hexachlorodibenzofurans; pentachlorophenol and its derivatives.
FO22	Tetra-, penta-, and hexachlorodibenzo-*p*-dioxins; tetra-, penta-, and hexachlorodibenzofurans.
FO23	Tetra-, and pentachlorodibenzo-*p*-dioxins; tetra- and pentachlorodibenzofurans; tri- and tetra-chlorophenols and their chlorophenoxy derivative acids, esters, ethers, amine and other salts.
FO26	Tetra-, penta-, and hexachlorodibenzo-*p*-dioxins; tetra-, penta-, and hexachlorodibenzofurans.
FO27	Tetra-, penta-, and hexachlorodibenzo-*p*-dioxins; tetra-, penta-, and hexachlorodibenzofurans; tri-, tetra-, and pentachlorophenols and their chlorophenoxy derivative acids, esters, ethers, amine and other salts.
FO28	Tetra-, penta-, and hexachlorodibenzo-*p*-dioxins; tetra-, penta-, and hexachlorodibenzofurans; tri-, tetra-, and pentachlorophenols and their chlorophenoxy derivative acids, esters, ethers, amine and other salts.
* * * * *	

10. Add the following constituents in alphabetical order to Appendix VIII of Part 261:

Appendix VIII—Hazardous Constituents

* * * * *

hexachlorodibenzo-*p*-dioxins
hexachlorodibenzofurans
pentachlorodibenzo-*p*-dioxins
pentachlorodibenzofurans

tetrachlorodibenzo-*p*-dioxins
tetrachlorodibenzofurans

* * * * *

11. Appendix X is added to Part 261 to read as follows:

Appendix X—Method of Analysis for Chlorinated dibenzo-p-dioxins and dibenzofurans [1, 2, 3, 4]

Method 8280

1. *Scope and Application*

1.1 This method measures the concentration of chlorinated dibenzo-*p*-dioxins and chlorinated dibenzofurans in chemical wastes including still bottoms, filter aids, sludges, spent carbon, and reactor residues, and in soils.

1.2 The sensitivity of this method is dependent upon the level of interferences.

1.3 This method is recommended for use only by analysts experienced with residue analysis and skilled in mass spectral analytical techniques.

1.4 Because of the extreme toxicity of these compounds, the analyst must take necessary precautions to prevent exposure to himself, or to others, of materials known or believed to contain CDDs or CDFs.

2. *Summary of the Method*

2.1 This method is an analytical extraction cleanup procedure, and capillary column gas chromatograph-low resolution mass spectrometry method, using capillary column GC/MS conditions and internal standard techniques, which allow for the measurement of PCDDs and PCDFs in the extract.

2.2 If interferences are encountered, the method provides selected general purpose cleanup procedures to aid the analyst in their elimination.

3. *Interferences*

3.1 Solvents, reagents, glassware, and other sample processing hardware may yield discrete artifacts and/or elevated baselines causing misinterpretation of gas chromatograms. All of these materials must be demonstrated to be free from interferences under the conditions of the analysis by running method blanks. Specific selection of reagents and purification of solvents by distillation in all-glass systems may be required.

3.2 Interferences co-extracted from the samples will vary considerably from source to source, depending upon the diversity of the industry being sampled. PCDD is often associated with other interfering chlorinated compounds such as PCB's which may be at concentrations several orders of magnitude higher than that of PCDD. While general cleanup techniques are provided as part of this method, unique samples may require additional cleanup approaches to achieve the sensitivity stated in Table 1.

3.3 The other isomers of tetrachlorodibenzo-*p*-dioxin may interfere with the measurement of 2,3,7,8–TCDD. Capillary column gas chromatography is required to resolve those isomers that yield virtually identical mass fragmentation patterns.

4. *Apparatus and Materials*

4.1. Sampling equipment for discrete or composite sampling.

4.1.1 Grab sample bottle—amber glass, 1-liter or 1-quart volume. French or Boston Round design is recommended. The container must be washed and solvent rinsed before use to minimize interferences.

4.1.2. Bottle caps—threaded to screw on to the sample bottles. Caps must be lined with Teflon. Solvent washed foil, used with the shiny side towards the sample, may be substituted for the Teflon if sample is not corrosive.

4.1.3. Compositing equipment—automatic or manual composing system. No tygon or rubber tubing may be used, and the system must incorporate glass sample containers for the collection of a minimum of 250 ml. Sample containers must be kept refrigerated after sampling.

4.2 Water bath—heated, with concentric ring cover, capable of temperature control (±2 °C). The bath should be used in a hood.

4.3 Gas chromatograph/mass spectrometer data system.

4.3.1 Gas chromatograph: An analytical system with a temperature-programmable gas chromatograph and all required accessories including syringes, analytical columns, and gases.

4.3.2 Column: SP–2250 coated on a 30 m long × 0.25 mm I.D. glass column (Supelco No. 2-3714 or equivalent). Glass capillary column conditions: Helium carrier gas at 30 cm/sec linear velocity run splitless. Column temperature is 210 °C.

4.3.3 Mass spectrometer: Capable of scanning from 35 to 450 amu every 1 sec or less, utilizing 70 volts (nominal) electron energy in the electron impact ionization mode and producing a mass spectrum which meets all the criteria in Table 2 when 50 ng of decafluorotriphenyl-phosphine (DFTPP) is injected through the GC inlet. The system must also be capable of selected ion monitoring (SIM) for at least 4 ions simultaneously, with a cycle time of 1 sec or less. Minimum integration time for SIM is 100 ms. Selected ion monitoring is verified by injecting .015 ng of TCDD Cl^{37} to give a minimum signal to noise ratio of 5 to 1 at mass 328.

4.3.4 GC/MS interface: Any GC-to-MS interface that gives acceptable calibration points at 50 ng per injection for each compound of interest and achieves acceptable tuning performance criteria (see Sections 6.1–6.3) may be used. GC-to-MS interfaces constructed of all glass or glass-lined materials are recommended. Glass can be deactivated by silanizing with dichlorodimethylsilane. The interface must be capable of transporting at least 10 ng of the components of interest from the GC to the MS.

4.3.5 Data system: A computer system must be interfaced to the mass spectrometer. The system must allow the continuous acquisition and storage on machine-readable media of all mass spectra obtained throughout the duration of the chromatographic program. The computer must have software that can search any GC/MS data file for ions of a specific mass and that can plot such ion abundances versus time or scan number. This type of plot is defined as an Extracted Ion Current Profile (EICP). Software must also be able to integrate the abundance, in any EICP, between specified time or scan number limits.

4.4 Pipettes-Disposable, Pasteur, 150 mm long × 5 mm ID (Fisher Scientific Co., No. 13–678–6A or equivalent).

4.5 Flint glass bottle (Teflon-lined screw cap).

4.6 Reacti-vial (silanized) (Pierce Chemical Co.).

5. *Reagents*

5.1 Potassium hydroxide-(ACS), 2% in distilled water.

5.2 Sulfuric acid-(ACS), concentrated.

5.3 Methylene chloride, hexane, benzene, petroleum ether, methanol, tetradecane-pesticide quality or equivalent.

5.4 Prepare stock standard solutions of TCDD and ^{37}Cl–TCDD (molecular weight 328) in a glove box. The stock solutions are stored in a glovebox, and checked frequently for signs of degradation or evaporation, especially just prior to the preparation of working standards.

5.5 Alumina-basic, Woelm; 80/200 mesh. Before use activate overnight at 600°C, cool to room temperature in a dessicator.

5.6 Prepurified nitrogen gas

6.0 *Calibration*

6.1 Before using any cleanup procedure, the analyst must process a series of calibration standards through the procedure to validate elution patterns and the absence of interferences from reagents.

6.2 Prepare GC/MS calibration standards for the internal standard technique that will allow for measurement of relative response factors of at least three CDD/^{37}CDD ratios. Thus, for TCDDs, at least three TCDD/^{37}Cl–TCDD and TCDF/^{37}Cl–TCDF must be determined.[5] The ^{37}Cl–TCDD/F concentration

---

[1] This method is appropriate for the analysis of tetra-, penta-, and hexachlorinated dibenzo-*p*-dioxins and -dibenzofurans.

[2] Analytical protocol for determination of TCDDs in phenolic chemical wastes and soil samples obtained from the proximity of chemical dumps. T.O. Tiernan and M. Taylor. Brehm Laboratory, Wright State University, Dayton, OH 45435.

[3] Analytical protocol for determination of chlorinated dibenzo-*p*-dioxins and chlorinated dibenzofurans in river water. T.O. Tiernan and M. Taylor. Brehm Laboratory, Wright State University, Dayton, OH 45435.

[4] In general, the techniques that should be used to handle these materials are those which are followed for radioactive or infectious laboratory materials. Assistance in evaluating laboratory practices may be obtained from industrial hygienists and persons specializing in safe laboratory practices. Typical infectious waste incinerators are probably not satisfactory devices for disposal of materials highly contaminated with CDDs or CDFs. Safety instructions are outlined in EPA Test Method 613(4.0)

See also: 1) "Program for monitoring potential contamination in the laboratory following the handling and analyses of chlorinated dibenzo-p-dioxins and dibenzofurans" by F. D. Hileman et al., *In:* Human and Environmental Risks of Chlorinated Dioxins and Related Compounds, R.E. Tucker, et al, eds., Plenum Publishing Corp., 1983. 2) Safety procedures outlined in EPA Method 613, Federal Register volume 44, No. 233, December 3, 1979.

[5] ^{37}Cl-labelled 2,3,7,8–TCDD and 2,3,7,8–TCDF are available from K.O.R. Isotopes, and Cambridge

Continued

in the standard should be fixed and selected to yield a reproducible response at the most sensitive setting of the mass spectrometer. Response factors for PCDD and HxCDD may be determined by measuring the response of the tetrachloro-labelled compounds relative to that of the unlabelled 1,2,3,4- or 2,3,7,8-TCDD, 1,2,3,4,7-PCDD or 1,2,3,4,7,8-HxCDD, which are commercially available.[6]

6.3 Assemble the necessary GC/MS apparatus and establish operating parameters equivalent to those indicated in Section 11.1 of this method. Calibrate the GC/MS system according to Eichelberger, et al. (1975) by the use of decafluorotriphenyl phosphine (DFTPP). By injecting calibration standards, establish the response factors for CDDs *vs.* ^{37}Cl-TCDD, and for CDFs *vs.* ^{37}Cl-TCDF. The detection limit provided in Table 1 should be verified by injecting .015 ng of ^{37}Cl-TCDD which should give a minimum signal to noise ratio of 5 to 1 at mass 328.

7. *Quality Control*

7.1 Before processing any samples, the analyst should demonstrate through the analysis of a distilled water method blank, that all glassware and reagents are interference-free. Each time a set of samples is extracted, or there is a change in reagents, a method blank should be processed as a safeguard against laboratory contamination.

7.2 Standard quality assurance practices must be used with this method. Field replicates must be collected to measure the precision of the sampling technique. Laboratory replicates must be analyzed to establish the precision of the analysis. Fortified samples must be analyzed to establish the accuracy of the analysis.

8. *Sample Collection, Preservation, and Handling*

8.1 Grab and composite samples must be collected in glass containers. Conventional sampling practices should be followed, except that the bottle must not be prewashed with sample before collection. Composite samples should be collected in glass containers in accordance with the requirements of the RCRA program. Sampling equipment must be free of tygon and other potential sources of contamination.

8.2 The samples must be iced or refrigerated from the time of collection until extraction. Chemical preservatives should not be used in the field unless more than 24 hours will elapse before delivery to the laboratory. If an aqueous sample is taken and the sample will not be extracted within 48 hours of collection, the sample should be adjusted to a pH range of 6.0–8.0 with sodium hydroxide or sulfuric acid.

8.3 All samples must be extracted within 7 days and completely analyzed within 30 days of collection.

9. *Extraction and Cleanup Procedures*

9.1 Use an aliquot of 1–10 g sample of the chemical waste or soil to be analyzed. Soils should be dried using a stream of prepurified nitrogen and pulverized in a ball-mill or similar device. Perform this operation in a clear area with proper hood space. Transfer the sample to a tared 125 ml flint glass bottle (Teflon-lined screw cap) and determine the weight of the sample. Add an appropriate quantity of ^{37}Cl-labelled 2,3,7,8-TCDD (adjust the quantity according to the required minimum detectable concentration), which is employed as an internal standard.

9.2 Extraction

9.2.1 Extract chemical waste samples by adding 10 ml methanol, 40 ml petroleum ether, 50 ml doubly distilled water, and then shaking the mixture for 2 minutes. Tars should be completely dissolved in any of the recommended neat solvents. Activated carbon samples must be extracted with benzene using method 3540 in SW–846 (Test Methods for Evaluating Solid Waste—Physical/Chemical Methods, available from G.P.O. Stock #055–022–81001–2). Quantitatively transfer the organic extract or dissolved sample to a clean 250 ml flint glass bottle (Teflon lined screw cap), add 50 ml doubly distilled water and shake for 2 minutes. Discard the aqueous layer and proceed with Step 9.3.

9.2.2 Extract soil samples by adding 40 ml of petroleum ether to the sample, and then shaking for 20 minutes. Quantitatively transfer the organic extract to a clean 250 ml flint glass bottle (Teflon-lined screw cap), add 50 ml doubly distilled water and shake for 2 minutes. Discard the aqueous layer and proceed with Step 9.3.

9.3 Wash the organic layer with 50 ml of 20% aqueous potassium hydroxide by shaking for 10 minutes and then remove and discard the aqueous layer.

9.4 Wash the organic layer with 50 ml of doubly distilled water by shaking for 2 minutes, and discard the aqueous layer.

9.5 Cautiously add 50 ml concentrated sulfuric acid and shake for 10 minutes. Allow the mixture to stand until layers separate (approximately 10 minutes), and remove and discard the acid layer. Repeat acid washing until no color is visible in the acid layer.

9.6 Add 50 ml of doubly distilled water to the organic extract and shake for 2 minutes. Remove and discard the aqueous layer and dry the organic layer by adding 10g of anhydrous sodium sulfate.

9.7 Concentrate the extract to incipient dryness by heating in a 55° C water bath and simultaneously flowing a stream of prepurified nitrogen over the extract. Quantitatively transfer the residue to an alumina microcolumn fabricated as follows:

9.7.1 Cut off the top section of a 10 ml disposable Pyrex pipette at the 4.0 ml mark and insert a plug of silanized glass wool into the tip of the lower portion of the pipette.

9.7.2 Add 2.8g of Woelm basic alumina (previously activated at 600° C overnight and then cooled to room temperature in a desiccator just prior to use).

9.7.3 Transfer sample extract with a small volume of methylene chloride.

9.8 Elute the microcolumn with 10 ml of 3% methylene cholride-in-hexane followed by 15 ml of 20% methylene chloride-in-hexane and discard these effluents. Elute the column with 15 ml of 50% methylene chloride-in-hexane and concentrate this effluent (55° C water bath, stream of prepurified nitrogen) to about 0.3–0.5 ml.

9.9 Quantitatively transfer the residue (using methylene chloride to rinse the container) to a silanized Reacti-Vial (Pierce Chemical Co.). Evaporate, using a stream of prepurified nitrogen, almost to dryness, rinse the walls of the vessel with approximately 0.5 ml methylene chloride, evaporate just to dryness, and tightly cap the vial. Store the vial at 5° C until analysis, at which time the sample is reconstituted by the addition of tridecane.

9.10 Approximately 1 hour before GC–MS (HRGC–LRMS) analysis, dilute the residue in the micro-reaction vessel with an appropriate quantity of tridecane. Gently swirl the tridecane on the lower portion of the vessel to ensure dissolution of the CDDs and CDFs. Analyze a sample by GC/EC to provide insight into the complexity of the problem, and to determine the manner in which the mass spectrometer should be used. Inject an appropriate aliquot of the sample into the GC–MS instrument, using a syringe.

9.11 If, upon preliminary GC–MS analysis, the sample appears to contain interfering substances which obscure the analyses for CDDs and CDFs, high performance liquid chromatographic (HPLC) cleanup of the extract is accomplished, prior to further GC–MS analysis.

10. *HPLC Cleanup Procedure*[7]

10.1 Place approximately 2 ml of hexane in a 50 ml flint glass sample bottle fitted with a Teflon-lined cap.

10.2 At the appropriate retention time, position sample bottle to collect the required fraction.

10.3 Add 2 ml of 5% (w/v) sodium carbonate to the sample fraction collected and shake for one minute.

10.4 Quantitatively remove the hexane layer (top layer) and transfer to a micro-reaction vessel.

10.5 Concentrate the fraction to dryness and retain for further analysis.

11. *GC/MS Analysis*

11.1 The following column conditions are recommended: Glass capillary column conditions: SP–2250 coated on a 30 m long x 0.25 mm I.D. glass column (Supelco No. 2–3714, or equivalent) with helium carrier gas at 30 cm/sec linear velocity, run splitless. Column temperature is 210° C. Under these conditions the retention time for TCDDs is about 9.5 minutes. Calibrate the system daily with, a minimum, three injections of standard mixtures.

11.2 Calculate response factors for standards relative to ^{37}Cl-TCDD/F (see Section 12).

11.3 Analyze samples with selected ion monitoring of at least two ions from Table 3.

Isotopes, Inc., Cambridge, MA. Proper standardization requires the use of a specific labelled isomer for each congener to be determined. However, the only labelled isomers readily available are ^{37}Cl-2,3,7,8-TCDD and ^{37}Cl-2,3,7,8-TCDF. This method therefore uses these isomers as surrogates for the CDDs and CDFs. When other labelled CDDs and CDFs are available, their use will be required.

[6] This procedure is adopted because standards are not available for most of the CDDs and CDFs, and assumes that all the congeners will show the same response as the unlabelled congener used as a standard. Although this assumption may not be true in all cases, the error will be small.

[7] For cleanup see also method #8320 or #8330, SW–846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (1982).

Proof of the presence of CDD or CDF exists if the following conditions are met:

11.3.1 The retention time of the peak in the sample must match that in the standard, within the performance specifications of the analytical system.

11.3.2 The ratio of ions must agree within 10% with that of the standard.

11.3.3 The retention time of the peak maximum for the ions of interest must exactly match that of the peak.

11.4 Quantitate the CDD and CDF peaks from the response relative to the ^{37}Cl-TCDD/F internal standards. Recovery of the internal standard should be greater than 50 percent.

11.5 If a response is obtained for the appropriate set of ions, but is outside the expected ratio, a co-eluting impurity may be suspected. In this case, another set of ions characteristic of the CDD/CDF molecules should be analyzed. For TCDD a good choice of ions is m/e 257 and m/e 259. For TCDF a good choice of ions is m/e 241 and 243. These ions are useful in characterizing the molecular structure to TCDD or TCDF. For analysis of TCDD good analytical technique would require using all four ions, m/e 257, 320, 322, and 328, to verify detection and signal to noise ratio of 5 to 1. Suspected impurities such as DDE, DDD, or PCB residues can be confirmed by checking for their major fragments. These materials can be removed by the cleanup columns. Failure to meet criteria should be explained in the report, or the sample reanalyzed.

11.6 If broad background interference restricts the sensitivity of the GC/MS analysis, the analyst should employ cleanup procedures and reanalyze by GC/MS. See section 10.0.

11.7 In those circumstances where these procedures do not yield a definitive conclusion, the use of high resolution mass spectrometry is suggested.

12. *Calculations*

12.1 Determine the concentration of individual compounds according to the formula:

$$\text{Concentration, } \mu g/gm = \frac{A \times A_s}{G \times A_{is} \times R_f}$$

where:

A = µg of internal standard added to the sample [8]

G = gm of sample extracted

A_s = area of characteristic ion of the compound being quantified.

A_{is} = area of characteristic ion of the internal standard

R_f = response factor [9]

Response factors are calculated using data obtained from the analysis of standards according to the formula:

$$Rf \quad \frac{A_s \times C_{is}}{A_{is} \times C_s}$$

where:

C_{is} = concentration of the internal standard

C_s = concentration of the standard compound

12.2 Report results in micrograms per gram without correction for recovery data. When duplicate and spiked samples are analyzed, all data obtained should be reported.

12.3 Accuracy and Precision. No data are available at this time.

TABLE 1.—GAS CHROMATOGRAPHY OF TCDD

Column	Retention time (min.)	Detection limit (µg/kg)[1]
Glass capillary	9.5	0.003

[1] Detection limit for liquid samples is 0.003 µg/l. This is calculated from the minimum detectable GC response being equal to five times the GC background noise assuming a 1 ml effective final volume of the 1 liter sample extract, and a GC injection of 5 microliters. Detection levels apply to both electron capture and GC/MS detection. For further details see 44 FR 69526 (December 3, 1979).

TABLE 2.—DFTPP KEY IONS AND ION ABUNDANCE CRITERIA [1]

Mass	Ion abundance criteria
51	30-60% of mass 198.
68	Less than 2% of mass 69.
70	Less than 2% of mass 69.
127	40-60% of mass 198.
197	Less than 1% of mass 198.
198	Base peak, 100% relative abundance.
199	5-9% of mass 198.
275	10-30% of mass 198.
365	Greater than 1% of mass 198.
441	Present but less than mass 443.
442	Greater than 40% of mass 198.
443	17-23% of mass 442.

[1] J. W. Eichelberger, L.E. Harris, and W.L. Budde. 1975. Reference compound to calibrate ion abundance measurement in gas chromatography-mass spectrometry. Analytical Chemistry 47:995.

TABLE 3.—LIST OF ACCURATE MASSES MONITORED USING GC SELECTED-ION MONITORING, LOW RESOLUTION, MASS SPECTROMETRY FOR SIMULTANEOUS DETERMINATION OF TETRA-, PENTA-, AND HEXACHLORINATED DIBENZO-*p*-DIOXINS AND DIBENZOFURANS

Class of chlorinated dibenzodioxin or dibenzofuran	Number of chlorine substituents (x)	Monitored m/z for dibenzodioxins $C_{12}H_{8-x}O_2l_x$	Monitored m/z for dibenzofurans $C_{12}H_{8-x}OCl_x$	Approximate theoretical ratio expected on basis of isotopic abundance
Tetra	4	[1] 319.897	[1] 303.902	0.74
		321.894	305.903	1.00
		[2] 327.885	[2] 311.894	
		[3] 256.933		0.21
		[3] 258.930		0.20
Penta	5	[1] 353.858	[1] 337.863	0.57
		355.855	339.860	1.00
Hexa	6	389.816	373.821	1.00
		391.813	375.818	0.87

[1] Molecular ion peak.

[2] Cl_4—labelled standard peaks.

[3] Ions which can be monitored in TCDD analyses for confirmation purposes.

PART 264—STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

12. The authority citation for Part 264 reads as follows:

Authority: Secs. 1006, 2002(a), 3004, and 3005 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), 6924, and 6925).

13. In Subpart I of Part 264, the introductory text in paragraph (c) is revised and a new paragraph (d) is added to § 264.175:

§ 264.175 Containment.

* * * * *

(c) Storage areas that store containers holding only wastes that do not contain free liquids need not have a containment system defined by paragraph (b) of this section, except as provided by paragraph (d) of this section or provided that:

* * * * *

(d) Storage areas that store containers holding the wastes listed below that do not contain free liquids must have a containment system defined by paragraph (b) of this section:

(1) FO20, FO21, FO22, FO23, FO26, and FO27.

(2) [Reserved]

14. In Subpart J of Part 264, amend § 264.194 by redesignating paragraph (c) as paragraph (c)(1), and adding a new paragraph (c)(2):

§ 264.194 Inspections.

* * * * *

---

[8] The proper amount of standard to be used is determined from the calibration curve (See Section 6.0).

[9] If standards for PCDDs/Fs and HxCDDs/Fs are not available, response factors for ions derived from these congeners are calculated relative to ^{37}Cl-TCDD/F. The analyst may use response factors for 1,2,3,4- or 2,3,7,8-TCDD, 1,2,3,4,7-PeCDD, or 1,2,3,4,7,8-HxCDD for quantitation of TCDDs/Fs, PeCDDs/Fs and HxCDDs/Fs, respectively. Implicit in this requirement is the assumption that the same response is obtained from PCDDs/Fs ccontaining the same numbers of chlorine atoms.

(c)(1) * * *

(2) For EPA Hazardous Wastes Nos. FO20, FO21, FO22, FO23, FO26, and FO27, the contingency plan must also include the procedures for responding to a spill or leak of these wastes from tanks into the containment system. These procedures shall include measures for immediate removal of the waste from the system and replacement or repair of the leaking tank.

15. In Subpart J of Part 264, add the following § 264.200:

§ 264.200 Special requirements for hazardous wastes FO20, FO21, FO22, FO23, FO26, and FO27.

(a) In addition to the other requirements of Subpart J, the following requirements apply to tanks storing or treating hazardous wastes FO20, FO21, FO22, FO23, FO26, and FO27.

(1) Tanks must have systems designed and operated to detect and adequately contain spills or leaks. The design and operation of any containment system must reflect consideration of all relevant factors, including:

(i) Capacity of the tank;

(ii) Volumes and characteristics of wastes stored or treated in the tank;

(iii) Method of collection of spills or leaks;

(iv) The design and construction materials of the tank and containment system; and

(v) The need to prevent precipitation and run-on from entering into the system.

(2) As part of the contingency plan required by Subpart D of Part 264, the owner or operator must specify such procedures for responding to a spill or leak from the tank into the containment system as may be necessary to protect human health and the environment. These procedures shall include measures for immediate removal of the waste from the system and replacement or repair of the leaking tank.

16. In Subpart K of Part 264, add the following section § 264.231:

§ 264.231 Special requirements for hazardous wastes FO20, FO21, FO22, FO23, FO26, and FO27.

(a) Hazardous Wastes FO20, FO21, FO22, FO23, FO26, and FO27 must not be placed in a surface impoundment unless the owner or operator operates the surface impoundment in accordance with a management plan for these wastes that is approved by the Regional Administrator pursuant to the standards set out in this paragraph, and in accord with all other applicable requirements of this Part. The factors to be considered are:

(1) The volume, physical, and chemical characteristics of the wastes, including their potential to migrate through soil or to volatilize or escape into the atmosphere;

(2) The attenuative properties of underlying and surrounding soils or other materials;

(3) The mobilizing properties of other materials co-disposed with these wastes; and

(4) The effectiveness of additional treatment, design, or monitoring techniques.

(b) The Regional Administrator may determine that additional design, operating, and monitoring requirements are necessary for surface impoundments managing hazardous wastes FO20, FO21, FO22, FO23, FO26, and FO27 in order to reduce the possibility of migration of these wastes to ground water, surface water, or air so as to protect human health and the environment.

17. In Subpart L of Part 264, add the following section § 264.259:

§ 264.259 Special requirements for hazardous wastes FO20, FO21, FO22, FO23, FO26, and FO27.

(a) Hazardous Wastes FO20, FO21, FO22, FO23, FO26, and FO27 must not be placed in waste piles that are not enclosed (as defined in §264.250(c)) unless the owner or operator operates the waste pile in accordance with a management plan for these wastes that is approved by the Regional Administrator pursuant to the standards set out in this paragraph, and in accord with all other applicable requirements of this Part. The factors to be considered are:

(1) The volume, physical, and chemical characteristics of the wastes, including their potential to migrate through soil or to volatilize or escape into the atmosphere;

(2) The attenuative properties of underlying and surrounding soils or other materials;

(3) The mobilizing properties of other materials co-disposed with these wastes; and

(4) The effectiveness of additional treatment, design, or monitoring techniques.

(b) The Regional Administrator may determine that additional design, operating, and monitoring requirements are necessary for piles managing hazardous wastes FO20, FO21, FO22, FO23, FO26, and, FO27 in order to reduce the possibility of migration of these wastes to ground water, surface water, or air so as to protect human health and the environment.

18. In Subpart M of Part 264, add the following section § 264.283:

§ 264.283 Special requirements for hazardous wastes FO20, FO21, FO22, FO23, FO26, and FO27.

(a) Hazardous Wastes FO20, FO21, FO22, FO23, FO26 and, FO27 must not be placed in a land treatment unit unless the owner or operator operates the facility in accordance with a management plan for these wastes that is approved by the Regional Administrator pursuant to the standards set out in this paragraph, and in accord with all other applicable requirements of this Part. The factors to be considered are:

(1) The volume, physical, and chemical characteristics of the wastes, including their potential to migrate through soil or to volatilize or escape into the atmosphere;

(2) The attenuative properties of underlying and surrounding soils or other materials;

(3) The mobilizing properties of other materials co-disposed with these wastes; and

(4) The effectiveness of additional treatment, design, or monitoring techniques.

(b) The Regional Administrator may determine that additional design, operating, and monitoring requirements are necessary for land treatment facilities managing hazardous wastes FO20, FO21, FO22, FO23, FO26, and FO27 in order to reduce the possibility of migration of these wastes to ground water, surface water, or air so as to protect human health and the environment.

19. In Subpart N of Part 264, add the following section § 264.317:

§ 264.317 Special requirements for hazardous wastes FO20, FO21, FO22, FO23, FO26, and FO27.

(a) Hazardous Wastes FO20, FO21, FO22, FO23, FO26, and FO27 must not be placed in a landfills unless the owner or operator operates the landfill in accord with a management plan for these wastes that is approved by the Regional Administrator pursuant to the standards set out in this paragraph, and in accord with all other applicable requirements of this Part. The factors to be considered are:

(1) The volume, physical, and chemical characteristics of the wastes, including their potential to migrate through the soil or to volatilize or escape into the atmosphere;

(2) The attenuative properties of underlying and surrounding soils or other materials;

(3) The mobilizing properties of other materials co-disposed with these wastes; and

(4) The effectiveness of additional treatment, design, or monitoring requirements.

(b) The Regional Administrator may determine that additional design, operating, and monitoring requirements are necessary for landfills managing hazardous wastes FO20, FO21, FO22, FO23, FO26, and FO27 in order to reduce the possibility of migration of these wastes to ground water, surface water, or air so as to protect human health and the environment.

20. In Subpart O of Part 264, amend § 264.343 by revising paragraph (a) and redesignating paragraph (a) as paragraph (a)(1), and adding a new paragraph (a)(2) to read as follows:

§ 264.343 Performance standards.

* * * * *

(a)(1) Except as provided in paragraph (a)(2), an incinerator burning hazardous waste must achieve a destruction and removal efficiency (DRE) of 99.99% for each principal organic hazardous constituent (POHC) designated (under § 264.342) in its permit for each waste feed. DRE is determined for each POHC from the following equation:

$$\mathrm{DRE} = \frac{(W_{in} - W_{out})}{W_{in}} \times 100\%$$

where:

W_{in} = mass feed rate of one principal organic hazardous constituent (POHC) in the waste stream feeding the incinerator

and

W_{out} = mass emission rate of the same POHC present in exhaust emissions prior to release to the atmosphere

(2) An incinerator burning hazardous wastes FO20, FO21, FO22, FO23, FO26, or FO27 must achieve a destruction and removal efficiency (DRE) of 99.9999% for each principal organic hazardous constituent (POHC) designated (under § 264.342) in its permit. This performance must be demonstrated on POHCs that are more difficult to incinerate than tetra-, penta-, and hexachlorodibenzo-*p*-dioxins and dibenzofurans. DRE is determined for each POHC from the equation in § 264.343(a)(1). In addition, the owner or operator of the incinerator must notify the Regional Administrator of his intent to incinerate hazardous wastes FO20, FO21, FO22, FO23, FO26, or FO27.

* * * * *

PART 265—INTERIM STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

21. The authority citation for Part 265 reads as follows:

Authority: Secs. 1006, 2002(a), 3004, and 3005 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), 6924, and 6925).

22. § 265.1 is amended by adding paragraph (d).

§ 265.1 Purpose, scope, and applicability.

* * * * *

(d) The following hazardous wastes must not be managed at facilities subject to regulation under this Part.

(1) EPA Hazardous Waste Nos. FO20, FO21, FO22, FO23, FO26, or FO27 unless:

(i) The wastewater treatment sludge is generated in a surface impoundment as part of the plant's wastewater treatment system;

(ii) The waste is stored in tanks or containers;

(iii) The waste is stored or treated in waste piles that meet the requirements of § 264.250(c) as well as all other applicable requirements of Subpart L of this Part;

(iv) The waste is burned in incinerators that are certified pursuant to the standards and procedures in § 265.352; or

(v) The waste is burned in facilities that thermally treat the waste in a device other than an incinerator and that are certified pursuant to the standards and procedures in § 265.383.

23. In Subpart O of Part 265, add the following § 265.352:

§ 265.352 Interim Status Incinerators Burning Particular Hazardous Wastes.

(a) Owners or operators of incinerators subject to this Subpart may burn EPA Hazardous Wastes FO20, FO21, FO22, FO23, FO26, or FO27 if they receive a certification from the Assistant Administrator for Solid Waste and Emergency Response that they can meet the performance standards of Subpart O of Part 264 when they burn these wastes.

(b) The following standards and procedures will be used in determining whether to certify an incinerator:

(1) The owner or operator will submit an application to the Assistant Administrator for Solid Waste and Emergency Response containing applicable information in §§ 270.19 and 270.62 demonstrating that the incinerator can meet the performance standards in Subpart O of Part 264 when they burn these wastes.

(2) The Assistant Administrator for Solid Waste and Emergency Response will issue a tentative decision as to whether the incinerator can meet the performance standards in Subpart O of Part 264. Notification of this tentative decision will be provided by newspaper advertisement and radio broadcast in the jurisdiction where the incinerator is located. The Assistant Administrator for Solid Waste and Emergency Response will accept comment on the tentative decision for 60 days. The Assistant Administrator for Solid Waste and Emergency Response also may hold a public hearing upon request or at his discretion.

(3) After the close of the public comment period, the Assistant Administrator for Solid Waste and Emergency Response will issue a decision whether or not to certify the incinerator.

24. In Subpart P of Part 265, add the following § 265.383:

§ 265.383 Interim Status Thermal Treatment Devices Burning Particular Hazardous Waste.

(a) Owners or operators of thermal treatment devices subject to this Subpart may burn EPA Hazardous Wastes FO20, FO21, FO22, FO23, FO26, or FO27 if they receive a certification from the Assistant Administrator for Solid Waste and Emergency Response that they can meet the performance standards of Subpart O of Part 264 when they burn these wastes.

(b) The following standards and procedures will be used in determining whether to certify a thermal treatment unit:

(1) The owner or operator will submit an application to the Assistant Administrator for Solid Waste and Emergency Response containing the applicable information in §§ 270.19 and 270.62 demonstrating that the thermal treatment unit can meet the performance standard in Subpart O of Part 264 when they burn these wastes.

(2) The Assistant Administrator for Solid Waste and Emergency Response will issue a tentative decision as to whether the thermal treatment unit can meet the performance standards in Subpart O of Part 264. Notification of this tentative decision will be provided by newspaper advertisement and radio broadcast in the jurisdiction where the thermal treatment device is located. The Assistant Administrator for Solid Waste and Emergency Response will accept comment on the tentative decision for 60 days. The Assistant Administrator for

Solid Waste and Emergency Response also may hold a public hearing upon request or at his discretion.

(3) After the close of the public comment period, the Assistant Administrator for Solid Waste and Emergency Response will issue a decision whether or not to certify the thermal treatment unit.

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

25. The authority citation for Part 270 reads as follows:

Authority: Secs. 1006, 2002(a), 3005, 3007, 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(a), 6925, 6927, and 6974).

26. In Subpart B of Part 270, paragraph (b)(7) of § 270.14 is revised to read as follows:

§ 270.14 Contents of Part B: General requirements.

* * * * *

(b)* * *

(7) A copy of the contingency plan required by Part 264, Subpart D. Note: Include, where applicable, as part of the contingency plan, specific requirements in §§ 264.227, 264.255, and 264.200.

* * * * *

27. In Subpart B of Part 270, §270.16 is amended by adding paragraph (g):

§ 270.16 Specific Part B information requirements for tanks.

* * * * *

(g) Where applicable, a description of the containment and detection systems to demonstrate compliance with § 264.200(a) must include at least the following:

(1) Drawings and a description of the basic design parameters, dimensions, and materials of construction of the containment system.

(2) Capacity of the containment system relative to the design capacity of the tank(s) within the system.

(3) Description of the system to detect leaks and spills, and how precipitation and run-on will be prevented from entering into the detection system.

28. In Subpart B of Part 270, § 270.17 is amended by adding paragraph (j):

§ 270.17 Specific Part B information requirements for surface impoundments.

* * * * *

(j) A waste management plan for EPA Hazardous Waste Nos. FO20, FO21, FO22, FO23, FO26, and FO27 describing how the surface impoundment is or will be designed, constructed, operated, and maintained to meet the requirements of § 264.231. This submission must address the following items as specified in § 264.231:

(1) The volume, physical, and chemical characteristics of the wastes, including their potential to migrate through soil or to volatilize or escape into the atmosphere;

(2) The attenuative properties of underlying and surrounding soils or other materials;

(3) The mobilizing properties of other materials co-disposed with these wastes; and

(4) The effectiveness of additional treatment, design, or monitoring techniques.

29. In Subpart B of Part 270, § 270.18 is amended by adding paragraph (j):

§ 270.18 Specific Part B information requirements for waste piles.

* * * * *

(j) A waste management plan for EPA Hazardous Waste Nos. FO20, FO21, FO22, FO23, FO26, and FO27 describing how a waste pile that is not enclosed (as defined in § 264.250(c)) is or will be designed, constructed, operated, and maintained to meet the requirements of § 264.259. This submission must address the following items as specified in § 264.259:

(1) The volume, physical, and chemical characteristics of the wastes to be disposed in the waste pile, including their potential to migrate through soil or to volatilize or escape into the atmosphere;

(2) The attenuative properties of underlying and surrounding soils or other materials;

(3) The mobilizing properties of other materials co-disposed with these wastes; and

(4) The effectiveness of additional treatment, design, or monitoring techniques.

30. In Subpart B of Part 270, § 270.20 is amended by adding paragraph (i):

§ 270.20 Specific Part B information requirements for land treatment facilities.

* * * * *

(i) A waste management plan for EPA Hazardous Waste Nos. FO20, FO21, FO22, FO23, FO26, and FO27 describing how a land treatment facility is or will be designed, constructed, operated, and maintained to meet the requirements of § 264.283. This submission must address the following items as specified in § 264.283:

(1) The volume, physical, and chemical characteristics of the wastes, including their potential to migrate through soil or to volatilize or escape into the atmosphere;

(2) The attentuative properties of underlying and surrounding soils or other materials;

(3) The mobilizing properties of other materials co-disposed with these wastes; and

(4) The effectiveness of additional treatment, design, or monitoring techniques.

31. In Subpart B of Part 270, § 270.21 is amended by adding paragraph (j):

§ 270.21 Specific Part B information requirements for landfills.

* * * * *

(j) A waste management plan for EPA Hazardous Waste Nos. FO20, FO21, FO22, FO23, FO26, and FO27 describing how a landfill is or will be designed, constructed, operated, and maintained to meet the requirements of § 264.317. This submission must address the following items as specified in § 264.317:

(1) The volume, physical, and chemical characteristics of the wastes, including their potential to migrate through soil or to volatilize or escape into the atmosphere;

(2) The attenuative properties of underlying and surrounding soils or other materials;

(3) The mobilizing properties of other materials co-disposed with these wastes; and

(4) The effectiveness of additional treatment, design, or monitoring techniques.

PART 775—STORAGE AND DISPOSAL OF WASTE MATERIAL [REMOVED]

32. The authority citation for Part 775 reads as follows:

Authority: Sec. 6 of the Toxic Substances Control Act (TSCA) Pub. L. 94–469, 90 Stat. 2020 (15 U.S.C. 2605).

33. Part 775 is removed.

[FR Doc. 85–604 Filed 1–11–85; 8:45 am]
BILLING CODE 6560-50-M