ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 260, 261, 264, 265, 270 and 302

[FRL–4596–6]

RIN 2050–AD60

Wood Surface Protection; Identification and Listing of Hazardous Waste; Testing and Monitoring Activities; Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

AGENCY: Environmental Protection Agency.

ACTION: Notice of proposed rulemaking.

SUMMARY: The U.S. Environmental Protection Agency (EPA) is proposing to amend the regulations for hazardous waste management under the Resource Conservation and Recovery Act (RCRA) by proposing to list as hazardous certain wastes from the use of chlorophenolic formulations in the wood surface protection industry. The Agency is proposing to list these wastes if the user's in-process formulation contains a concentration greater than 100 ppb pentachlorophenate. This action proposes various testing, analysis, recordkeeping requirements and management standards for wood surface protection plants. Related to the testing requirement, the Agency proposes to amend SW–846 ("Test Methods for Evaluating Solid Waste, Physical/Chemical Methods") to include Method 4010 (Immunoassay Test for the Presence of Pentachlorophenate). This action also proposes to modify the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) list of hazardous substances to reflect the newly proposed listing. This action proposes to add six hazardous constituents to appendix VIII of 40 CFR part 261 and to amend appendix VII of 40 CFR part 261 by adding F033 and the hazardous constituents found in the wastes on which the listing determination is based. Finally, this action also requests comment on the option not to list as hazardous wastes from the surface protection processes which would fall within the scope of this proposed listing. The "no-list" option is being considered by the Agency because future generation of these wastes is expected to rapidly diminish and because the results from risk analysis show that risk from the dominant exposure pathways is relatively modest assuming the widespread use of chlorophenolics does not resume. The intended effect of this proposed listing will be to insure that wastes generated from surface protection processes covered under this listing will be properly managed.

DATES: EPA will accept public comments on this proposed rule until June 28, 1993. Comments postmarked after this date will be marked "late" and may not be considered. Requests for extensions will not be granted due to judicial deadlines for the promulgation of a final rule. Any person may request a public hearing on this proposal by filing a request with Mr. David Bussard, whose address appears below, by May 11, 1993.

ADDRESSES: The official record of this rule-making is identified by Docket Number F–93–F33P–FFFFF and is located at the following address: EPA RCRA Docket Clerk, room 2427 (OS–332), U.S. Environmental Protection Agency, 401 M Street SW., Washington, DC 20460.

The docket is open from 9 a.m. to 4 p.m., Monday through Friday, excluding Federal holidays. The public must make an appointment to review docket materials by calling (202) 260–9327. The public may copy 100 pages from the docket at no charge; additional copies are $0.15 per page. Copies of materials relevant to the CERCLA portions of this rulemaking also are located in room 2427 at the above address.

To request a public hearing on this proposal file a request with Mr. David Bussard (OW–330), U.S. Environmental Protection Agency, 401 M Street SW., Washington, DC 20460.

FOR FURTHER INFORMATION CONTACT: The RCRA/Superfund Hotline, at (800) 424–9346 (toll-free) or (703) 920–9810, in the Washington, DC metropolitan area. The TDD Hotline number is (800) 553–7672 (toll-free) or (703) 486–3323, locally. For technical information on the proposed listing, contact Mr. David J. Carver at (202) 260–6775, Office of Solid Waste (OS–333), U.S. Environmental Protection Agency, 401 M Street SW., Washington, DC 20460.

For technical information on the CERCLA aspects of this rule, contact: Ms. Gerain H. Perry, Response Standards and Criteria Branch, Emergency Response Division (5202–G), U.S. Environmental Protection Agency, 401 M Street SW., Washington, DC 20460, (703) 603–8732.

SUPPLEMENTARY INFORMATION: To assist the public in its review of critical documents, the Agency has provided copies of all relevant background documents to the following affected National trade groups: American Forest & Paper Association, and the National Furniture Manufacturers Association. These documents are also available for public review in the docket for this rulemaking. The contents of this preamble are listed in the following outline:

I. Legal Authority

These regulations are being promulgated under the authority of sections 2002(a) and 3001(b) and (e)(1) of the Solid Waste Disposal Act, as amended, 42 U.S.C. 6912(a), 6921(b) and (e)(1), and 6922 (commonly referred to as RCRA), and section 102(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C. 9602(a).

II. Background

A. History of the Regulation

Section 3001(e) of RCRA as amended by the Hazardous and Solid Waste Amendments (HSWA) requires EPA to determine whether to list as hazardous wastes containing chlorinated dioxins and chlorinated dibenzofurans. As part of this mandate, the Agency in 1988 initiated an investigation of dioxin-containing wastes from wood surface protection and wood preserving processes.

On December 30, 1988, EPA proposed four hazardous waste listings pertaining to wastes from wood preserving and surface protection, as well as a set of standards for the management of these wastes (53 FR 53282). The Agency finalized three generic hazardous waste listings for wastes from wood preserving processes and promulgated standards in 40 CFR parts 264/265, Subpart W for the management of these wastes on drip pads on December 6, 1990 (55 FR 50450). (The Agency subsequently modified those listings on December 24, 1992 (57 FR 61492).) In the December 6, 1990 final rule, the Agency deferred listing wastes from the surface protection industry because of a need for additional data on these wastes to determine whether they should be listed as hazardous wastes.

In accordance with a proposed consent decree signed by the EPA and the Environmental Defense Fund (EDF), EPA has agreed to promulgate a final listing determination for chlorophenolic wastes generated by the wood surface protection industry by the end of December, 1993.

B. Summary of Additional Information Collection

Since 1990, the Agency has acquired a substantial amount of new information on the surface protection industry and its waste generation. This new information was obtained, in part, from questionnaire responses which the Agency received from 134 plants under the authority of RCRA section 3007. The information obtained includes a history of past use of the chlorophenolic surface protectants and information on the duration of their use, as well as production information, process information, and waste generation and management information.

In addition to the information collected through the questionnaires, the Agency visited and interviewed personnel at various plant sites throughout the Nation. The majority of the plants selected for on-site interviews used, at the time of the visit, chlorophenolic formulations to protect the surface of lumber. All process types and varying production sizes were observed. These visits assisted the Agency in selecting appropriate initial sampling locations, as well as in obtaining information about process layouts, terrain, and proximity to groundwater wells. In addition, the Agency studied waste management and pollution prevention practices. Subsequent site visits included familiarization sampling which was used to estimate present waste content prior to record sampling which followed during subsequent site visits. The site selection process was not a random selection process. The Agency conducted on-site studies at 19 different operating plants. From information collected at these on-site visits, combined with extensive research and industry trade group assistance, the Agency determined that it could obtain better, more realistic information on the wastes generated by the sawmill industry if it chose specific sites, instead of using a random selection process. The Agency used various parameters to select the five chosen sites for record analysis. A more detailed discussion as to site selection can be found in the background document for this rulemaking. However, the Agency believed that the following variables affected waste generation to the largest degree: (1) Process type, (2) production quantity, (3) current management practices, (3) current or past user status (along with time period since last used a chlorophenolic), (4) degree for potential groundwater contamination as expressed by a drastic score analysis, and (5) whether or not a plant cleaned out equipment prior to switching over to a substitute product. Video and still photography captured much of the on-site work. Information was also collected from plant personnel. The Agency also collected information from EPA Regional Offices, State and local agencies, and other federal agencies including the U.S. Forest Service, the Department of Commerce, the Internal Revenue Service, and the U.S. Customs Service. All information related to this proposal for which a Confidential Business Information (CBI) claim has not been made is available for public review in the docket for this rulemaking. For more information about the Agency's CBI protection, please refer to 40 CFR part 2, subpart B. The Agency requests comment on the information gathered to support this proposal, including information gathered from sawmill sites across the country.

Based on the additional data collected, the Agency examined potential human health pathways, ecological effects, and performed new risk modeling to simulate the flow of waste drippage to ground water and to nearby streams. Both waste and environmental media samples were taken to obtain true soil concentrations for the purpose of running the risk models. Also, additional damage incidents were identified to provide additional data for this listing determination. The details of the Agency's risk assessment and health effects analysis are discussed in section VI.(C) of the preamble.

III. Description of the Industry and Surface Protection Processes

A. Defining Surface Protection

The wood surface protection industry consists primarily of sawmills that cut rough lumber and timber. United States manufacturers produced a total of 43.13 billion board feet of lumber in 1989. Of the total production, the top 10 lumber producers manufactured 13.71 billion board feet, about 28 percent of the total U.S. output. Small sawmill operations account for the remaining volume (72%) of the lumber produced in the U.S.

The types of wood that are cut are divided into two main classes, softwoods and hardwoods. Softwoods are those obtained from such coniferous trees as pines, spruces, hemlocks, and firs; hardwoods come from deciduous trees, and include such trees as oaks, ashes, maples, basswood, poplars, gums, as well as many tropical trees. Softwoods are used more extensively in building construction and hardwoods are used for furniture, interior finish, and for products where special wood structure is desired.

The surface protection industry protects wood against sapstaining that may occur during temporary lumber storage. Sapstaining of freshly cut lumber will occur in humid conditions, typically when the water content inside the wood is greater than 19% water. Sapstain does not attack the structural components of the wood, however, the affected surface becomes colored with dark blue or black stains. This discoloration is often objectionable to the buyer and may decrease the value of the wood. Following one day of storage, the stain can usually be planed away; however, stains that remain on lumber for a longer period usually cannot be planed away without excessive wood loss. To avoid staining, many plants coat lumber with chemicals to prevent the occurrence of stain. This practice is accomplished on-site at sawmills throughout the country, during various periods of the year, depending on the regional climate. The Agency believes that there are approximately 3200 sawmills operating in the U.S. today. Out of that number, approximately 980 mills perform some surface protection activities.

The Agency believes that other industries, including furniture manufacturing and lumber export, are or have been engaged in surface protection operations. The Agency requests information on the extent or absence of this practice (both past and current) within these and other industries. It is important to note that because the Agency is proposing a non-specific source hazardous waste listing (F waste code), all industries performing surface protection operations are potentially subject to this proposed regulation, not just sawmills. Based on any information received during the comment period and from further EPA investigations before promulgation of the final rule, EPA will modify the risk and cost estimates as appropriate to account for other potentially affected facilities.

The surface protection of wood involves the application of sapstain control agents by spraying or dipping. Historically, chlorophenolic formulations used for anti-stain purposes consisted of sodium pentachlorophenate, which is an aqueous solution produced by dissolving pentachlorophenol in sodium hydroxide (NaOH). The active ingredient in the formulation, depending upon the pH of the system, may exist as pentachlorophenol or as sodium pentachlorophenate.

The trade names of the chlorophenolic formulations used in wood surface protection include Permatox 101, Permatox 181, and Permatox 10S, all of which were made by Chapman Chemicals and are no longer being produced. By the time today's proposal is promulgated as a final rule, the Agency does not expect there will be any users of full-strength chlorophenolic formulations within the surface protection industry. ("Full-strength" formulations are those having a typically recommended chlorophenolic content by the manufacturer of approximately 0.4 percent pentachlorophenate.) Many plants, however, use, and will continue to use for some time, formulations with lower concentrations of pentachlorophenate.

As a result of increased environmental concerns and more stringent regulation involving pentachlorophenol and related chemicals, alternative formulations have been developed to replace sodium pentachlorophenate. The Agency requests information on substitute chemicals sold in the U.S. that can be used in place of the chlorophenolic formulations with which this proposed listing is concerned. Information on alternate use will be incorporated into a manual detailing pollution prevention methods currently being developed by the Agency to benefit the lumber industry.

B. Process Description

Sawmill cutting operations are typically the same at all plants. Raw logs are cut into cants that are trimmed into rough lumber. In some cases, cants are cut to specific lengths or further finished depending on the final destination of the lumber product. Not all sawmills conduct surface protection operations. Surface protection is typically conducted at mills that process hardwoods; however, soft woods cut for export may also be surface protected.

An estimation of process "cutting" production rates is important in estimating surface protection waste generation rates. For this purpose, the Agency grouped mills into three categories, by production rate: Small mill production (less than 5 million board feet (mbf) per year), medium mill production (between 5 and 25 mbf/year), and large mill production (more than 25 mbf/year). The Agency studied these groups to determine if particular management standards or practices are related to mill size. The Agency conducted on-site interviews and sampling at mills in all three production categories. After the wood is cut, it is stacked and prepared for surface protection. The large mills in the western U.S. export much of their product and treat their lumber with surface protectants all year, while smaller plants or large plants that do not typically export, only treat their lumber with surface protectants during humid months depending on the region of the country in which they operate. Often, wood that is prepared for export is treated with surface protectants because ship transit often subjects the wood to high humidity. Usually, only high grade wood is treated with surface protectants.

Once the wood has been cut at a sawmill, it is typically surface protected unless it is low quality, or will be preserved later at a different facility (i.e., by the customer). Although surface protection is usually accomplished at the sawmill, the Agency recognizes, as noted above, that other types of facilities (particularly furniture manufacturers) may perform this process. The Agency assumes that the types of processes used at sawmills (described below) are the same as those used by furniture manufacturers or other types and that the quantities of waste generated are also similar. This assumption is based on the Agency's in-depth knowledge of wood surface protection. The processes described in this section are, to the Agency's knowledge, the only types of processes available for wood surface protection, and, therefore, are the only processes likely to be used by any industry which surface protects wood.

There are three major processes used by sawmills for applying anti-stain formulation to wood: the dip process, the spray process, and the green chain process. The Agency was unable to obtain information on the treatment of wood by furniture manufacturers or exporting firms and requests information on this.

Typically, a sawmill will use only one process to surface protect; however, the Agency realizes that some plants use a combination of processes to treat lumber at different locations throughout a mill. Dipping is a batch process; green chain and spray operations are continuous processes. The process type influences the amount of control a plant has on waste which it generates.

Dip operations offer the best opportunity to control drippage since an owner or operator has the capability of keeping the wood over the tank until it stops dripping. In actuality, however, dipping operations can lead to more drippage when mills do not allow the treated loads to stop dripping before the next load is dipped. Lumber is dipped in horizontal bundles, as a result, surface protectant is often trapped within the bundles (referred to as "entrained" liquid). When forklifts remove the lumber, large quantities of protectant can drip from the wood if the lumber is tipped.

Unlike the dipping operation, the spray operation is a continuous operation. Individual pieces of lumber are fed end-to-end by chain, roller, or conveyor belt system through a spray box, which is often equipped with flexible brushes or curtains at both ends to isolate the formulation spray and minimize drippage.

Green-chain systems represent another type of continuous operation. The green-chain is so-named because chains drag fresh cut (or "green") lumber through a tank of protectant formulation and back out again for sorting and grading. After the wood is cut, it is transferred to the green chain. A dip vat containing anti-stain formulation is typically located at the head of the green chain and the wood falls into this vat from the cutting operations. Some systems utilize wheels or rollers just above the formulation surface to force the wood pieces completely into the solution. As the wood is drawn from the vat and along the green chain, excess formulation is released from the wood pieces. Green-chain operations are typically the least controllable operation with respect to drippage.

IV. Summary of the Proposed Regulation

A. Overview of Proposed Hazardous Waste Listing

The Agency is proposing to add one group of wastes from the wood surface protection industry to the list of hazardous wastes from non-specific sources (40 CFR 261.31). This listing, if made final, would carry the F033 waste code and includes the following specific wastestreams:

F033: Process residuals, wastewaters that come in contact with protectant, discarded spent formulation, and protectant drippage from wood surface protection processes at plants that use surface protection chemicals having an in-process formulation concentration of pentachlorophenate [expressed as pentachlorophenol during analysis] exceeding 0.1 ppm. (T)

As noted in the language of the listing description, the Agency proposes to list as hazardous only those wastes from wood surface protection processes using protectant formulations that have a pentachlorophenate concentration greater than 0.1 ppm. Under this concentration trigger, the F033 listing may cover owners or operators who have switched to an alternate, non-chlorophenolic formulation (so-called "transitional users") and who did not clean out their equipment prior to switch-over. The Agency considers the wastes generated by such transitional users to be included within the scope of this proposed listing if their formulations exceed the proposed concentration. It is possible, however, that wastes generated by a transitional user may not meet the listing description if product switch-over either occurred long enough ago so that all the chlorophenolics have been consumed in the process or if the tank was cleaned out thoroughly prior to switch-over.

To minimize future risks to human health and the environment from the release of wastes, EPA has set a maximum level of pentachlorophenate in a formulation of 0.1 ppm (100 ppb) as the level above which the proposed listing applies. An owner/operator using formulations containing pentachlorophenate at or below 0.1 ppm does not generate wastes that meet the proposed F033 listing. As described later, the Agency's risk assessment suggests that the use of surface protection formulations containing chlorophenolics at concentrations greater than 0.1 ppm may pose risks to human health and the environment.

Formulations with penta-chlorophenate concentrations at or below the 0.1 ppm threshold established in the proposed listing description would result in levels of pentachlorophenate that reach ground water that are below health-based levels of concern. The 0.1 level was calculated using a Maximum Contaminant Level (MCL) of 0.001 ppm and a risk analysis using the Agency's Multi-med model. Multi-med simulates the risk to groundwater from specific sources, and for this proposal, it incorporated variables which are specific to sawmill conditions. The Agency's analysis approximated the dilution of pentachlorophenate from the time the waste contacts the ground to when it reaches a ground water well. The Agency's selection of the 0.1 ppm formulation concentration level generates risk levels to human health from groundwater contamination ranging from a high end individual risk range of 5×10^{-7} to 7×10^{-6} to a central tendency individual risk of 2×10^{-8}. The Agency considers these risks to lie within the acceptable risk range. The Agency did not arrive at the 0.1 ppm level by applying a dilution attenuation factor (DAF) of 100 (as the Agency has done in other circumstances) to the MCL. Indeed, the Agency is not taking a position, in this proposal, about the use of DAFs in calculating acceptable risk levels for any constituents. A detailed discussion of the Agency's modeling assumptions and actual parameters used to generate risk approximations can be found in the docket for this proposed rule.

This calculated level of 0.1 ppm for the pentachlorophenate formulation content is also consistent with levels used in the Agency's RCRA hazardous waste delisting program (see 40 CFR 260.22). In making delisting determinations, the Agency compares leachable levels of the constituents of concern associated with a particular waste with health based levels for those constituents. The model used (the Composite Model for Landfills, or CML) in making delisting determinations generates Dilution Attenuation Factors (DAFs) in a range from 10 to 100. Where a particular waste's volume is not known, a conservative DAF of 10 is used. The CML-generated DAF is then used to determine constituent levels for delisting. A typical level for which wastes may be delisted for leachable pentachlorophenol constituents is between 1×10^{-2} to 0.1 ppm. A typical level for pentachlorophenate constituents would be the same, because the leachable pentachlorophenate would be expressed in analysis as pentachlorophenol. Thus, the pentachlorophenate concentration level of 0.1 for in-process formulations in the proposed listing is consistent with the delisting level.

The Agency notes that industry has been voluntarily switching to alternate non-chlorophenolic substitutes. By listing wastes generated from formulations whose pentachlorophenate concentration is above 0.1 ppm, the Agency hopes to contribute to these voluntary measures and to create an impetus for switching away from the use of chlorophenolic compounds. In order to achieve a pentachlorophenate level at or beneath 0.1 ppm, a plant that at one point used a chlorophenolic formulation must typically clean its equipment. The Agency has determined that sandblasting the formulation tank is one effective method for cleaning equipment to reduce penta-chlorophenate levels. The Agency has also found that formulation tank sandblasting followed by coating the tank with epoxy coating will reduce both pentachlorophenate levels and dioxin levels. This is because dioxin tends to bind to the walls of equipment and the coating provides a physical barrier to cross-contamination. Because of the added environmental benefits of reducing levels of dioxin in the formulation (and this reducing possible dioxin contamination in process area soils due to drippage), the Agency recommends, but is not requiring, that formulation tanks be cleaned by sandblasting followed by epoxy coating. Further information on the Agency's findings, including a discussion equipment cleaning field testing conducted during the development of this proposal can be found in the docket associated with this rulemaking.

The Agency is also proposing to require that those surface protection plants that do not generate an F033 hazardous waste because their in-process formulation is equal to or less than 0.1 ppm pentachlorophenate to test their formulations using a method found in SW–846 (Test Methods for Evaluating Solid Waste, Physical/Chemical Methods). Several appropriate methods can be found in SW–846, including methods 8040 and 8270. This notice also proposes to add Method 4010 (Immunoassay Test for Determining the Presence of Pentachlorophenate) to SW–846. The testing analysis must be performed by a laboratory qualified to perform the analysis. The Agency also proposes to require that either a licensed professional engineer or a responsible company official sign a certification stating the sampling location, the laboratory used with address, the date the analysis was performed, the type of analysis used and the analysis results.

The Agency notes that the proposed testing requirement does not affect the requirement of 40 CFR 262.11 that every generator of a solid waste determine whether that waste is a hazardous waste. Maintaining a signed certification, as described above, will, however, establish a presumption that the plant has complied with 40 CFR 262.11.

Although EPA has not, in the past, imposed an affirmative testing requirement in connection with the listing of other hazardous wastes, the Agency feels that the testing requirement proposed today is both reasonable and appropriate. Unlike other listed hazardous wastes, F033, as proposed, includes in its regulatory listing description a specific numerical concentration component. Without testing and analysis requirements it would be difficult for an Agency inspector to determine whether the surface protectant formulation at a given plant is at or beneath the proposed threshold level. The level of pentachlorophenate in formulations level cannot be determined by observation alone. It is important to note that concentration testing is not required for *wastes;* rather, the concentration of pentachlorophenate in the in-process formulation defines, in part, the scope of the proposed listing, thus making testing appropriate. The Agency requests comment on the appropriateness of imposing this testing requirement.

The importance of the proposed concentration trigger in the proposed listing description cannot be overemphasized. Only processes using formulations with a concentration of pentachlorophenate exceeding the standard in the proposed listing would generate F033 wastes and, thus, be subject to the requirements proposed today. It is important to note that all wood surface protection plant owner and/or operators that have used chlorophenolics in the past who wish to transition from the use of chlorophenolic to non-chlorophenolic formulations in order to avoid handling their wastes as F033 hazardous wastes will be required to test their in-process formulations. Plants whose formulations test at or below 0.1 ppm pentachlorophenate would not generate F033 wastes. Under today's proposal, however, these plants must maintain records of this analysis and comply with other one-time provisions of proposed subpart T (§ 264.561(a) and § 264.562).

If a plant elects to not handle its wastes as F033 hazardous waste, and believes that its in-process formulation is at or beneath the proposed pentachlorophenate concentration level, the plant owner/operator must sample and analyze the in-process product formulation used to protect the surface of lumber. Such sampling must be conducted immediately following operation (and consistent with safe plant operations); and must be conducted by the owner/operator utilizing the guidance found in chapter 9 (sampling plan) and chapter 10 (sampling methods) of EPA's Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW–846). Analysis of the formulation will require the utilization of a qualified analytical laboratory. Sampling must be performed immediately after operation to ensure a true characterization of the formulation, since it is the formulation, agitated by use during operation, that drips from treated wood as waste. The results of this analysis must be maintained on-site as long as the plant is in operation. EPA is proposing that laboratories must use test methods found in SW–846. Methods 8040 and 8270, which appear in SW–846 are appropriate for this analysis. The Agency believes that method 4010, which is presently in draft form and not a part of SW–846, is also appropriate for the determination of pentachlorophenate content. EPA is proposing to add method 4010 to SW–846.

Method 4010 is an immunoassay test for the presence of pentachlorophenate. It does not provide an exact concentration, but determines whether a sample is above or below a set limit (like the 0.1 ppm level proposed today). The detection limit for this test is 0.005 ppm. Method 4010 is presently in draft status and this action proposes its incorporation in SW–846.

Other methods for the determination of pentachlorophenate as pentachlorophenol are SW–846 Methods 8270 and 8040. Method 8270 (entitled Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)) uses a mass spectrometer to perform analytical measurements. Another SW–846 method, EPA Method 8040 (entitled Phenols by Gas Chromatography), utilizes a flame ionization technique or an electron capture procedure to obtain pentachlorophenate concentrations. EPA requests data on other test methods that may be equally effective in detecting pentachlorophenate.

B. Proposed Hazardous Waste Management Standards

The EPA has found that the wastes proposed for listing today contain toxic constituents, some of which are carcinogenic. These wastes, when mismanaged, pose a substantial threat to human health and the environment. Based on its study of the industry, the Agency considers waste mismanagement to include drippage, spillage, or other releases onto soil as well as disposal of tank sludge into sawdust piles to be carried off as boiler fuel. The Agency considers the burning of sawdust contaminated by sludges heavily laden with pentachlorophenate and dioxin to be an example of mismanagement of this waste when the plants which burn the sawdust usually do not follow 40 CFR part 266, subpart H under the Boiler and Industrial Furnace ("BIF") Rule or 40 CFR parts 264/265, subpart O which covers incinerator operation requirements. If, however, a plant was classified as a boiler or an industrial furnace and is in compliance with applicable regulations, then the burning of these sludges would not be an example of mismanagement. In addition, the Agency has compiled information showing that certain constituents found in these wastes are persistent and mobile in the environment surrounding surface protection plants. Wastes from this industry are also water-soluble and can be carried by precipitation run-off over and down through soil. These constituents are capable of reaching sensitive environmental systems in harmful concentrations. Information that supports these claims is described in detail in section VI(C) of this preamble and additional supporting information can be found in the docket for this rulemaking.

In support of the F033 listing proposed today, EPA is proposing to amend appendices VII and VIII of part 261, Basis for Listing Hazardous Waste and Hazardous Constituents, respectively. These appendices are amended to add the hazardous constituents that form the basis for listing proposed hazardous waste No. F033 (appendix VII), as well as other hazardous constituents contained in the proposed F033 waste streams (appendix VIII).

The Agency is proposing to require wood surface protectors whose wastes fall within the scope of this listing to comply with certain specific management standards proposed today as subpart T of parts 264 and 265. In addition, surface protectors must operate and maintain their plants in accordance with all otherwise applicable RCRA requirements to minimize the extent to which the wastes contaminate the environment. The Agency believes that existing methods for managing hazardous waste under EPA's regulations are available to many surface protection plants and can adequately protect human health and the environment from the risks posed by the waste streams which the Agency is proposing to list as hazardous. Examples of such regulatory programs are the hazardous waste tank regulations in 40 CFR parts 264/265, subpart J and the standards for drip pads in 40 CFR parts 264/265, subpart W. The Agency is proposing to require plants that generate F033 wastes to manage their F033 wastes in units that satisfy either subpart J or subpart W requirements.

Under today's proposed hazardous waste listing, the Agency would consider surface protection plants who have formulations with pentachlorophenate concentrations greater than 0.1 ppm to be potential generators of F033 hazardous waste under the RCRA program. There is no RCRA requirement that generators, solely due to their status as generators, obtain permits for operation under subpart W or J. However, generators are required, at times, to obtain permits if they store generated wastes on-site for time periods which exceed their RCRA storage allowances based on the amount of waste generated. For example, if a plant generated greater than 100 but less than 1000 kg of waste in any one calendar month and complied with certain conditions, it would be allowed to store hazardous wastes on-site for up to 180 days without obtaining a RCRA permit. See 40 CFR 262.34(d), (f). If a plant generates more than 1000 kg of hazardous waste in any one calendar month (considered a large quantity generator), then the plant would be allowed to store hazardous wastes on-site for up to 90 days without a permit. See 40 CFR 262.34(a).

Because both wood preserving and surface protection processes treat lumber with chlorophenolic formulations, a short description of the differences between the two industries and their waste generation is necessary. The Agency considers a "wood preserving process" to be any process intended to preserve wood from structural attack. A wood surface protection process is a process merely intended to prevent surface discoloration. The distinction, therefore, is not based on the type of process used, i.e., pressure treatment or non-pressure dip treatment, but on the intent of the treatment itself. Therefore, "dipping" operations are not excluded from wood preserving if the intent of the operation is to preserve wood. As the Agency stated in its initial proposed wood preserving hazardous waste listing, that wood preservatives are used to delay deterioration and decay of wood caused by organisms such as insects, fungi, and marine borers. Surface discoloration (sapstaining) during short term storage can be adequately controlled by a superficial application of preservative, but for long lasting effectiveness, penetration of preservative to a uniform depth is required. This deep penetration is usually accomplished by forcing preservative into the wood under pressure, so that "pressure treated" is often used as a synonym for "preserved". (53 FR 53282, December 30, 1988).

Typically, sodium penta-chlorophenate is used for sapstain control on lumber following cutting. Sapstain control is considered surface protection, not wood preserving. However, if a plant is treating wood with sodium pentachlorophenate with the intent of preserving the wood, it would be considered a wood preserving operation, and the wastes generated would be chlorophenolic wastes from a wood preserving plant (noted as a facility in the wood preserving regulations) designated as F032. The Agency believes that it would be very unlikely that a wood preserving facility would use sodium pentachlorophenate to preserve wood, since the preserving solution is aqueous and would wash off the treated wood and render the treatment ineffective, since it is the intent of wood preserving to obtain a long term protection of the wood.

As noted recently in the Final Modifications to Wood Preserving Regulations (57 FR 61492, December 24, 1992), incidental drippage at active wood preserving plants is not considered illegal disposal of a hazardous waste if it is removed from the storage yard and managed appropriately within 24 hours (or 72 hours) of occurrence, depending on whether the plant was in operation when the drippage occurred. Wood preserving incidental drippage occurs due to "kickback" of preservative following treatment of wood under pressure. This is not the case with surface protection. There is no "kickback" occurring in this industry because protectant is applied to the surface without pressure. However, protectant drippage does occur from newly treated wood at surface protection plants. Additional drippage may occur from surface-protected wood in storage, due either to liquid entrained in the wood bundles or precipitation coming in contact with the wood.

Plants using surface protection formulations with concentrations of pentachlorophenate greater than 0.1 ppm are subject to the proposed subpart T requirements. All drippage from treated wood, including any drippage that may occur as a result of any liquid entrainment within a packed bundle, must cease before it is transferred to the storage yard. For purposes of containing the drippage in the process area, an owner/operator must employ either a tank system, such as a sump, or a drip pad beneath the process area. If a plant has a sump system for removal of drippage in the process area, that system is subject to the tank standards in 40 CFR parts 264/265, subpart J. Likewise, if an owner/operator installs a drip pad for collection of process drippage, the drip pad standards in Subpart W are applicable.

For those plants which generate F033 wastes, the Agency is proposing to require owner/operators of those surface protection plants to develop and implement a contingency plan for immediate response to protectant drippage in storage yards. The Agency does not expect plants within the scope of the proposed listing to experience drippage in the storage yard because the proposed subpart T requires that drippage cease prior to removing wood from the process area. However, the Agency recognizes the possibility that some incidental drippage may, nonetheless, occur after wood is removed to the storage yard. This contingency plan requirement would not apply to drippage in the process area, where other subpart T requirements would apply.

The requirement is proposed to be the same as the contingency plan requirement promulgated for wood preserving facilities in the December 24, 1992 final rule. In that rule, the Agency clarified what it meant by the term "immediate response" (57 FR 61494). With respect to the word "immediate," EPA intends that owner/operators respond to storage yard drippage that occurs while a plant is in operation within one consecutive working day. A facility is considered to be in operation any day on which it is treating wood. For plants that are not in operation during a storage yard drippage event, the Agency expects the plant to clean up the drippage within 72 hours of occurrence. It is important to note that the timing of response to drippage is based on when the drippage actually occurs, rather than when the drippage is detected in the storage yard. The approach proposed today, like the approach promulgated for wood preserving plants, places the responsibility for checking storage yards for drippage on the plant owner/operator. Regular checks of storage yards, particularly following the initial storage of newly treated wood, will allow owner/operators to respond to drippage in accordance with today's proposal.

With respect to the word "response," EPA intends this term to include cleanup and removal of protectant drippage from the storage yard. For purposes of today's proposal, cleanup of visible drippage from the treated lumber in the storage yard will satisfy the requirements for immediate response. The proposed requirements for the contingency plan are also the same as those finalized in the wood preserving rule. Owner/operators must prepare and maintain a written plan that describes how the plant will respond to storage yard drippage. At a minimum, the plan must describe how the owner/operator will accomplish the following:

(i) Clean up the drippage;
(ii) Document the cleanup of drippage;
(iii) Retain this documentation for three years; and
(iv) Manage the contaminated media in a manner consistent with Federal regulations.

With regard to the requirement to document the cleanup of drippage, the Agency will consider an annual certification, signed by either a registered professional engineer or a responsible company official of proper authority on company letterhead, that the owner/operator has cleaned up drippage in accordance with these rules, to be adequate documentation.

The Agency is proposing to require plants that store wood on-site in areas unprotected from precipitation to cover the treated wood bundles to minimize the quantities of surface protectant that run off the wood into the environment. The chlorophenolic formulations used by the wood surface protection industry are water-soluble, and storage yards are easily contaminated with protectant from precipitation run-off. This cover requirement, and the contingency plan requirement, are being proposed to minimize further contamination of the environment.

C. Historical Soil Contamination

The standards proposed today should substantially decrease any future environmental contamination that would otherwise result from continued generation of these waste streams. There is, however, a considerable amount of soil (process area and storage yard) and water (ground and surface) that already has been contaminated as a result of past surface protection practices.

EPA generally protects human health and the environment against the risks associated with contaminated soil via the "contained-in" policy. The "contained-in" policy states that media containing a listed hazardous waste are themselves considered listed hazardous wastes when they are actively managed (*e.g.*, excavated). See *Chemical Waste Management, Inc.* v *E.P.A.*, 869 F.2d 1526, 1539–40 (D.C. Cir. 1989). The media, henceforth, are regulated as hazardous wastes until such time as the media no longer "contain" the originally listed hazardous waste.

The Agency is in the process of examining issues related to contaminated media and reviewing existing policy on these issues. EPA recently proposed to exempt media contaminated with petroleum wastes. See 57 FR 61542 (Dec. 24, 1992) (materials not regulated under the Underground Storage Tank Program) and 58 FR 8562 (Feb. 12, 1993) (materials regulated under the Underground Storage Tank program). EPA also is involved in an on-going dialogue with interested parties as part of the rulemaking process specifically related to the Hazardous Waste Identification Rule (HWIR), proposed on May 20, 1992 (57 FR 21450) and subsequently withdrawn on October 30, 1992 (57 FR 49280). Since its withdrawal, a national and multi-sectoral outreach program has been initiated.

Because of the historical soil contamination associated with the surface protection industry, the F033 listing proposed today raises issues concerning the regulation and management of contaminated soils. The proposed listing potentially affects actions taken at several thousand sites that are past users of pentachlorophenate. While this proposed listing, coupled with application of the "contained-in" policy to these sites, assures government jurisdiction if such soils are actively managed, it does not, on its own, compel corrective action. It may, in fact, serve to impede or slow site clean-ups as well as other minor activities that, on their own, pose no significant environmental risks, if those activities result in the generation of contaminated soils that must be handled as hazardous wastes. In light of these issues, EPA is requesting data and comment on the "contained-in" policy as it pertains to the wood surface protection industry. Such data and comment might consider:

(1) The appropriateness of subjecting these soils to all requirements of the Subtitle C program when actively managed;

(2) The level of contamination in process area and storage yard soils as well as groundwater; and

(3) The risks posed by these soils.

The Agency acknowledges that a substantial number of plants that previously used chlorophenolic formulations have contaminated their equipment with dioxin, an impurity found in the formulation. Sampling data show that dioxin is, indeed, found in the protectant formulations and wastes from plants that have switched over to non-chlorophenolic formulations, indicating that there has been cross-contamination by previous chlorophenolic use. The original proposal of December 30, 1988 (53 FR 53282) proposed that all cross-contaminated wastes would be included within the scope of the listing unless an equipment-cleaning procedure was used to decontaminate the equipment and prevent the further cross-contamination of product and waste. Today's proposal differs substantially from the 1988 proposal with respect to cross-contaminated wastes. The Agency has determined that a plant must have greater than 0.1 ppm pentachlorophenate (expressed as pentachlorophenol during analysis) in their formulation to generate an F033 waste. There may be plants whose formulations are cross-contaminated due to previous, and now abandoned, use of chlorophenolics, but whose formulations have concentrations of pentachlorophenate less than or equal to 0.1 ppm. Information collected subsequent to the 1988 proposal supports the Agency's findings that wastes from such plants pose what the Agency considers to be an acceptable lifetime excess cancer risk from pentachlorophenate contamination in ground water of 3×10^{-6}, as derived from the carcinogenic slope factor (CSF). A detailed discussion of the Agency's risk assessment is contained in section VI(C) of this preamble, as well as in the docket associated with this rulemaking.

V. Options Considered by the Agency

The Agency carefully considered all the analysis described in Section VII of this preamble in developing today's proposal. The Agency acknowledges that factors in this analysis argue both for listing wood surface protection wastes as well as for not listing these wastes as hazardous. The Agency has decided to list these wastes as hazardous (for reasons described below), but EPA specifically requests comments on the option to not list these wastes as hazardous.

A. Not Listing Wood Surface Protection Wastes as Hazardous

As indicated above, there is some information which suggests that the Agency should not list wood surface protection wastes as hazardous. First, the use of full-strength chlorophenolics has rapidly declined, and is not expected to increase. As indicated in section III, the Agency knows of only two sawmills currently using chlorophenolic formulations to surface protect lumber. Chapman Chemicals (the sole recent producer of chlorophenolic formulations) ceased production of its chlorophenolic formulations in January 1992 and soon after voluntarily filed for product registration cancellation. A notice describing this action was published for public review in the **Federal Register** notice (see 57 FR 23401 (June 3, 1992)). Following a comment period for this action, a final cancellation order was sent to Chapman Chemicals with an effective date of September 14, 1992. This cancellation notice cancelled the following products produced by Chapman Chemicals: Permatox 181, 10S, and 101, and Mitrol G–ST. Any manufacturer would have to obtain a new registration before these chemicals could be re-introduced and be made available for use in wood surface protection.

Second, the risk associated with surface protection wastes is estimated to be, for some exposure pathways, at or below the range of what the Agency considers acceptable. This is the first hazardous waste listing proposal which uses the Agency's risk characterization guidance (U.S. Environmental Protection Agency. Guidance for Risk Assessment. Risk Assessment Council, November 1991). The purpose of the risk assessment, which is described in detail in section VI of this preamble, was to determine to what extent these wastes pose a threat to human health and the environment. For this proposal, the Agency performed a multifaceted study of how these wastes have been and are currently distributed to the environment. The two principal areas of risk associated with surface protection wastes are:

(1) Drinking water contamination associated with groundwater sources contaminated by the current and past use of chlorophenolics; and

(2) Ingestion of fish and shellfish tissues and ingestion of soils contaminated over a long period of time by PCDDs and PCDFs ("dioxins").

To make a listing determination, the Agency applies a "weight-of-evidence" approach, examining risk associated with all potential human health and environmental exposure pathways. By listing wastes from the use of surface protection formulations that contain 0.1 ppm PCP or above, the Agency would effect a change in the risk associated with the cross-contamination of non-chlorophenolic formulations with PCP and dioxins. The risk reduction achieved by cleaning tanks and equipment to a level below 0.1 ppm, i.e., the incremental risk, is relatively modest. The Agency's risk analysis indicates that the incremental risks attributed to this regulation are as follows:

	High end individual risk estimate	Central tendency individual risk estimate	Population risk estimate[1]
Groundwater Consumption	1×10^{-5} to 2×10^{-4}	5×10^{-7}	0.005
Fish/Shellfish Consumption	1×10^{-8} to 4×10^{-7}	8×10^{-10}	0.2
Soil Ingestion	2×10^{-6} to 2×10^{-5}	7×10^{-7}	0.0004

[1] Best estimate for 70 year lifetime.

A listing is expected to have little or no effect on the risk associated with contaminated soils and ground water that has already occurred due to usage of chlorophenolics in the past. Only remediation of existing contamination would address this risk. Site remediation is not required by the mere listing of the wastes. Site remediation is also not expected to occur to any significant degree as a consequence of the management of contaminated media incidental to general facility operations.

The damage cases described later indicate damages from past usage of chlorophenolics. Damages of this magnitude may not occur in the future unless use of full strength chlorophenolics resumes.

Finally, the Agency is aware that the proposed listing could, in fact, accelerate environmental contamination by encouraging plants to dispose of any chlorophenolic-bearing formulations on-site prior to the effective date of a Final Rule, in an attempt to avoid generating F033 hazardous waste. By not listing wood surface protection wastes as hazardous, this accelerated contamination would not likely occur. However, the Agency notes that if contaminated soils are actively managed following the effective date of a Final Rule, such wastes may be subject to the Agency's contained-in policy. The "contained-in" policy states that media containing a listed hazardous waste are themselves considered listed hazardous wastes when they are actively managed (*e.g.*, excavated). See *Chemical Waste Management, Inc.* v *E.P.A.*, 869 F.2d 1526, 1539–40 (D.C. Cir. 1989). The media, henceforth, are regulated as hazardous wastes until such time as the media no longer "contain" the originally listed hazardous waste.

If a manufacturer of pentachlorophenate wanted to resume its production, it would be required to meet all of the requirements under FIFRA for registering a new chemical.

This requires prior completion of health and environmental effects data sets that EPA uses to determine if the chemical poses an unreasonable risk. EPA requests comment on whether FIFRA requirements would meet RCRA concerns.

B. Rationale for Proposing To List Wood Surface Protection Wastes as Hazardous

The Agency elected to propose the listing of these wastes as hazardous for several reasons. First, the Agency's analysis suggests that, even when chlorophenolic formulations are no longer used by a plant (as is currently the case with a majority of surface protectors), contamination of soils and ground water will continue to occur. This is because "transitional users" typically have not cleaned their equipment and elevated levels of pentachlorophenates still remain in their formulation. Drippage onto the ground following treatment of lumber is a normal occurrence in the surface protection process. The chlorophenolic formulations used by sawmills are aqueous solutions that contain both carcinogenic and systemic constituents, including dioxin.

The risks from these wastes may be comparable to those from other listed wastes. As a comparison, the population risk from the groundwater ingestion pathway for the recently promulgated wood preserving wastes listing was lower than risks from wood surface protection wastes (zero excess case over 300 years). However, the Agency listed wood preserving wastes because of the high levels of constituents of concern and significant number of damage cases including 54 NPL sites. Although the central tendency and high-end risks determined for these surface protection wastes seem to be near the low end of concern, the constituents of concern in the waste are in high enough concentrations that these wastes would have been listed under the previously used methodology employed for listing determinations.

Second, EPA is very concerned about potential risks that may occur if chlorophenolic formulations are put back into use. As indicated above, the cancellation of this formulation's FIFRA registration was voluntary. Following the voluntary action, EPA cancelled the registration. Registration of pesticides are governed by section 3 of FIFRA. The Agency's regulations governing the registration process can be found at 40 CFR part 152, subpart C. If the cancelled chlorophenolic formulations are re-instated for use in wood surface protection operations, the risks associated with the use of pentachlorophenate and dioxin can be expected to increase significantly. The Agency believes that listing these wastes as hazardous will provide additional barrier to the use of these formulations beyond the FIFRA registration process. As noted above, EPA requests comment on whether FIFRA would meet RCRA concerns.

In addition, the Agency has information concerning 21 damage cases that document the presence of, and threats to human health and the environment posed by the past use of pentachlorophenate (PCP) and tetrachlorophenate (TCP) at surface protection plants in ground water, surface water, and soil. Significant concentrations of PCP, often orders of magnitude above the water Health-Based Level (HBL), were detected in the ground water of many sawmills. The sampling and analysis data which contribute to these damage incidents were collected during on-going surface protection operations at a time when chlorophenolic formulations were actively used, and EPA believes they are indicative of damages that could occur in the event that production and widespread use of chlorophenolics resume in the future.

Furthermore, as discussed above, the "no-list" option, if adopted in the final rule, would necessarily rely on the FIFRA cancellation of the chlorophenolic formulations in order to minimize unacceptable adverse impacts on human health and the environment. The Agency may take into consideration the impact of other statutory and regulatory requirements when making hazardous waste listing determinations under RCRA (as it has done here, with respect to the impact of the FIFRA cancellation on the anticipated future volume of wastes generated). However, the regulations governing the listing of hazardous wastes at 40 CFR § 260.10 specify a wide range of factors, not all of which will necessarily be adequately addressed by other statutory or regulatory schemes, such as those administered under FIFRA. Therefore, the Agency is reluctant to rely solely on other statutes to accomplish the goals of EPA's hazardous waste listing program.

Finally, today's listing is unique in that it sets a level of pentachlorophenate of 0.1 ppm in formulations as the level above which the listing would apply. This allows plants to clean their equipment such that their formulation is beneath the 0.1 ppm regulatory level, thus reducing the number of plants that would be affected by this rule. The Agency acknowledges, as discussed above, that there is concern about potential one-time waste disposal prior to the effective date of the final rule. However, EPA believes there may be disincentives to such one-time disposal. The economic value of chlorophenolic formulations may discourage disposal. In addition, potential liability under either the Agency's RCRA contained-in policy (discussed in section IV(c) of this preamble) and/or the Comprehensive Environmental Response Compensation and Liability Act (CERLCA, or Superfund) may deter unsafe on-site waste disposal.

For the above reasons, the Agency is proposing to list wood surface protection wastes as hazardous, but is seeking comment on the option to "not list" these wastes in the final rulemaking. The Agency specifically requests comment and supporting information on the risks posed by these wastes.

VI. Description of Wastes Generated

A. Types of Wastes Included in This Proposal

This section describes the waste streams that are generated by the use of surface protection formulations containing chlorophenolics. Two types of primary waste streams are typically generated: process residuals and drippage. Secondary waste streams include spent formulation and wastewaters.

Process residuals are tank sludges that accumulate in the dip tank and/or mix tank as the lumber passes through for treatment. Some plants use spray systems that generate a sludge when recovered formulation is filtered. Periodically, the accumulated sludge must be removed and is typically placed on sawdust or wood chip piles on-site. The ultimate destination of the sludge is dependent on the management of the sawdust piles. Plants have reported burning the sawdust on-site or shipping it off-site for use as boiler feed for energy recovery. Depending on the particle size, some of these wood chips may be shipped to a pulp or paper mill.

Some plants generate little or no tank sludge as a result of certain process variations. Dip tank operations sometimes utilize an internal circulation system to enhance mixing and promote penetration into the packed bundles. The agitation does not allow any particulates to settle, and when the bundles are removed, some of the suspended solids are also removed. Green chain operations sometimes use a system of rollers that are partially submerged into the dip tank. These rollers force the pieces of lumber under the surface of the formulation to ensure thorough coverage of the exposed surfaces. Forcing the lumber deeper into the tank physically drags the lumber through any sludge that has settled in the tank and this sludge leaves the tank with the treated lumber. This system may agitate the formulation within the tank and achieve the same result as an internal circulation system. These practices are described in more detail in the waste management section of this preamble.

Another wastestream is excess formulation drippage from freshly treated lumber. Excess drippage can fall on the ground when the wood is transported from the dip tank or green chain to stacking and packaging. The Agency has observed that spray operations tend to result in less excess formulation on the wood than either the dipping or green-chain operations. Some plants utilize simple recovery systems to minimize the loss of formulation. Pack dip operations hold the wood over the dip tank at an angle to collect excess formulation prior to transfer to storage. Green chain and spray operations may utilize a collection pan under the conveyor to collect formulation as the freshly treated lumber runs along the green chain. The treated wood is then stored on-site or immediately shipped off-site to the buyer.

Other wastes generated by surface protection processes and included in today's proposed listing are wastewaters and discarded spent formulation. Wastewaters are typically not generated by this industry since it is not desirable to wet freshly treated lumber. Untreated logs awaiting cutting are sometimes kept wet to reduce the risk of fire and mold formation. These wastewaters would not be included within the scope of this proposed listing unless they contacted formulation. The Agency has found that larger plants which operate indoors perform "good housekeeping" measures, including the washdown of floors and equipment. The wastewaters generated from these activities, if they contact formulation within the scope of the proposed listing, would be a listed hazardous waste. Discarded spent formulation includes any discarded formulation that a plant disposes of as a result of a change in product formulation.

B. Quantities of Waste Generated

The Agency believes that there are three distinct user groups within the surface protection industry generating this proposed F033 waste: sawmills, furniture manufacturers, and exporters of wood. The Agency has been unable to acquire information on the extent of use within the furniture manufacturing and export industries and requests such data. The Agency has obtained, as earlier mentioned, a substantial amount of new information on the saw mill industry. The quantity of wastes generated by this industry is described in the following paragraphs.

Based on current industry directories, the Agency estimates that there are approximately 3200 operating sawmills in the United States. The Agency further estimates that approximately 980 (one-third) of these mills perform surface protection operations. Of these 980 mills, the EPA estimates that about 50% of the lumber cut at these plants is actually surface-protected. These percentage estimates may be high for smaller mills and low for the larger mills, but the Agency believes, on weighted average, that they are sufficiently accurate for purposes of estimating waste generation quantities and for performing risk modeling.

Based on the above, quantities of waste generated on a national level can be estimated. Formulation drippage and precipitation run-off from storage yards are the two types of waste generated at surface protection plants that the Agency believes can result in substantial human exposure. These are the highest volume waste streams generated by the industry and are included within the scope of the proposed listing.

The Agency has estimated from on-site field sampling and interviews regarding typical solution concentrations, that the amount of process area drippage that can occur at mills throughout the U.S. is between 1000 and 4000 gallons per one million board feet of lumber treated. Given the number of sawmill plants in operation throughout the country, the number of process types and set-ups, and the type of management practices, the Agency assumes that approximately 2000 gallons of drippage infiltrate soil per one million board feet of lumber surface-protected.

The other type of waste that presents significant human exposure risk is storage yard run-off. Depending on market conditions, lumber may remain in the yard following surface protection for longer than a month. During this period, precipitation may carry formulation into nearby bodies of water or further contaminate soils throughout the yard. The Agency is aware that larger mills often package their wood or otherwise keep their wood protected from weather for better resale. The Agency notes that, given the variability in plant size, location, climate, and management practices, there is a high uncertainty in estimating the amount of storage yard run-off from this industry. A study performed in British Columbia, Canada provides information about run-off from an on-site two-day rain event. A copy of this study is in the docket for today's rulemaking. The formula used to derive the actual concentration of chlorophenolic in run-off for use in making risk assessments is discussed later in the preamble.

Sludges removed from process tanks or filters are generated infrequently and never in large quantities by this industry. Indeed, many small plants have never removed sludge because it has not caused a problem and the system is continuously replenished. Other plants, because of their process, generate sludge, but all of it leaves the plant with the treated wood product.

C. Waste Management Practices

The Agency has found that wastes generated by this industry are managed by any of the following methods: (1) Burned on-site as fuel, (2) shipped off-site for use as boiler fuel, (3) land disposed on-site, (4) land disposed off-site, or (5) dripped or placed onto soil. The majority of mills allow formulation to drip directly onto the ground and dispose of sludge in sawdust piles. The Agency has seen very little evidence of management of these wastes that would be in compliance with RCRA requirements, were this proposed listing finalized. However, EPA notes that there are some plants that dispose of these wastes in what would constitute a proper manner for hazardous wastes. The details of the Agency's findings regarding waste management practices can be found in the docket for this rulemaking.

D. Pollution Prevention and Recycling Practices

The Agency is currently preparing a separate guidance manual recommending voluntary pollution prevention and waste minimization techniques for the lumber industry. The manual will be completed prior to expected promulgation of a final F033 hazardous waste listing rule in December 1993. Some recommended strategies for pollution prevention in the surface protection industry are described in this section. Further information will be included in the manual.

The ultimate goal of pollution prevention is to reduce present and future threats to human health and the environment. Pollution prevention (also referred to as source reduction) is the use of materials, processes, or practices that reduce or eliminate the quantity and/or toxicity of wastes at the source of generation. Pollution prevention is the first step in a hierarchy of options for reducing the generation of waste. The first recommended pollution prevention option is to replace chemical treatment with another type of treatment to achieve surface protection. One alternate is to dry the wood to reduce water content (high water content leads to sapstain). The Agency is aware that this option may not be economically viable for a smaller mill. If such a system cannot be feasibly employed, it would be preferable for a user of chlorophenolic-containing formulations to switch to an alternate formulation that does not generate a hazardous waste.

Because the proposed F033 listing includes a concentration standard for treatment formulations, a plant could avoid generating a hazardous waste by ensuring that its formulation is at or beneath this concentration standard (0.1 ppm pentachlorophenate). The Agency performed field testing on a dip tank formulation following the cleaning of the tank (the plant was switching from a chlorophenolic formulation to a non-chlorophenolic formulation) by sandblasting and found that sandblasting effectively reduces chlorophenolic contamination to acceptable levels. This is the only method that has been field tested by the Agency. The Agency requests comment and data on the effectiveness of other cleaning procedures, e.g. steam cleaning, etc. Another pollution prevention option is the use of high velocity spray systems that generate fewer process residuals and less drippage. Again, however, a small production volume may not favor this option since spray systems require a larger flow of wood through the system to be economically or technically feasible.

Other pollution prevention strategies for use within the surface protection industry: (1) Local and general ventilation within the cutting process area to reduce dust which would accumulate on wood; (2) blowing wood with air to further reduce sawdust on wood prior to surface protection; and (3) the use of drainage collection devices (gutters) on roof tops to keep rainwater away from process wastes. For wastes that cannot be reduced at the source, generators may consider recycling as the next best option. Pollution prevention practices are very critical in plant operations that produce a hazardous waste since they can reduce the amount of hazardous waste generated. Recycling activities, when safely operated and maintained, are next best because they take what would have been termed hazardous waste generated from the process and reuse it to reduce actual hazardous waste generation that is destined for disposal.

VII. Analysis Supporting This Proposal

In support of this proposed rulemaking, the Agency has:

(1) Performed sampling and analysis of various surface protection sites which include actual waste and soil sampling;

(2) Studied the management of these wastes;

(3) Obtained examples of previous incidents of environmental contamination (known as damage cases), and

(4) Performed a rigorous risk assessment which uses actual sampling and site data to model the effects of past and present contamination and to estimate the risks that the contaminants pose to human health and the environment as a result of chlorophenolic use.

A. Recorded Incidents of Environmental Contamination

The extent of pentachlorophenate contamination in plant process area soils is well documented. The damage cases do not provide data on sediment contamination in nearby streams, but they do support the mobility property of a "chlorophenolic" (such as pentachlorophenate) to ground and surface waters. Ten of the 21 damage cases showed on-site ground-water contamination with PCP above the HBL of 0.001 ppm. Eleven of the 21 plants showed surface water contamination with PCP at levels above the HBL.

B. Waste Characterization and Constituents of Concern

Because the sampling sites were not randomly selected, one cannot draw accurate conclusions about all sawmills from this small sampling population. However, the waste characterization data obtained from the sample population is appropriate and useful in making a determination on the waste itself, although it may be of limited use in characterizing the entire industry. All three waste streams encompassed by the proposed listing contain the following proposed Appendix VIII constituents of concern: Pentachlorophenol, tetrachlorophenol, total equivalence of 2,3,7,8 substituted dibenzo-p-dioxins (PCDDs) and total equivalence of 2,3,7,8-substituted dibenzofurans (PCDFs). Analysis of samples collected at five plants show that process area residuals are not hazardous wastes under the Toxicity Characteristic Leachate Procedure (TCLP, 40 CFR 261.24). Analysis of samples taken at these five plants show that contaminated storage yards (which represent the largest area of a mill) contain low levels of dioxin (at or below 1 ppb) and non-detectable levels of pentachlorophenate. Such dioxin concentrations are below concentrations that would generally trigger a Superfund clean-up (1 ppb). By comparison, process area soils have been found to contain high levels of dioxin and very low to non-detectable levels of pentachlorophenate.

SAMPLE ANALYSIS

Waste stream dioxin	Current user of PCP		Max. Penta (ppm)	Past user of PCP		Median TEF (ppb)
	Penta Conc. (ppm)	TEF dioxin (ppb)		Median penta (ppm)	Max TEF dioxin (ppb)	
Sludge	1722	88	247	28	15.36	3.95
Formulation	290	0.01	8.3	2.6	2.14	0.0085
Process soil	0.17	0.94	1.4	1.0	4.09	2.13
Storage yard	0.09	0.07	Non-Detect	Non-Detect	0.96	0.05
Sediment/drain	No Analysis	No Analysis	0.97	0.03	0.034	0.017

To compare these figures with the corresponding health based levels (HBLs') for each of the constituents in soil and formulation, one can use a HBL (pentachlorophenate in soil)= 9 ppm and a HBL(pentachlorophenate in water)= 0.001 ppm. For the dioxin constituent, on should use HBL (dioxin in soil)= .007 ppb and a HBL (dioxin in water) = 0.000030 ppb.

C. Health and Ecological Effects

1. Toxicity of Constituents

A variety of toxic effects with implications for human health and the environment have been associated with the chemical constituents found in chlorophenolic surface protection formulations. These constituents include pentachlorophenol, 2,3,4,6-tetrachlorophenol, and other chlorophenols, as well as numerous polychlorinated dibenzodioxins and polychlorinated dibenzofurans. Pentachlorophenol is classified as a probable human carcinogen based on sufficient evidence in laboratory animals. In addition, pentachlorophenol exhibits non-cancer pathological effects on the liver and kidneys. 2,3,4,6–Tetrachlorophenol is a systemic toxicant which also has adverse effects on the liver and kidneys at low doses. As a group, polychlorinated dibenzodioxins and dibenzofurans exhibit a wide range of toxic effects at exceptionally low doses. The most studied congener, 2,3,7,8-tetrachlorodibenzo-p-dioxin, is classified as a probable human carcinogen, a teratogen, and an immunotoxin.

a. Human health criteria and effects. EPA uses health-based levels, or HBLs, as a means for evaluating levels of concern of toxic constituents in various media. In establishing HBLs, EPA evaluates a wide variety of health effects data and existing standards and criteria. EPA uses any Maximum Contaminant Level (MCL) promulgated under the Safe Drinking Water Act as an HBL for contaminants in water. For other media, or if there is no MCL, EPA uses an oral reference dose (RfD), an inhalation reference concentration (RfC), and/or a carcinogenic slope factor (CSF) to derive the HBL, in conjunction with various exposure assumptions and, for carcinogens, a risk level of concern. The risk level of concern may vary, but for the purpose of deriving the health-based levels in the following discussion, the risk is taken as 10^{-6} (i.e., one in a million). A given constituent may have an RfD, an RfC, and/or a CSF, depending on the variety and nature of the toxic effects exhibited. The RfD is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population, including sensitive subgroups, that is likely to be without appreciable risk of deleterious effects during a lifetime. The CSF is an estimate of the upper bound confidence limit of the lifetime risk of developing cancer, per unit dose, which results from the application of a low-dose extrapolation procedure. When available, EPA uses RfDs, RfCs, and CSFs that have been verified by the Agency's Reference Dose/Reference Concentration (RfD/RfC) Work Group or CRAVE (Carcinogen Risk Assessment Verification Endeavor) Work Group. If no verified values exist, other estimates of RfDs, RfCs, and CSFs are examined to determine if they are appropriate for use in establishing HBLs. HBLs are intended to be protective of human health under a wide variety of exposure conditions. Health-based levels in water and soil, and the criteria used to establish them, are shown in Table 1 for the constituents of concern in chlorophenolic surface protection formulations.

TABLE 1.—HEALTH BASED LEVELS AND CRITERIA FOR CONSTITUENTS OF CONCERN

Constituent	Health based levels		Criteria		
	Water (mg/L)	Soil (mg/kg)	MCL (mg/L)	RfD (mg/kg/d)	CSF $(mg/kg/d)^{-1}$
Pentachlorophenol	0.001	9.0	0.001	0.03	0.12
2,3,4,6-Tetrachlorophenol	1.0	2000	....	0.03	....
2,3,7,8-TCDD	0.00000003	0.000007	0.00000003	0.000000001	160000

Pentachlorophenol has an HBL in water of 0.001 mg/L, based on the MCL. For a person who drinks 2 liters of water containing pentachlorophenate at the HBL each day for 70 years, this corresponds to a risk of 3×10^{-6}, as derived from the CSF. The HBL at a risk level of 10^{-6} in soil is 9 mg/kg, based on the CSF and a soil ingestion rate of 200 mg/day in children (from one year of age to age six).[1] Pentachlorophenol has been classified as a B_2 carcinogen (i.e., a probable human carcinogen) on the basis of statistically significant increases in the incidence of multiple biologically significant tumor types in mice, including hepatocellular carcinomas, malignant pheochromocytomas, and hemangiosarcomas. Pathology of the liver and kidneys, other than carcinomas and sarcomas, has been reported in rats.

2,3,4,6-Tetrachlorophenol has an HBL in water of 1 mg/L based on the RfD and a drinking water ingestion rate of 2 L/day. The HBL in soil is 2000 mg/kg, based on the RfD and a soil ingestion rate in children of 200 mg/day. In laboratory studies, rats exhibited significant increases in liver and kidney weight and centrilobular hypertrophy. 2,3,4,6-Tetrachlorophenol has not been evaluated for carcinogenicity.

2,3,7,8-Tetrachlorodibenzo-p-dioxin has an HBL in water of 30 pg/L (or 30 parts per quadrillion), based on the MCL. For a person who drinks 2 liters of water containing PCDDs and PCDFs at the HBL (in terms of 2,3,7,8-TCDD toxicity equivalent) each day for 70 years, this corresponds to a risk of 1×10^{-4}, as derived from the CSF.[2] The MCL is also consistent with the oral RfD for 2,3,7,8–TCDD, again assuming an intake rate 2 L/day.[3] The HBL at a risk level of 10^{-6} in soil is 7 ng/kg (or 7 parts per trillion), based on the CSF and a soil ingestion rate of 200 mg/day in children (from one year of age to age six). 2,3,7,8-TCDD has been demonstrated to be a potent carcinogen in animals and has been classified as a

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[1] This presumes that exposure associated with incidental soil ingestion for individuals over six years old is low relative to childhood exposure.

[2] EPA is currently conducting a scientific reassessment of the risks of exposures to 2,3,7,8,-tetrachlorodibenzo-p-dioxin and related compounds. A major objective of the reassessment is the development of a biologically based dose-response model to reflect significant advances that have been made in understanding the mechanisms of dioxin toxicity. Health assessment and exposure assessment documents are being updated and revised. This will be followed by a public review process, which will also involve EPA's Science Advisory Board (57 FR 37158). Completion of this review process is anticipated to occur in mid-1993.

[3] Although the oral RfD for 2,3,7,8-TCDD has been withdrawn by the Agency's Office of Research and Development pending completion of the reassessment of the health effects of dioxins and related compounds, until such time as a revised RfD for non-cancer effects is established, the Agency believes that the withdrawn RfD continues to be a useful toxicological benchmark.

B_2 carcinogen.[4] Hepatocellular carcinomas and carcinomas of the thyroid, tongue, hard palate, and lung have been observed in rats. Hepatocellular carcinomas have also been observed in mice. In addition, 2,3,7,8-TCDD has been shown to exhibit a wide variety of other effects. Teratogenesis has been observed, including such frank effects as cleft palate and hydronephrotic kidneys in mice and internal organ hemorrhage in rats. Severe reproductive effects (e.g., spontaneous abortion) have been found in monkeys. Suppression of immune system function has been reported in monkeys, mice, and other species.

Other polychlorinated dibenzodioxin (PCDD) and polychlorinated dibenzofuran (PCDF) congeners differ in the number and position of chlorine atoms they contain. Of the limited number of congeners that have been adequately tested, only a mixture of 1,2,3,6,7,8- and 1,2,3,7,8,9-hexachlorodibenzo-p-dioxin has been shown to be carcinogenic in laboratory animals. This mixture of 2,3,7,8-substituted HxCDD congeners is classified as a B_2 carcinogen based on a chronic exposure study in which statistically significant increases were observed in the incidence of hepatocellular carcinomas in mice and rats. Other symptoms of "dioxin toxicity," such as general weight loss and toxic hepatitis, were also observed.

However, a much larger body of data is available from both short-term in vivo and a variety of in vitro studies covering a wide variety of end points (e.g., developmental toxicity, cell transformation, and enzyme induction) which can be used to supplement the comparative lack of long-term in vivo results. This information reveals a strong structure-activity relationship. Specifically, congeners in which the lateral 2, 3, 7, and 8 positions on the dibenzodioxin and dibenzofuran molecules are occupied by chlorine atoms are much more biologically active than the non-2,3,7,8-substituted congeners. Furthermore, the relative potency of the various congeners is generally consistent from one end point to another. Because these compounds generally occur in the environment as a complex mixture, it is appropriate to consider them as a group and to draw conclusions about their toxicity as a group of compounds with related effects. These observations serve as the basis for the "toxicity equivalency factor" concept in which the concentration of a given PCDD or PCDF congener can be translated into an equivalent concentration of 2,3,7,8–TCDD. A subgroup of the North Atlantic Treaty Organization Committee on the Challenges of Modern Society (NATO/CCMS) has approved in principle the adoption of the TEFs for the 2,3,7,8-substituted congeners listed in Table 2.

TABLE 2.—TOXICITY EQUIVALENCY FACTORS (TEFs) FOR PCDD AND PCDF CONGENERS

Dibenzodioxin	TEF	Dibenzofuran	TEF
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1	2,3,7,8-Tetrachlorodibenzofuran	0.1
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	0.5	1,2,3,7,8-Pentachlorodibenzofuran	0.05
2,3,4,7,8-Pentachlorodibenzo-p-dioxin	0.5	2,3,4,7,8-Pentachlorodibenzofuran	0.5
2,3,7,8-Hexachlorodibenzo-p-dioxins	0.1	2,3,7,8-Hexachlorodibenzofurans	0.1
2,3,7,8-Heptachlorodibenzo-p-dioxins	0.01	2,3,7,8-Heptachlorodibenzofurans	0.01
Octachlorodibenzo-p-dioxin	0.001	Octachlorodibenzofuran	0.001

Source: U.S. Environmental Protection Agency. 1989 Update to the Interim Procedures for Estimating Risks Associated with Exposures to Mixtures of Chlorinated Dibenzo-p-Dioxins and -Dibenzofurans (CDDs and CDFs). Washington, D.C.: Risk Assessment Forum, March, 1989.

Other constituents found in chlorophenolic surface protection formulations include 2,4,5-trichlorophenol and 2,4,6-trichlorophenol. 2,4,5-Trichlorophenol, which has an RfD of 0.1 mg/kg/day, has been observed to cause mild diuresis and slight degenerative changes in the liver and kidneys in a subchronic oral study in rats. 2,4,6-Trichlorophenol, which has been classified as a B_2 carcinogen, has a CSF of 0.011 $(mg/kg/day)^{-1}$. 2,4,6-Trichlorophenol has been shown to cause an increase in lymphomas and leukemias in rats and hepatocellular carcinomas in mice. However, both these compounds are found at relatively low concentrations in surface protection formulations, when present at all.

b. Constituents proposed for addition to appendix VIII. A number of the constituents of concern that are present in wastes generated from wood surface protection processes with chlorophenols do not appear on the list of hazardous constituents at 40 CFR part 261, appendix VIII. The Agency is proposing to add six hazardous constituents to appendix VIII: Sodium pentachlorophenate, potassium pentachlorophenate, the sodium salt of 2,3,4,6-tetrachlorophenol, the potassium salt of 2,3,4,6-tetrachlorophenol, octachlorodibenzo-p-dioxin (OCDD) and octachlorodibenzofuran (OCDF).

Sodium and potassium pentachlorophenate are the sodium and potassium salts of pentachlorophenol. As a result of gastric secretions following ingestion, the sodium and potassium salts of pentachlorophenol and 2,3,4,6-tetrachlorophenol are readily converted to the corresponding phenols by acidification. Therefore, the sodium and potassium salts are expected to elicit the same health effects as the corresponding phenols. For this reason, EPA proposes to add these four compounds to the list of hazardous constituents in appendix VIII.

The other two compounds proposed for addition to appendix VIII, OCDD and OCDF, are members of the large family of polychlorinated dioxins and furans (PCDDs and PCDFs). Certain of these compounds, most notably, 2,3,7,8-TCDD, have been shown to be extraordinarily toxic, as discussed elsewhere in today's notice. EPA's Risk Assessment Forum has evaluated toxicity data for many chlorinated dibenzo-p-dioxins and dibenzofurans in order to establish interim procedures for estimating risks associated with exposures to mixtures of these

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[4] However, recently published epidemiological studies of occupationally exposed individuals report statistically significant increases in mortality from both lung cancer and from all other cancers combined. EPA is currently evaluating these studies as part of its scientific reassessment of 2,3,7,8-TCDD and related compounds.

compounds.[5] These data indicate that 2,3,7,8-substituted congeners of chlorinated dibenzo-p-dioxin and dibenzofurans have toxic effects similar to 2,3,7,8-tetrachlorodibenzo-p-dioxin. Data available from in vivo and in vitro studies reveal a strong structure-activity relationship, in which the 2,3,7,8-substituted congeners are much more biologically active than other congeners. Both OCDD and OCDF are 2,3,7,8-substituted congeners. The data also show that the relative responses of different PCDDs and PCDFs are generally consistent across a variety of toxicity end points.

In regard to OCDD specifically, test animals exhibited initial signs of "dioxin toxicity" in a subchronic study of mice exposed to OCDD at low levels.[6] These data suggest that when exposed for long periods, animals absorb and accumulate sufficient amounts of OCDD to manifest dioxin-like effects. Furthermore, rat hepatoma data from in vitro studies demonstrate a form of enzyme induction for OCDD that is characteristic of dioxins. Structure-activity relationships suggest that similar effects would be expected for OCDF (although no confirmatory experimental data are available). Therefore, EPA has concluded that there is sufficient evidence to show that octachlorodibenzo-p-dioxin (OCDD) and octachlorodibenzofuran (OCDF) are hazardous constituents which should be added to appendix VIII of 40 CFR part 261. The Agency specifically solicits comment on the addition of OCDD and OCDF as hazardous constituents to appendix VIII.

c. Potential human exposure pathways. Human exposure to the hazardous constituents found in wastes generated by the use of chlorophenols for surface protection can occur by a wide variety of pathways. These pathways are identified by the nature of the release of the contaminants into the environment, the subsequent fate and transport within the environment (which depends on the physical, chemical, and biological properties of the hazardous constituents), and the routes of human exposure to contaminated media. The primary media of concern are soils, ground water, surface water, and air. However, biological media (such as fish and shellfish, beef and dairy products, and food crops) may also act as significant reservoirs of contamination from which dietary exposures can occur. The major routes of human exposure are ingestion, inhalation, and dermal absorption. Fate and transport processes include sorption onto soils, infiltration to ground water, runoff to surface water, soil erosion to rivers and streams, suspension of soil and dust particles in air, volatilization, translocation and deposition to plants, and bioaccumulation in aquatic and terrestrial organisms. Processes which can lead to changes in the chemical identity of the constituents include photolysis, hydrolysis, microbial degradation, and biological metabolism within the food chain.

A major source of contamination at sawmills is drippage of excess formulation from treated wood. This can occur directly onto bare soils or onto a pad (on which the equipment is supported) from which infiltration or runoff occurs. Another significant source is precipitation wash-off from treated lumber in storage yards, which can run off to surface waters, infiltrate into ground water, or be retained in the soil column.

Of the many possible human exposure pathways, the Agency has focused its assessment on three principle pathways for which data are available. These pathways are: direct ingestion of contaminated soil; infiltration to ground water and ingestion as drinking water; and soil erosion followed by bioaccumulation in fish and shellfish and subsequent dietary ingestion. The Agency's assessment of risk to human health via these three pathways is discussed elsewhere in today's notice.

d. Ecological effects. At one time pentachlorophenol was one of the most widely used biocides in the United States, having been registered for use as an insecticide, fungicide, molluscicide, herbicide, algicide, and general disinfectant. Therefore, it is not surprising that pentachlorophenol has also been found to cause a variety of ecological effects. Even at relatively low concentrations, pentachlorophenol has been shown to be extremely toxic to aquatic life. Among species of fish, salmonoids appear to be the most sensitive, commonly having LC_{50} values below 100 µg/L.[7] However, some non-salmonoid species of fish also display LC_{50} values in this range. Although pentachlorophenol does not appear to bioaccumulate in aquatic organisms, there is some evidence that certain of its metabolites may bioaccumulate. EPA has established ambient water quality criteria for pentachlorophenol for the protection of freshwater aquatic organisms, as a function of pH. At a surface water pH of 6.8, the criterion is 5 µg/L, measured as a four-day average. At lower pH's, the ambient water quality criteria are somewhat lower. However, these criteria may not be protective of the most sensitive species, e.g., juvenile salmonoids, for which lower criteria may be appropriate.[8]

Because process wastewaters, excluding material storage yard runoff (see 40 CFR 429.11(c)), are prohibited from being discharged directly by the effluent guideline regulations for the sawmill portion of the timber products industry (40 CFR part 429), contamination of surface waters with pentachlorophenol from sawmills is expected to occur only from stormwater run-off. Considerable dilution occurs in water courses during rain events, thereby minimizing the possibility that concentrations of pentachlorophenol could be high enough to be harmful to aquatic life. Therefore, EPA does not believe that surface protection operations pose a significant risk to aquatic ecosystems, if transfer of chlorophenolics to the soil and groundwater is prevented, in the absence of unlawful discharge of chlorophenolic surface protection formulations.

Pentachlorophenol is also toxic to terrestrial animals and plants. It has been used as a nonspecific herbicide, defoliant, and crop desiccant and therefore exhibits toxic effects in many species of plants. Pentachlorophenol has been reported to be poisonous to a variety of domestic animals, including cats, horses, pigs, and poultry. Wildlife have also been killed by the use of pentachlorophenol as a pesticide.

Less information is available on the toxicity of 2,3,4,6-tetrachlorophenol in the environment. Although it has not been tested in salmonoid species of fish, it is acutely toxic to bluegill, having an LC_{50} slightly above 100 µg/L. 2,3,4,6-Tetrachlorophenol has also been shown to be acutely toxic to certain species of zooplankton at sub-part per million levels.

2,3,7,8-Tetrachlorodibenzo-p-dioxin is extremely toxic to mammals, birds, and fish. Exposure to 2,3,7,8-TCDD has been associated with acute and delayed

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[5] U.S. Environmental Protection Agency. 1989 Update to the Interim Procedures for Estimating Risks Associated with Exposures to Mixtures of Chlorinated Dibenzo-p-Dioxins and -Dibenzofurans (CDDs and CDFs). Washington, DC: Risk Assessment Forum, March, 1989. EPA/625/3–89/016.

[6] Couture, L.A., M.R. Elwell, and L.S. Birnbaum. Dioxin-like effects observed in male rats following exposure to octachlorodibenzo-p-dioxin (OCDD) during a 13 week study. Toxicology and Applied Pharmacology, Vol. 93, pp 31–46, 1988.

[7] LC_{50} is the concentration in water at which 50 percent mortality is observed in the species test.

[8] U.S. Environmental Protection Agency. Ambient Water Quality Criteria for Pentachlorophenol—1986. Washington, DC: Office of Water Regulations and Standards, September, 1986. EPA–440/5–86–009.

mortality and with carcinogenic, teratogenic, reproductive, histopathologic, and immunotoxic effects in a variety of animal species.[9] Although data on ecological effects are generally available only for 2,3,7,8-TCDD, the effects of other dioxin and furan congeners are probably determined by a structure-activity relationship similar to the one elucidated for effects on human health.

Acute oral toxicity studies involving 2,3,7,8-TCDD indicate that LD_{50} values for certain wildlife species are as low as, or lower than, those of some laboratory animals.[10] For example, the LD_{50} value for bobwhite quail is 15 µg/kg, whereas for domestic chickens, LD_{50} values lie in the range of 25 to 50 µg/kg. At lower doses, below 10 µg/kg, domestic chickens exhibit signs of chick edema disease and liver pathology. 2,3,7,8-TCDD is also associated with poor reproduction in herring gulls. Eggshell thinning appears to be the most common reproductive effect in avian species. Acute effects in aquatic organisms show an unusual pattern of delayed response, whereby acute effects show a similarity to chronic effects. Among aquatic organisms, fish appear to be the most sensitive to 2,3,7,8-TCDD. For example, the LC_{50} value for rainbow trout has been estimated to be below 40 pg/L. The most commonly reported nonlethal effect in fish is growth retardation of yolk sac fry.

2,3,7,8-TCDD has been shown to bioaccumulate in the food chain. Therefore, among aquatic species, the highest concentrations and most pronounced effects are expected in the largest predators. In terrestrial species, 2,3,7,8-TCDD has been shown to be bioaccumulated in the earthworm by a factor of three relative to the concentration in soil. Therefore, high exposures are expected in terrestrial species whose diet includes a large proportion of earthworms (e.g., robins, woodcocks, and shrews). As part of an ecological assessment of the risks associated with the land disposal of pulp and paper sludge (56 FR 21802), EPA concluded that levels of 2,3,7,8-TCDD in soil as low as 3 parts per trillion could cause adverse effects to terrestrial wildlife (not including adjustments for uncertainties in the underlying toxicity data). Because levels of 2,3,7,8-TCDD toxicity equivalents in sawmill soils are well above these levels, some adverse effects on terrestrial wildlife may occur. However, the relatively small areas of contaminated soils at sawmills could mitigate these effects. Furthermore, significant effects on wildlife populations would appear to be unlikely. The same assessment found minimal risk to aquatic organisms from run-off of 2,3,7,8-TCDD contaminated soils.

2. Resource Damage Incidents

EPA has assembled a substantial body of information on environmental contamination at sawmill facilities associated with the use of chlorophenols for the surface protection of wood. EPA obtained much of its information from the Oregon Department of Environmental Quality, the California Department of Toxic Substances Control, and California's Regional Water Quality Control Boards. To supplement the information from Oregon and California, EPA conducted a search of the open literature and searched its own CERCLIS data base. CERCLIS is EPA's central repository of information on Superfund site assessments, emergency removals, and site remediation activities.[11]

a. Contaminated media. Altogether, EPA has obtained information on levels of media contamination for 21 sawmill facilities. The preponderance of the data are for pentachlorophenol and 2,3,4,6-tetrachlorophenol in ground water, soils, and surface water.[12] A small amount of data are also available for PCDDs and PCDFs in soils, expressed as 2,3,7,8-TCDD toxicity equivalents (TEQ). The data on soils represent soil in the immediate vicinity of the process area where wood was being treated with chlorophenols or had formerly been treated. The surface water data generally represent water in drainage ditches, catchment basins, or other conveyances on-site. These data, presented as the range of the maximum measured concentrations from among the various sites, are summarized in Table 3.[13]

TABLE 3.—RESOURCE DAMAGE INCIDENT MEDIA CONCENTRATIONS

Media	Ground water			Process soil			Surface water		
Constituent	Low (mg/L)	High (mg/L)	N	Low (mg/kg)	High (mg/kg)	N	Low (mg/L)	High (mg/L)	N
Pentachlorophenol	<0.001	45	14	<9	50,000	17	0.002	0.76	11
2,3,4,6-Tetrachlorophenol	<1	<1	7	<2000	14,000	13	<1	1.1	8
2,3,7,8-TCDD TEQ	N/A	N/A	0	0.004	0.15	3	N/A	N/A	0

N=number of facilities with data available.
N/A=data not available.
Only values that are above health based levels are given.

As shown in Table 3, pentachlorophenol has been found above health based levels in ground water, surface water, and soils. Of the 14 facilities with ground water data, 10 facilities show levels above the MCL of 0.001 mg/L. All 11 facilities with on-site surface water data have levels above the MCL. In addition, measurements of pentachlorophenol at one facility show levels of 50 mg/L in water being discharged from an underground seep into surface waters. This discharge is believed to have originated in the process area. Although not shown in Table 3, of five facilities for which surface water data are available off-site, in streams and rivers, four show

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[9] Eisler, R. Dioxin Hazards of Fish, Wildlife, and Invertebrates: A Synoptic Review. U.S. Fish and Wildlife Services, 1986. Biological Report 85.

[10] LD_{50} is the dose (on a unit body weight basis) at which 50 percent mortality is observed in the species tested.

[11] EPA also searched a data base of State bans and advisories on the consumption of fish and shellfish which is maintained by EPA's Office of Water as a special forum of the Nonpoint Source Information Exchange Computer Bulletin Board System (NPS BBS). Although 120 bans and advisories for dioxins were identified, none could be attributed specifically to discharges from sawmills.

[12] Sodium and potassium pentachlorophenate and the sodium and potassium salts of 2,3,4,6-tetrachlorophenol are measured and reported as the corresponding phenols.

[13] EPA's own sampling and analysis data, which are discussed elsewhere in today's notice, are not included in Table 3.

pentachlorophenol levels above the MCL; these data range from 0.03 mg/L to 0.1 mg/L. In soils, of 17 facilities with soil data, 16 facilities show pentachlorophenol levels above the health based level of 9 mg/kg. Also not shown in the table are data on subsurface soils, i.e., soils below about six inches from the surface. Of eight facilities with data available, seven show levels in subsurface soils above the health based level; these data range from 90 mg/kg to 4200 mg/kg. More than 15 years after usage of chlorophenols ended at one facility, pentachlorophenol levels still exceed the health based level to depths as great as six feet.

The damage incident data show that, in none of the seven cases for which ground-water data are available, do the levels for 2,3,4,6-tetrachlorophenol exceed the MCL of 1 mg/L. In only one case out of eight do levels in surface water on-site exceed the MCL, and only by a small amount. Although not shown in Table 3, of four cases with surface water data off-site, in streams and rivers, none show levels above the MCL. However, measurements of 2,3,4,6-tetrachlorophenol taken at one facility show levels of 340 mg/L in water being discharged from an underground seep into surface waters, a discharge which is believed to have originated in the process area. In soils, of 13 cases for which data are available, only three show 2,3,4,6-tetrachlorophenol levels above the health based level of 2000 mg/kg. Although not shown in Table 3, of five cases for which subsurface soil data are available, only one is above the health based level. Noteworthy about this case is that the sample, for which a value of 4800 mg/kg is reported, was taken six years after usage of chlorophenols ended at the site.

Data on PCDDs and PCDFs from the resource damage incidents are limited to soils in the process area. Of the three cases for which data are available, all exceed the health based level of 0.000007 mg/kg (7 parts per trillion) by three orders of magnitude or more. In addition, as part of its own sampling and analysis activities, EPA has acquired data on PCDDs and PCDFs in subsurface process soils at two sites and in stream and drainage ditch sediments at four sites. These data are not included in Table 3 but are discussed elsewhere in today's notice. The data on subsurface process soils, which range from 0.00001 mg/kg (10 parts per trillion) to 0.00027 mg/kg (270 parts per trillion), indicate that health based levels can be exceeded to depths of three feet or more. The sediment data, which range from 0.000009 mg/kg (9 parts per trillion) to 0.000034 mg/kg (34 parts per trillion), also exceed the health based level for soil.

b. Discussion. The levels of pentachlorophenol, 2,3,4,6-tetrachlorophenol, PCDDs, and PCDFs in contaminated media at sawmill facilities frequently reach levels of concern, based on the information obtained from resource damage incident reports.[14] Pentachlorophenol has commonly been found at levels of concern across all media (with the exception of air). Compared to pentachlorophenol, 2,3,4,6-tetrachlorophenol tends to be found at similar levels across the same media. However, given that the corresponding health based levels are substantially higher, 2,3,4,6-tetrachlorophenol is generally of lesser concern.[15] Although the sodium and potassium salts of these compounds are highly mobile in water, the data show that following the cessation of usage of chlorophenols for surface protection, significant levels can be retained in soils for time periods of ten years or more. However, the degree of retention in soil appears to be highly site-specific. In addition, pentachlorophenol and 2,3,4,6-tetrachlorophenol are known to biodegrade. The rate at which biodegradation actually occurs in soils can be expected to be highly variable, depending on local environmental conditions. In contrast, PCDDs and PCDFs bind strongly to soils and are quite resistant to biodegradation, indicating that these compounds can be expected to persist at levels of concern for long periods of time. Nevertheless, these compounds appear to exhibit some mobility in the environment, as evidenced by measurements of elevated levels in soils at depths to three feet or more and by both on-site and off-site measurements of elevated levels in sediments.

EPA has limited direct evidence of damage to ecosystems that can be attributed specifically to the usage of chlorophenols for surface protection. One Swedish study documents an extensive fish kill associated with the discharge to an adjacent stream of a chlorophenol solution from a sawmill surface protection operation. Two weeks following this incident, fish collected six kilometers downstream exhibited liver tissue concentrations of 5 parts per million total chlorophenols. Fish collected 15 kilometers downstream exhibited increasing concentrations in liver tissue, reaching a level of 2 parts per million two months after the discharge. This study, which illustrates that chlorophenols are readily distributed in aquatic ecosystems, suggests that chlorophenols can be accumulated in higher organisms through the food chain.

3. Assessment of Risk from Usage of Chlorophenolic Formulations

The resource damage incidents discussed in the previous section demonstrate that soil, ground-water, and surface water resources at sawmill facilities have been damaged due to on-site contamination by hazardous constituents from chlorophenolic surface protection formulations. However, in the context of non-occupational exposures, these damages pose a threat to public health only if the contamination migrates off-site or if on-site exposure occurs as a consequence of a change in land use. To address these scenarios, EPA performed a risk assessment to quantify the potential risks to human health. This assessment focuses on risk associated with exposure to contaminated ground water and soils and risk associated with dietary exposures from fish and shellfish ingestion due to their uptake of contaminated surface water sediments.

a. *Source characterization.* EPA estimates that approximately 3200 sawmills are currently operating in the United States and that approximately one-third of these surface-protect. EPA believes that of the sawmills that surface protect, nearly all have used chlorophenols at some time. An unknown number of additional sawmills that do not currently surface-protect may have done so in the past using chlorophenols.

Although a number of wastes are generated by surface protection operations, the most important in terms of potential human exposure are drippage of excess formulation in the process area and precipitation wash-off in the storage yard. These are by far the highest volume wastes generated at sawmill facilities. The volume of waste is a major factor in determining the potential risk to human health. Process drippage and precipitation wash-off are frequently disposed of directly onto unprotected soils. Process area and storage yard soils that become contaminated as a result of drippage and wash-off then become additional sources of potential human exposures.

1. *Process drippage.* Process drippage is generated whenever excess formulation drips from the wood once it has been treated. Although the drippage

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[14] This conclusion is corroborated in part by EPA's own sampling and analysis data, as discussed elsewhere in today's notice.

[15] In this regard, however, the Agency notes that 2,3,4,6-tetrachlorophenol has not been evaluated for carcinogenicity.

may be collected and returned to the process, typically there is little or no effective collection system. In dip tank operations, the amount of drippage generated depends on the length of time the lumber is allowed to drain over the tank before it is transferred from the process area. Process drippage may drip directly onto soils in the vicinity of the tank or onto a concrete pad from which runoff occurs. The runoff may subsequently infiltrate into the subsurface environment or be conveyed to surface waters.

Based on drippage measurements made during a field experiment, EPA estimates that the amount of drippage generated is between 1000 and 4000 gallons for every one million board feet of treated lumber. This compares to an estimate of approximately 10,000 gallons of formulation used per million board feet of lumber treated.[16] Measurements of the amount absorbed by the wood vary widely. However, EPA believes that absorption accounts for no more than about 1500 gallons per million board feet. Based on these figures, the drippage and absorption combined do not appear to account for the amount of formulation actually used. Although measurement error may account for much of the disparity, some portion may be attributable to leaks and spills. In spite of the uncertainty, the Agency is assuming for the purpose of characterizing risk that 2400 gallons infiltrate into soils for every one million board feet of lumber that are treated. The Agency believes that this value is well within the range of uncertainty of the data. EPA requests comment on the validity and reliability of this assumption.

Estimates of the strength of the formulation solution range from 0.2 percent to 2 percent, as total chlorophenols. However, chlorophenolic formulations differ substantially in the proportion of pentachlorophenate and 2,3,4,6-tetrachlorophenate salts from one product to another. Some formulations are composed primarily of sodium or potassium salts of pentachlorophenate while others contain a high proportion of salts of 2,3,4,6-tetrachlorophenate. Drippage consists of undiluted excess formulation; therefore, the strength and composition of the drippage is the same as that of the formulation. For the purpose of characterizing risk associated with the usage of chlorophenols for surface protection, the Agency is assuming that the concentration of chlorophenols in the drippage is 0.4 percent, or 4000 parts per million.[17] For the purpose of characterizing the incremental risk associated with the cross-contamination of non-chlorophenolic formulations, the Agency is assuming based on its record sampling that the residual concentration of chlorophenols in the drippage is approximately 3 parts per million. This estimate is based on sampling and analysis data on levels in the formulation of users of non-chlorophenolics who previously used chlorophenols.

2. *Storage yard wash-off.* Wash-off is generated whenever precipitation contacts treated wood. Although this can occur anywhere that treated wood is handled outdoors, most wash-off is generated at sawmills in uncovered storage yards. While generated only intermittently, these wastes are high in volume. The volume generated depends on the size of the storage yard and the amount of rainfall. However, the concentrations of waste constituents in wash-off are relatively low compared to the concentrations in process drippage. Although storage yards may be paved with asphalt, more typically they are situated on unprotected compacted soil or are overlaid with gravel. In most situations, some portion of the wash-off is expected to infiltrate into the ground, the amount depending on the particular site and the specific conditions at the time. The Agency is assuming for the purpose of characterizing risk that 25 percent of the wash-off infiltrates into the ground.

Studies conducted in British Columbia by Environment Canada show that leaching from treated lumber begins after as little as one millimeter of continuous precipitation and occurs even after extended periods of drying.[18] The Environment Canada study collected data on the concentrations of chlorophenols in storage yard runoff as a function of rainfall intensity. EPA evaluated these data, which include several rain events of one to two days duration each. For the purpose of characterizing risk associated with chlorophenolic usage, the Agency took the average runoff concentrations that were reported for the individual rain events and weighted them by the corresponding cumulative rainfall totals to estimate an overall average runoff concentration. This concentration, which is approximately 7 mg/L, represents the average concentration in the wash-off over several cycles of precipitation and subsequent drying. For the purpose of characterizing the incremental risk associated with cross-contamination of non-chlorophenolic formulations, the Agency reduced this concentration by the same factor that the concentration in drippage was reduced, as described above. The Agency requests comment on whether this approach is appropriate and requests additional data to assist in refining this estimate.

3. *Process area and storage yard soils.* For the purpose of characterizing risk related to soil contamination, EPA collected soil samples from the process area and storage yard at five sawmill facilities, one of which was a current user of chlorophenolics. Each sample was collected by a six inch auger inserted to a depth of six inches. In order to collect representative samples of the areas of soil contamination, a team consisting of a hydrogeologist and chemical engineer made a careful assessment of the sampling locations. The samples were analyzed for PCDDs and PCDFs.[19] The sampling and analysis results demonstrate the presence of PCDDs and PCDFs in both the process area and storage yard. The concentrations of the storage yard samples collected by EPA, which range from 0.014 μg/kg (parts per billion) to 0.96 μg/kg (parts per billion) have a mean value of 0.22 μg/kg (parts per billion), expressed as 2,3,7,8-TCDD toxicity equivalents (TEQ). Two process area soil samples collected by EPA have concentrations of 0.94 μg/kg (parts per billion) and 4.1 μg/kg (parts per billion), expressed as 2,3,7,8-TCDD toxicity equivalents (TEQ), giving a mean value of 2.5 μg/kg (parts per billion).[20]

The levels measured in the process area samples represent the accumulation of PCDDs and PCDFs in soil from drippage over an extended, though unknown, period of time. The Agency lacks adequate historical data

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[16] Total usage is based on a manufacturer's estimate.

[17] The concentration of chlorophenols is based on a manufacturer's estimate of what is typically used in the industry.

[18] Environment Canada. Assessment of Storm Water Related Chlorophenol Releases from Wood Protection Facilities in British Columbia. Pacific and Yukon Region, August, 1987. Regional Program Report 87-15.

[19] EPA also analyzed the soil samples for chlorophenols. However, neither pentachlorophenol nor 2,3,4,6-tetrachlorophenol were detected in the soil samples. These results differ with the results from the resource damage incident reports, as discussed elsewhere in today's notice, which show pentachlorophenol and 2,3,4,6-tetrachlorophenol in process soils in the part per million range (and above). Such site to site differences are not unexpected and are probably related to variations in soil types and the soil's ability to bind chlorophenols from aqueous solutions of their salts or other site-specific factors.

[20] EPA notes that the limited data on concentrations of PCDDs and PCDFs in process area soils from the resource damage incident reports, as discussed elsewhere in today's notice, are generally higher than the concentrations discussed here.

on the levels of PCDDs and PCDFs in chlorophenolic surface protection formulations to relate to the observed soil concentrations. Therefore, with the data available, it is not possible to accurately quantify the process area soil contamination that would result from any given level of PCDDs and PCDFs in the formulation. The situation is made even more difficult with respect to storage yard soils because the mechanism by which the contamination occurs is not known. Any one or a combination of the following mechanisms could be involved: (1) Residual drippage in the storage yard (though this has not actually been observed by the Agency); (2) precipitation wash-off from treated lumber (though no actual measurements of PCDDs and PCDFs in wash-off are available); (3) phototransformation of soil pentachlorophenol to octachlorodibenzo-p-dioxin (OCDD) in situ and subsequent photolytic dechlorination to other PCDDs, which has been observed in the laboratory; or (4) phototransformation of phenoxyphenols (i.e., "predioxins," which are co-contaminants of chlorophenolic formulations) to various PCDDs and PCDFs, which appears to require the presence of a strong hydrogen donor. For the purpose of analyzing soil-related exposure pathways, the Agency believes that due to the complexity and uncertainty involved, direct measurement of PCDDs and PCDFs in soils is the best approach for characterizing the source of the contamination.

For characterizing risk associated with existing levels of soil contamination from historical usage of chlorophenolic formulations, the levels measured in soils may be used directly. However, cross-contamination of non-chlorophenolic formulations will continue to contribute to soil contamination with PCDDs and PCDFs. In order to characterize the baseline risks associated with cross-contamination by PCDDs and PCDFs of current non-chlorophenolic formulations, the Agency attempted to estimate the level of soil concentration which would occur from usage of cross-contaminated non-chlorophenolic formulations. A comparison of available data on the levels of these compounds in chlorophenolic and cross-contaminated non-chlorophenolic formulations suggests that concentrations of PCDDs and PCDFs may have dropped by about a factor of four. In the absence of any other information, the Agency believes it is reasonable to expect correspondingly lower levels of PCDDs and PCDFs in soils attributable to such cross-contamination than the levels indicated by direct measurement. Therefore, the measured soil concentrations were reduced by a factor of four to estimate the soil concentrations which would result solely from cross-contamination. EPA requests comment on whether this approach is appropriate to use to estimate the baseline soil concentration for non-chlorophenolic users.

b. *Exposure pathway analyses*—1. *Ground-water ingestion.* This exposure pathway is based on the premise that contaminated ground water in shallow, unconfined aquifers may be used as a drinking water supply. A mathematical model is used to describe ground water flow and pollutant transport in unsaturated soils (i.e., the vadose zone) and unconfined ground water aquifers (i.e., the saturated zone). This model, known as the MULTIMED model, is based on many of the same analytical and numerical solution techniques that have been used by the Agency for other rulemakings, including the Toxicity Characteristic revisions (March 29, 1990; 55 FR 11798).[21] A significant difference in the analysis conducted for this proposal is the simulation of ground water transport in the transient mode; no "infinite source" or steady-state assumption is made in performing the transport calculations. However, important simplifying assumptions of the model remain. These include the assumption that the properties of the saturated, porous medium are isotropic and homogeneous. Fractured media, aquicludes, and multiple aquifers are not simulated. Ground water flow is assumed to be steady and uniform. The sorbed and aqueous phases are assumed to be in equilibrium; sorption is further assumed to follow a linear isotherm.

Initially, EPA used the MULTIMED model to perform screening analyses to identify the constituents that are likely to migrate through ground water at appreciable rates, the model input parameters to which the modeling results are most sensitive, and the sources of ground water contamination that are most important. The screening analyses show that, as expected, PCDDs and PCDFs do not migrate significantly in ground water. The screening analyses also show that drippage in the process area is considerably more important than wash-off in the storage yard as a source of ground water contamination. Parameters to which the modeling results are sensitive include: (1) The initial source concentration; (2) the source infiltration rate; (3) the recharge rate; (4) the various sorption parameters, including the soil:water partition coefficient and the fraction of organic carbon in the vadose zone and the aquifer; (5) the hydraulic conductivity of the aquifer and the vadose zone; and (6) the distance from the source area to the nearest drinking water well. The hydraulic conductivity and the organic carbon fraction are related to the type of geologic materials of which the aquifer and the unsaturated zone are comprised. A variety of other parameters also influence the modeling results. Values of the important parameters used for the ground water analysis are found in Table 4 below.

TABLE 4.—PARAMETERS VALUES FOR GROUND WATER INGESTION PATHWAY

Parameter	Central tendency value	High end value
Source Concentration:		
Chlorophenolic Usage (ppm)	4000	4000
Baseline (ppm)	2.8	2.8
Residual (ppm)	0.1	0.1
Facility Size (MMBF)	20	100
Distribution Coefficient (Kd):		
Pentachlorophenol (mL/g)	1068	412
2,3,4,6-Tetrachlorophenol (mL/g)	966	87
Precipitation (inches/year)	48	40
Recharge Rate (meters/year)	0.24	0.20
Infiltration Rate (meters/year)	0.32	1.14
Vadose Zone:		
Total Thickness (meters)	3.0	1.5
Soil Type (-)	loam	sand
Hydraulic Conductivity (cm/hr)	1.04	29.7
Organic Carbon (percent)		
Layer 1	1.1	0.6
Layer 2	0.2	0.1
Aquifer:		
Thickness (meters)	30	15
Hydraulic Conductivity (m/yr)	5000	10000
Organic Carbon Fraction (-)	0.002	0.001
pH	6.2	7.9
Hydraulic Gradient (-)	0.002	0.004
Distance to Well (feet)	500	100
Ingestion Rate (L/day)	1.4	1.4
Exposure Duration (years)	9	9

A discussion of the various ground water modeling assumptions and the values of the input parameters is found

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[21] The reader is referred to the docket for today's proposal for a detailed description of the MULTIMED model and its application for this proposal.

in the risk assessment background document for today's proposal.

2. *Direct soil ingestion.* This exposure pathway is based on the premise that young children may be exposed to hazardous constituents that are present in contaminated soils while playing outdoors, as a result of normal hand to mouth behavior. Such exposure could occur if the site where the contaminated soils are located is converted to residential housing, in the absence of soil remediation.[22] The Agency assumes that adult exposures associated with incidental soil ingestion are generally low when compared to childhood exposures.

Limited sampling and analysis data collected by EPA have identified soils in the process area and storage yard of sawmills that are contaminated with PCDDs and PCDFs. These compounds are highly persistent and can be expected to remain in the soil for many years to come. EPA used actual measurements of these compounds in soil in conjunction with various exposure assumptions to estimate potential childhood exposures to PCDDs and PCDFs if sawmill sites were converted to residential use without prior soil remediation. These assumptions are detailed in Table 6 below and in the risk assessment background document for today's proposal.

TABLE 5.—PARAMETERS VALUES FOR DIRECT SOIL INGESTION PATHWAYS

Parameter	Central tendency value	High end value
Soil Concentration (µg/kg)	0.218	0.96
Soil Ingestion Rate (g/day)	0.1	0.2
Exposure Duration (days)	800	1825
Absorption Fraction (-)	0.3	1.0

As discussed previously, for the baseline risk the Agency reduced the measured values by a factor of four in making estimates of soil concentrations resulting from cross-contamination. With regard to chlorophenols, however, the Agency's own data indicate an absence of significant soil contamination. For this reason, EPA has not attempted to characterize quantitatively, the potential risks associated with childhood exposures to chlorophenols via direct soil ingestion.[23]

3. *Fish and shellfish ingestion.* Most sawmills are located adjacent to or in close proximity to rivers and streams. This fact, combined with the results of actual sediment measurements, indicate a high probability that PCDDs and PCDFs have migrated into surface water sediments, presumably by soil erosion. Once river and stream sediments are contaminated, biological uptake may occur by freshwater organisms. This is of particular concern to human health in the case of freshwater fish which are consumed as part of the diet. Uptake of the more highly chlorinated PCDDs and PCDFs, such as those found in soils at sawmills, has been documented in laboratory studies of young fish exposed to contaminated riverine sediments.[24] Furthermore, estuarine fish and shellfish may also be subject to uptake of PCDDs and PCDFs when contaminated sediments are naturally discharged into bays and estuaries.

EPA used a methodology for fish and shellfish ingestion which is similar to one used in the proposed rule for land application of chlorine-bleached pulp and paper mill sludge (56 FR 21802). This approach uses the USDA's Universal Soil Loss Equation to estimate the ratio of the rate of erosion of soils from a contaminated site to the rate of erosion in the watershed as a whole. The ratio represents the dilution of sediments from a site by sediments from the entire drainage basin. Applying this ratio (or "dilution" factor) to the concentration in soils from a contaminated site gives the average sediment concentration in the watershed to which fish and shellfish may be exposed. To determine the average watershed acreage per sawmill, EPA mapped the location of over 2500 sawmills to determine the number of sawmills in each of over 2000 hydrologic cataloguing units in the continental United States, as defined by the U.S. Geological Survey.[25] Parameters for biological uptake are established using an empirically-derived sediment: fish bioaccumulation factor. Data from a USDA national food consumption survey are then used to estimate human exposure in the general population. In addition, data from other surveys are used to estimate exposures among recreational fishers. Values of the important parameters used in the analysis are summarized in Table 6 below.

TABLE 6.—PARAMETER VALUES FOR FISH AND SHELLFISH INGESTION PATHWAY

Parameter	Central tendency value	High end value
Site Area (hectares)	1.9	16.2
Ratio of Site Slope to Basin Slope (−)	1.0	1.0
Site Delivery Ratio (−)	0.80	0.62
Soil Concentration (µg/day)	0.218	0.96
Sites per Basin Area (ha)−1	2.79×10^{-6}	1.03×10^{-5}
Cover Factor (−)	0.04	0.004
Bioaccumulation Factor (−)	0.008	0.1
Consumption Rate (g/day)		
Recreational Fishers	30	140
General Population	5.9	38
Ratio of TCDD-TEQ in fish filet to whole body (−)	0.5	0.5
Diet Fraction (−)	0.4	0.4

A detailed description of the methodology for the fish and shellfish exposure pathway is found in the background document for today's proposal.

c. *Characterization of risk from usage of chlorophenolic formulations.*

For today's proposal, EPA is taking a generic approach to the characterization of risk from the land disposal of certain wastes generated by the surface protection of wood at sawmill facilities, specifically process drippage and storage yard wash-off. A generic approach is necessary due to a lack of adequate data to perform site-specific risk assessments for a representative sample of sites.[26] With this approach, a generic scenario is developed in order to represent a prototypical sawmill site.

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[22] The agency recognizes that the very presence of contaminated soils is a factor that could also discourage residential development of former sawmill sites.

[23] The Agency noted that data from the resoure damage incidents described elsewhere in today's notice suggest that process soils could pose a threat to human health due to contamination with chlorophenols, primarily pentachlorophenol. The data are insufficient to draw any conclusions regarding chlorophenols in storage yard soils. However, any risks posed by soils contaminated with chlorophenols are contingent on residential redevelopment, without prior remediation.

[24] Kuehl, D.W., P.M. Cook, A.R. Batterman, D. Lothenbach, and B.C. Butterworth. Bioavailability of polychlorinated dibenzo-p-dioxins and dibenzofurans from contaminated Wisconsin River sediment to carp. Chemosphere, Vol. 16, pp 667–679, 1987.

[25] The mapping results indicate that among cataloguing units where sawmills are located, there is one sawmill on average for every 270,000 acres, or approximately three sawmills per cataloguing unit. EPA estimates that approximately a third of these sawmills currently surface protect, or about one sawmill on average per cataloguing unit.

[26] EPA notes that a generic approach to risk characterization complements the site-specific data on media contamination from resource damage incidents, as described elsewhere in today's notice. Although useful for judging the reasonableness of the generic assessment, the resource damage incidents do not of themselves provide an adequate basis for characterizing risk.

The prototypical site is characterized in terms of size, waste generation, waste characterization, waste management practices, hydrogeologic characteristics, and drainage basin characteristics based on industry responses to questionnaires, EPA site visits, sampling and analysis data, and other information available to the Agency. The development of this scenario involves the evaluation of each of the parameters that is required in order to characterize human exposure and the selection of specific values for each of those parameters. Each of the exposure pathways described previously was analyzed using this approach.

If the values for all the exposure parameters are selected to represent what is typical (as indicated by the mean or median values for the parameters), then the corresponding risk from such an exposure scenario represents a central tendency estimate. On the other hand, if the values of all the parameters are selected to represent the high end at the same time, then the corresponding risk represents a bounding estimate; such estimates are generally useful only for eliminating certain exposure scenarios from further consideration. In theory, one can generate a distribution of individual risk in a population from the joint distribution of the various exposure parameters. The Agency has determined that EPA risk assessments should, at a minimum, include both central tendency and high-end estimates of individual risk, where the high end represents conceptually the 90th percentile of the population distribution and above. High end estimates are intended to exclude estimates, such as bounding estimates, that are likely to be above the risk to the most exposed individual in the actual population.

In order to characterize the high end risk, the various exposure parameters are first evaluated individually and high-end values for the parameters are selected based on the 90th to 95th percentile of the distribution of the values, or on some less precise measure of the high end where detailed data are not available. For this analysis, one estimate of the high end risk is made by setting each parameter to its high end value, one parameter at a time, and taking the highest of the estimates from this group of scenarios. A second estimate of the high end risk for this analysis is made by setting the exposure parameters to their high end values, two parameters at a time (resulting in a large matrix of exposure scenarios), and taking the highest of the risk estimates from this group of scenarios. These two estimates are intended to represent the lower and upper ends of the high end range of the distribution of risk. EPA requests comment on this approach for making high end risk estimates.

1. *Individual risk from usage of chlorophenolic formulations.* This section presents the results of the Agency's assessment of individual risk associated with the uncontrolled land disposal of process drippage and storage yard run-off from the use of chlorophenols for the surface protection of wood.

For the carcinogenic waste constituents (i.e., pentachlorophenol, PCDDs, and PCDFs), individual risk is described in terms of a lifetime excess cancer risk. The lifetime excess cancer risk represents the estimated upper bound of the 95th percentile confidence interval of the probability that an individual will contract cancer over his or her lifetime due to exposure to a particular substance. The results for PCDDs and PCDFs are combined in terms of 2,3,7,8-TCDD toxicity equivalents (TEQ) by using the toxicity equivalency factors discussed elsewhere in today's notice. For 2,3,4,6-tetrachlorophenol, which is classified as neither a human nor a probable human carcinogen, individual risk is described in terms of a hazard quotient. The hazard quotient is the ratio of the concentration to which an individual is exposed to the media concentration corresponding to the reference dose (otherwise referred to as the health-based level). The higher the hazard quotient, the greater the likelihood that adverse health effects will be observed in an individual and the greater the severity of those effects.

The risk results for the ground water pathway are given in Table 4. These results are broken out separately for drippage in the process area and wash-off in the storage yard. Risks from cross-contaminated non-chlorophenolic formulations would be lower by about a factor of 1400.

TABLE 7.—INDIVIDUAL RISK FROM USAGE OF CHLOROPHENOLIC FORMULATIONS FROM GROUND WATER INGESTION

Constituent	Central tendency	High end
Pentachlorophenol †	$7x10^{-4}$	$2x10^{-2}$ to $3x10^{-1}$
Tetrachlorophenol *	$1x10^{+1}$	$2x10^{+2}$ to $2x10^{+3}$

† Upper bound excess lifetime cancer risk.
* Hazard quotient.

The expected increased risk to a typically exposed individual is $7x10^{-4}$, or a chance of seven in ten thousand of contracting cancer over a lifetime. The assumption is made here that ground water is ingested at the rate of 1.4 liters per day for 9 years. Nine years is typical of the length of time an individual dwells at any one residence and, therefore, of the average duration of exposure to contaminated ground water. The risk calculation assumes that the individual's nine year residency period occurs during the peak nine year exposure segment over the modeling period. Of course, these results are based on the premise that ground water down-gradient of the source of contamination may be used for drinking water. As part of the RCRA section 3007 survey of 166 surface protection facilities, facilities were asked to provide the distance to the nearest ground water well. The survey data indicates that the median distance reported by the 68 responding facilities is 500 feet. Four of the 68 facilities report wells being as close as 100 feet. The further assumptions are made that the well is used for drinking water, is located down-gradient of the facility on the centerline of the plume, and draws from the top of the surficial aquifer. However, since sawmills are often located near rivers and streams, the contaminated ground water plume may be intercepted at least in part by surface water drainages, thereby reducing both the magnitude and likelihood of human exposures. Furthermore, the contaminated plume may not reach a drinking water well for many decades, raising the possibility that biodegradation in situ could significantly lower concentrations in the ground water aquifer. However, the toxicities of the many possible metabolites that may result from biodegradation have not been characterized and may not be inconsequential. The Agency requests comment on these individual risk estimates.

The risk results for the direct soil ingestion pathway are given in Table 5. Risks from soils contaminated only by cross-contaminated non-chlorophenolic formulations would be lower by about a factor of four. These results are broken out separately for the process area and the storage yard.

TABLE 8.—INDIVIDUAL RISK FROM USAGE OF CHLOROPHENOLIC FORMULATIONS FROM DIRECT SOIL INGESTION

Source	Process area		Storage yard	
	Central tendency	High/End	Central tendency	High/End
Constituent:				
2,3,7,8-TCDD TEQ †	2×10^{-5}	5×10^{-5} to 2×10^{-4}	2×10^{-6}	9×10^{-6} to 2×10^{-5}

† Upper bound excess lifetime cancer risk.

The results in Table 5 suggest that the risk from direct soil ingestion by children is considerably smaller than the risk from ground water ingestion. A child exposed to contaminated storage yard soils under typical conditions would be subject to an increased cancer risk of 2×10^{-6} over a lifetime, or a chance of only two in a million. These risk estimates assume soil ingestion rates in the range of 100 mg/day to 200 mg/day from normal hand to mouth behavior. Children who exhibit pica behavior may consume much larger quantities of soil; these children, therefore, could be subject to proportionately higher risks.

Finally, the risk results for the fish and shellfish ingestion pathway are given in Table 6 for two different population groups, recreational fishers and the general population. Risks from this exposure pathway from soils contaminated only by cross-contaminated non-chlorophenolic formulations would be lower by about a factor of four.

TABLE 9.—INDIVIDUAL RISK FROM USAGE OF CHLOROPHENOLIC FORMULATIONS FROM FISH AND SHELLFISH INGESTION

Population	Recreational fishers		General population	
	Central tendency	High/End	Central tendency	High/End
Constituent:				
2,3,7,8-TCDD TEQ †	1×10^{-8}	2×10^{-7} to 2×10^{-6}	4×10^{-9}	3×10^{-8} to 3×10^{-7}

† Upper bound excess lifetime cancer risk.

Because storage yard soils represent by far the largest area of contamination at sawmill facilities (the process area being relatively small by comparison), the results in Table 6 are based on PCDD and PCDF levels in storage yard soils only. The risk estimates for the general population and the central tendency risk estimates for recreational fishers have been adjusted by the proportion of hydrologic cataloguing units in which sawmills are located in order to account for the proportion of the market basket of fish and shellfish that could be contaminated by sediment from sawmills. This proportion is estimated to be 40 percent. EPA requests comment on the appropriateness of this methodology.

The results suggest that human exposures through this pathway are of relatively little concern to any particular individual. For a typically exposed individual in the general population, the risk of contracting cancer is increased by only 4×10^{-9}, or a chance of four in a billion. In fact, the estimated concentrations of PCDDs and PCDFs in fish tissues are substantially lower than levels which have been characterized by some investigators as "background" levels, which suggests that sawmills are not one of the more important sources of PCDDs and PCDFs in the aquatic food chain. However, as described elsewhere in today's notice, the methodology EPA used for the fish and shellfish ingestion pathway is based on average sediment concentrations in an entire drainage basin, which can represent thousands of square miles. Concentrations in sediments immediately downstream of contaminated sites would be expected to greatly exceed the average sediment concentration, suggesting the possibility of the existence of significant localized risks which have not been quantified. Also, despite the estimated risks to any one individual not being very high, the overall contribution of PCDDs and PCDFs from surface protection operations to the aquatic environment is of concern because of the large number of facilities and the enormous size of the population potentially exposed via dietary consumption of fish and shellfish. Human exposure to these compounds from a variety of sources are already at sufficiently high levels that any increase in exposure is cause for concern.

2. *Population risk from usage of chlorophenolic formulations.* Population risk represents the number of persons in a given population which may be expected to exhibit adverse health effects, either in terms of morbidity or mortality. Although population risk can be estimated by summing individual risks across the entire population, in practice detailed information on the distribution of individual risk is rarely available. However, for carcinogens which are assumed to exhibit a linear dose-response relationship, an estimate of population risk can be made by multiplying the central tendency estimate of individual risk by the size of the exposed population. This estimate, which represents the number of cases over a lifetime, can be divided by the period of time over which the population is exposed to calculate an "annual average" number of cases during the 70 year period of maximum exposure. An estimate of this type is

made with the implicit assumption that larger risks to more highly exposed individuals in the population are offset by smaller risks to less exposed individuals. For noncarcinogenic effects, population risk can be estimated by multiplying the proportion of the population that receives an exposure which exceeds the reference dose (RfD) by the size of the exposed population. An estimate of this type obviously requires some knowledge of the distribution of individual risk in the exposed population (as measured by the hazard quotient, for example). This estimate also can be converted to an annual average as discussed above.[27]

Estimates of population risks associated with existing environmental contamination for the ground water ingestion pathway, the fish and shellfish ingestion pathway, and the soil ingestion pathway are given in Table 7. Incremental risk associated with the cross-contamination of non-chlorophenolic formulations is discussed in the benefits section of today's proposal. Note that population risk estimates are not made for pentachlorophenol and 2,3,4,6-tetrachlorophenol for the soil-based pathways (i.e., direct soil ingestion and fish and shellfish ingestion) and for 2,3,7,8-TCDD for the ground water pathway, for the reasons cited earlier.

TABLE 10.—POPULATION RISK FROM USAGE OF CHLOROPHENOLIC FORMULATIONS BY EXPOSURE PATHWAY

Pathway	Ground water	Fish and shellfish	Soil
Constituent:			
Pentachlorophenol †	9×10^{-2}	NA	NA
2,3,4,6-Tetrachlorophenol *	$2\times10^{+2}$	NA	NA
2,3,7,8-TCDD TEQ †	NA	1×10^{-2}	2×10^{-5}

† Cancer cases, annual average during 70 year period of maximum exposure.

* Non-cancer cases, annual average during 70 year period of maximum exposure.

For the ground-water pathway, the population risk estimates are based on an estimated exposed population of approximately 17000 individuals over 70 years. This is derived by adjusting the number of sawmills which currently engage in surface protection operations by the proportion of sawmills reporting the presence of a ground water well and making the assumption of one household per well. The residence time or turnover period is assumed to be 9 years, resulting in eight exposed households (or cohorts) over 70 years. The exposed households are assumed to obtain their drinking water from wells which are located 500 feet directly down-gradient of the surface protection operation and draw from the top of a shallow, contaminated surficial aquifer. The rationale for making these particular assumptions is discussed in the risk assessment background document for today's proposal. Because the assumption that each well is located directly down-gradient of the surface protection operation and is used as a drinking water supply is probably quite conservative (particularly given the frequency with which sawmills are located near surface waters that are likely to intercept at least some portion of the contaminated ground water plume), the population risk estimate could be characterized as a bounding estimate. However, the degree of conservatism is reduced by having not considered that other households at farther distances could also be exposed. Also, sawmills that are not currently conducting surface protection operations may have done so in the past and, if so, would most likely have used chlorophenolic formulations. These would represent additional sites that have the potential for human exposure to contaminated ground water. Although community wells would not be expected to draw from very shallow aquifers, such wells could become contaminated to the extent that the surficial aquifer and the water-bearing aquifer are hydraulically connected. If this occurs, the actual population risk could be much higher. However, because the Agency lacks adequate data on the location of community wells relative to sawmills, EPA regards the existence of contaminated community wells as a matter of speculation only, particularly where community water systems are required to comply with the MCL (the maximum contaminant level established under the Safe Drinking Water Act) for pentachlorophenol.

For the fish and shellfish ingestion pathway, the population risk estimates are based on the entire U.S. population, approximately 250 million people, along with the previously discussed assumption that 40 percent of the commercial freshwater and estuarine fish and shellfish come from regions where sawmills that surface protect are located. As presented previously, a central tendency estimate of individual risk was made for the general population. The assumption made here is that all persons in the general population of the U.S. are potentially exposed. EPA believes that this is a reasonable assumption when one considers that the greatest production of lumber occurs in the regions of the U.S. which also produce the highest commercial fish and shellfish catches, in particular the Gulf Coast and the Pacific Northwest regions. EPA requests comment on these assumptions.

For the direct soil ingestion pathway, an estimate of population risk can be made by estimating the number of children that could be exposed to contaminated soils assuming a change in land use from industrial to residential. This could occur where a sawmill is abandoned and, without prior soil remediation, is later developed for residential housing or is sold to a developer or prospective homeowner. As discussed earlier, the population risk can be estimated by multiplying the exposed population by the central tendency estimate of individual risk. However, because the storage yard is so much larger than the process area, only the individual risk value for the storage yard is used in this calculation. Ideally, one would examine local land-use patterns and land values to ascertain the location of sawmills that are likely candidates for residential development. However, this type of information is not readily available to the Agency. Instead, a bounding estimate can be made by assuming an immediate change in land use to rural

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[27] Another way of estimating the number of annual cases for non-carcinogenic health effects is to estimate the rate at which individuals are exposed to levels above the reference dose.

residential and estimating the number of potentially exposed children based on rural residential population densities, age demographic data, and estimated turnover times of child-bearing households (i.e., the time period from when one child-bearing household is replaced with another child-bearing household). Taking this approach, a bounding estimate of the size of the exposed population is approximately 500 children over a 70year period. While this can be characterized as a bounding estimate, it does not consider the possibility that a sawmill site located close to an expanding urban area could be converted to high density single family or multifamily housing. Even if only a small number of sawmills were to be developed for high-density housing, the potential population of exposed children could be larger than EPA's estimate.

VIII. Applicability of the Land Disposal Restrictions

RCRA requires EPA to make land disposal prohibition determinations for hazardous wastes that are newly identified or listed in 40 CFR part 261 after November 8, 1984, within six months of the date of final listing (RCRA section 3004(g)(4), 42 U.S.C. 6924(g)(4)). EPA is also required to set levels or methods of treatment, if any, which substantially diminish the toxicity of the waste or substantially reduce the likelihood of migration of hazardous constituents from the waste so that short-term and longterm threats to human health and the environment are minimized (RCRA section 3004(m)(1), 42 U.S.C. 6924(m)(1)). Land disposal of wastes that meet treatment standards thus established by EPA is not prohibited.

A general overview of the Agency's approach in performing analysis of the how to develop treatment standards for hazardous wastes can be found in greater detail in section III.A.1. of the preamble to the final rule for Third Third wastes (55 FR 22535, June 1, 1990). The framework for the development of the entire Land Disposal Restrictions program was promulgated in the Solvents and Dioxins rule (51 FR 40572, November 7, 1986).

Treatment standards typically are established based on performance data from the treatment of the listed waste or wastes with similar chemical and physical characteristics or similar concentrations of hazardous constituents. Treatment standards also are established for both wastewater and nonwastewater forms on a constituent-specific basis. The constituents selected for regulation under the Land Disposal Restriction Program are not necessarily limited to those identified as present in the F033 wastes in today's notice, but include those constituents or parameters that will ensure that the technologies are operated properly.

Wherever feasible, the Agency anticipates transferring BDAT treatment standards for both wastewater and nonwastewater forms of the proposed F033 wastes from the list of treatment standards for F039, the listing for multi-source leachate, promulgated in the Third Third final rule (see 40 CFR 268.43). These treatment standards, in fact, should be generally achievable. If F033 wastes have constituents present that are not currently regulated in these wastes, EPA will develop treatment standards for these constituents and may then propose to add them to the treatment standards for F039. (The Final BDAT Background Document for U and P Wastes/Multi-source Leachate is available from NTIS (National Technical Information Service), 5285 Port Royal Road, Springfield, Virginia 22161, (703) 487–4600. The NTIS numbers for the three-volume set are PB90–234337, PB90–234345, and PB90–234352.

Although data on waste characteristics and current management practices for the proposed F033 wastes have been gathered as part of the administrative record for today's rule, the Agency has not completed its evaluation of the usefulness of these data for developing specific treatment standards or assessing the capacity to treat (or recycle) these wastes.

Available treatment performance data for wastes believed as difficult to treat as F033 show that incineration, chemical dechlorination, and biological treatment are potentially applicable to F033. These technologies have shown some promise in the treatment of dioxin-containing wastes. EPA is, in fact, evaluating the feasibility of developing concentration-based treatment standards based on the performance of chemical dechlorination technologies demonstrated on wood preserving wastes or unspent commercial chemical products used in the formulation of solutions that are precursors to the generation of F033 or F032 (wood preserving waste). These data are also under review for the purpose of developing treatment standards for F033. A collection of the available treatment information has been placed in the docket for today's rule.

EPA intends to propose treatment standards for F033 in a separate rulemaking. However, EPA specifically is soliciting comment and data on the following as they pertain to the proposed listing of F033 wastes identified in today's notice:

(1) Technical descriptions of the treatment systems that are or could potentially be used for these wastes;

(2) Descriptions of alternative technologies (such as bioremediation) that might be currently available or anticipated as applicable;

(3) Performance data for the treatment of these or similar wastes (in particular, constituent concentrations in both treated and untreated wastes, as well as equipment design and operating conditions);

(4) Information on known or perceived difficulties in analyzing treatment residues or specific constituents;

(5) Quality assurance/control information for all data submissions;

(6) Factors affecting on-site and off-site treatment capacity;

(7) Information on the potential costs for set-up and operation of any current and alternative treatment technologies for these wastes; and

(8) Information on waste minimization approaches.

IX. State Authority

A. Applicability of Final Rule in Authorized States

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

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

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

B. Effect on State Authorizations

1. HSWA Provisions

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

2. Modification Deadlines

Section 271.21(e)(2) of EPA's state authorization regulations (40 CFR part 271) requires that States with final authorization must modify their programs to reflect Federal program changes and submit the modifications to EPA for approval. The deadline by which the States must modify their programs to adopt this proposed regulation, if it is adopted as a final rule, will be determined by the date of promulgation of a final rule in accordance with § 271.21(e)(2). If the proposal is adopted as a final rule, Table 1 at 40 CFR 271.1 will be amended accordingly. Once EPA approves the modification, the State requirements become RCRA Subtitle C requirements.

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

It should be noted that authorized States are required to modify their programs only when EPA promulgates Federal standards that are more stringent or broader in scope than existing Federal standards. Section 3009 of RCRA allows States to impose standards more stringent than those in the Federal program. For those Federal program changes that are less stringent or reduce the scope of the Federal program, States are not required to modify their programs. (See 40 CFR 271.1(i).) This proposed rule, if finalized, is neither less stringent than nor a reduction in the scope of the current Federal program and, therefore, States would be required to modify their programs to retain authorization to implement and enforce these regulations.

X. Proposed Amendment of SW–846 (Test Methods for Evaluating Solid Waste, Physical/Chemical Methods)

The Agency is proposing to require that certain wood surface protection plants test the pentachlorophenate concentration of their formulations (see discussion in section IV(B) above) using the analytical and test methods found in SW–846 (Test Methods for Evaluating Solid Waste, Physical/Chemical Methods). In connection with this proposed testing requirement, the Agency is today proposing to add method 4010 (Immunoassay Test for the Presence of Pentachlorophenate) to the Second and Third Editions of SW–846.

SW–846 contains the analytical and test methods that EPA has evaluated and found to be among those acceptable for testing under subtitle C of the Resource Conservation and Recovery Act, as amended (RCRA). These methods are intended to promote accuracy, sensitivity, specificity, precision, and comparability of analyses and test results.

Several of the hazardous waste regulations under subtitle C of RCRA require that specific testing methods described in SW–846 be employed for certain applications. For the convenience of the reader, the Agency lists below a number of the sections currently found in 40 CFR parts 260 through 270 that require the use of a specific method for a particular application, or the use of appropriate SW–846 methods in general. If today's proposal is adopted in final form, the proposed pentachlorophenate testing requirement would be added to this list.

(1) Section 260.22(d)(1)(i)—Submission of data in support of petitions to exclude a waste produced at a particular plant (i.e., delisting petitions);

(2) Section 261.22(a)(1) and (2)—Evaluation of waste against the corrosivity characteristic;

(3) Section 261.24(a)—Leaching procedure for evaluation of waste against the toxicity characteristic;

(4) Sections 264.190(a), 264.314(c), 265.190(a), and 265.314(d)—Evaluation of waste to determine if free liquid is a component of the waste;

(5) Section 266.112(b)(1)—Certain analyses in support of exclusion from the definition of a hazardous waste of a residue which was derived from burning hazardous waste in boilers and industrial furnaces;

(6) Section 268.32(i)—Evaluation of a waste to determine if it is a liquid for purposes of certain land disposal prohibitions;

(7) Sections 268.40(a), 268.41(a), and 268.43(a)—Leaching procedure for evaluation of waste to determine compliance with Land Disposal treatment standards;

(8) Sections 270.19(c)(1)(iii) and (iv), and 270.62(b)(2)(i)(C) and (D)—Analysis and approximate quantification of the hazardous constituents identified in the waste prior to conducting a trial burn in support of an application for a hazardous waste incineration permit; and

(9) Sections 270.22(a)(2)(ii)(B) and 270.66(c)(2)(i) and (ii)—Analysis conducted in support of a destruction and removal efficiency (DRE) trial burn waiver for boilers and industrial furnaces burning low risk wastes, and analysis and approximate quantitation conducted for a trial burn in support of an application for a permit to burn hazardous waste in a boiler and industrial furnace.

In situations where hazardous waste regulations under subtitle C of RCRA require that specific testing methods described in SW–846 be employed for certain applications, methods contained in the Second Edition of SW–846, as amended, currently must be utilized. See 40 CFR 260.11 and 270.6(a). In a separate rulemaking, EPA has proposed to require the use of the Third Edition of SW–846, as amended by update I, in lieu of the Second Edition of SW–846, as amended, in situations where the use of SW–846 methods are specifically mandated. See 54 FR 3212 (January 23, 1989).

In other situations, any reliable analytical method may be used to meet other requirements in 40 CFR parts 260 through 270. SW–846 functions in those situations as a guidance document setting forth acceptable, although not required, methods to be implemented by the user, as appropriate, in responding to RCRA-related sampling and analysis requirements.

In today's proposed rule, the Agency is proposing to require that certain wood surface protection plants test the pentachlorophenate concentration of their formulations using the analytical and test methods found in SW-846. The proposal does not, however, require the use of any one specific SW-846 method. Because the Agency believes that method 4010 is appropriate for the testing requirements proposed today, it is proposing to add that method to SW-846. Method 4010, including its protocol and documentation supporting this proposal can be found in the docket for this rulemaking.

If the portion of the proposed rule referenced above (54 FR 3212 (January 23, 1989)) that would require the use of SW-846 Third Edition methods in lieu of SW-846 Second Edition methods is promulgated and, thereafter, the Agency determines, after reviewing comments submitted, that SW-846 test methods should be required for the proposed pentachlorophenate testing requirement and that Method 4010 should be added to SW-846, the Agency is proposing that Method 4010 be added only to the Third Edition of SW-846 as Update IIA to that edition. If, on the other hand, a final rule replacing the Third Edition of SW-846 for the Second Edition of SW-846 in situations where the use of SW-846 methods is specifically mandated is not promulgated prior to promulgation of a rule finalizing the proposals discussed above in this section, the Agency will consider adding Method 4010 to the Second and Third Editions of SW-846 so that it will be available for use regardless of which edition is mandated.

SW-846 is a document that will change over time as new information and data are developed. Advances in analytical instrumentation and techniques are continually reviewed by the Agency and periodically incorporated into SW-846 to support changes in the regulatory program and to improve method performance. This proposed addition represents such an incorporation. Therefore, although only comments related to the proposals referenced above will be considered in connection with today's proposed rule, EPA also solicits any available data and information that may affect the usefulness of SW-846.

XI. CERCLA Designation and Reportable Quantities

All hazardous wastes listed under RCRA and codified in 40 CFR 261.31 through 261.33, as well as any solid waste that exhibits one or more of the characteristics of a RCRA hazardous waste (as defined in §§ 261.21 through 261.24), are hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended. See CERCLA section 101(14)(c). CERCLA hazardous substances are listed in Table 302.4 at 40 CFR 302.4 along with their reportable quantities (RQs). Accordingly, the Agency is proposing to:

(1) List the proposed F033 hazardous waste as a CERCLA hazardous substance in Table 302.4 of 40 CFR 302.4; and

(2) Establish an adjusted CERCLA RQ of one pound for F033.

Reporting Requirements

Under CERCLA section 103(a), the person in charge of a vessel or plant from which a hazardous substance has been released in a quantity that is equal to or exceeds its RQ shall immediately notify the National Response Center of the release as soon as that person has knowledge thereof. See 40 CFR 302.6. The toll free number of the National Response Center is 1-800-424-8802; in the Washington, D.C. metropolitan area, the number is (202) 426-2675. In addition to this reporting requirement under CERCLA, section 304 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) requires owners or operators of certain plants to report the release of a CERCLA hazardous substance to State and local authorities. EPCRA section 304 notification must be given immediately after the release of an RQ or more to the community emergency coordinator of the local emergency planning committee for each area likely to be affected by the release, and to the State emergency planning commission of any state likely to be affected by the release. If today's proposal is promulgated as a final rule, releases of one pound or more of F033 waste will be subject to the requirements described above.

Adjustment of RQs

Under Section 102(b) of CERCLA, all hazardous substances newly designated under CERCLA have a statutory RQ of one pound unless and until adjusted by regulation. The Agency's methodology for adjusting RQs of individual hazardous substances begins with an evaluation of the intrinsic physical, chemical, and toxicological properties of each hazardous substance. (For more detailed information on this methodology, see the preamble to an RQ adjustment final rule published on August 14, 1989 (54 FR 33426).) The intrinsic properties examined, called "primary criteria," are aquatic toxicity, mammalian toxicity (oral, dermal, and inhalation), ignitability, reactivity, chronic toxicity, and potential carcinogenicity. Generally, for each intrinsic property, the Agency ranks hazardous substances on a scale, associating a specific range of values on each scale with an RQ of 1, 10, 100, 1000, or 5000 pounds. The data for each hazardous substance are evaluated using various primary criteria; each hazardous substance may receive several tentative RQ values based on its particular intrinsic properties. The lowest of the tentative RQs becomes the "primary criteria RQ" for that substance.

After the primary criteria RQs are assigned, substances are further evaluated for their susceptibility to certain degradative processes, which are used as secondary adjustment criteria. These natural degradative processes are biodegradation, hydrolysis, and photolysis (BHP). If a hazardous substance, when released into the environment, degrades relatively rapidly to a less hazardous form by one or more of the BHP processes, its RQ (as determined by the primary RQ adjustment criteria) is generally raised one level. (No RQ level increase based on BHP occurs if the primary criteria RQ is already at its highest possible level [100 pounds for potential carcinogens and 5000 pounds for all other types of hazardous substances except radionuclides].) This adjustment is made because the relative potential for harm to public health or welfare or the environment posed by the release of such a substance is reduced by the degradative processes. Conversely, if a hazardous substance degrades to a more hazardous product after its release, the original substance is assigned an RQ equal to the RQ of the more hazardous substance, which may be one or more levels lower than the RQ for the original substance. The downward adjustment is appropriate because the hazard posed by the release of the original substance is increased as a result of the BHP.

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

Under the proposed definition of the F033 waste, its constituents may include 2,3,7,8-tetrachlorodibenzo-p-dioxin, which has an adjusted RQ of one pound (the lowest RQ). Therefore, the Agency is proposing a one-pound adjusted RQ for F033.

XII. Compliance Costs Associated With the Rule

A. Executive Order 12291

Executive Order 12291 requires EPA to conduct a Regulatory Impact Analysis (RIA) for all "major" rules. A major rule is defined as one that is likely to result in:

(1) An annual impact on the economy of $100 million or more;

(2) A major increase in costs or prices for consumers, individual industries, Federal, State, or local government agencies, or geographic regions; or

(3) Significant impacts on competition, unemployment, investment, productivity, innovation, or the ability of United States-based enterprises to compete in domestic or export markets.

EPA has determined that the F033 Listing Proposal is not a major rule, as defined by the above criteria. Nevertheless, the Agency has prepared an abbreviated RIA or "Economic Assessment" (EA) in order to examine costs and benefits likely to occur as a result of this action. The EA is in the public docket for this notice. A brief summary of the Economic Assessment findings is presented below for both the no-list and list option.

B. Cost of Proposed F033 No-List Option

Facilities may choose to take some remedial action as a result of publicity surrounding this action. However, no specific action will be required under this option. As a result, incremental cost impacts to the regulated community are expected to be zero under the no-list option.

C. Cost of Proposed F033 List Option

a. Methodology

i. *General approach.* The objective of the cost analysis was to determine the social cost of the actions potentially regulated firms would take to comply with the proposed F033 listing. The principle used to determine the actions firms would take is that they would undertake the lowest cost alternative available that would satisfy rule requirements.

Facilities have several alternative compliance strategies available to them:

(1) Treat waste as hazardous;

(2) Use a non-PCP formulation and take actions necessary to ensure that concentrations of PCP in surface protection formulations are at or below 0.1 ppm;

(3) Replace equipment and use a non-PCP formulation; or

(4) Go out of business.

Using the least-cost alternative principle, EPA projects that all potentially regulated facilities would choose number two above; use a non-PCP formulation and clean their equipment to ensure that PCP concentrations are less than or equal to 0.1 ppm. Under this scenario, facilities are assumed to test their formulation, clean equipment and test again following cleaning to insure compliance. Furthermore, although not required, facilities are assumed to avoid liability concerns through the added costs associated with offsite disposal of wastes generated during the cleaning process.

ii. *Identification of potentially regulated community.* Any entity that generates wastes from wood surface protection processes containing levels of pentachlorophenate above 0.1 ppm is potentially subject to the proposed rule. Because sapstain can begin to form on wood within hours after it is cut, sawmills are in the best position to apply the anti-stain chemicals. Nevertheless, there are isolated cases in which downstream facilities such as furniture manufacturers and flooring companies prefer to surface-protect wood after they receive it. EPA has learned from industry representatives, however, that few, if any, such facilities would be affected by an F033 listing. Therefore, the Economic Assessment (EA) focuses exclusively on sawmills, for this proposal.

As described elsewhere in this preamble, EPA estimates that there are over 3,200 sawmills currently operating in the United States, of which approximately 980 surface protect at least some portion of their wood. The three primary methods of surface protection are dip tank, green chain, and spray chamber.

iii. *General assumptions.* The following assumptions underlie the Agency's projection of what facilities would do in response to an F033 listing and the resulting cost of these actions:

(1) No facility will be using sodium pentachlorophenate upon promulgation of a final rule;

(2) All current users of sapstain control chemicals were once users of sodium pentachlorophenate;

(3) Sodium pentachlorophenate will not be used again by any facility in the future; and

(4) All affected facilities (980) would currently generate wastes that meet the listing description (i.e., have formulations with pentachlorophenate concentrations greater than 0.1 ppm).

The first three of these assumptions reflect the best information available. The last assumption is conservative. Many facilities may currently have formulations with concentrations of pentachlorophenate at or below 0.1 ppm (the approximate number is unknown). Facilities are known to routinely clean their equipment, or did so when they switched formulations.

b. Results

i. *Per facility costs.* Costs of the projected compliance action are assumed to vary across facilities depending on the type of surface protection equipment used and the quantity of lumber processed. Estimated one-time per facility costs range from a low of $1,960 for a sawmill using a spray chamber and producing less than 100 million board feet per year, to as high as $9,350 for a facility using a dip tank and producing more than 100 million board feet per year. Labor, testing and waste disposal are the primary cost factors. Waste disposal costs represent anywhere from six to 70 percent of total estimated facility compliance costs, depending upon equipment used and facility size. In addition, testing costs may vary widely and contribute to the overall range. Labor costs reflect best professional judgment of the estimated hours necessary for a thorough "high pressure" water spray cleaning. These costs also vary based on facility size.

ii. *Total cost estimation.* The total social cost of the proposed rule was calculated by multiplying the number of mills in each industry classification (based on the type of equipment employed and volume of lumber produced) by the per facility cost estimated for that classification.

The aggregate social cost of the proposed F033 listing is estimated to range from $3.5 to $4.5 million. All costs are expected to be incurred entirely within the first year after promulgation of the rule. Forty percent of the facilities sampled were found to have existing PCP levels below the proposed regulatory cutoff (i.e., have formulations with pentachlorophenate concentrations at or below 0.1 ppm). Extrapolating to the total cost figure results in an aggregate low cost estimate of approximately $2.3 million (including affirmative testing for the 40 percent).

This action may also result in classification of certain soils as hazardous, resulting in subtitle C management costs, if they are actively managed. Soil management costs would vary significantly, depending upon the amount of contaminated soil actually managed and the technology used to dispose of the soil. These factors are difficult to quantify. In practice, the expense of added soil management costs likely would discourage many firms from disturbing (building on, excavating, etc.) areas of contaminated soils. However, even though firms are likely to avoid disturbing contaminated soil areas, some affected facilities may choose to implement stricter soil management requirements out of human health and/or liability concerns. Any estimates of the costs associated with future management of contaminated soils could be only speculative, and are not included in this analysis.

Opportunity costs associated with restricted property use may result from this action. These costs would be reflected in reduced property values. The presence of PCP-contaminated soils may reduce the value of the land by compelling clean-up actions, or through the lost use of restricted areas. These costs are assumed to be reflected in the market value of the property. Furthermore, the Agency feels that most reductions in the market value of property results from past contamination. Opportunity costs, therefore, may be attributable, in many cases, to existing State and Federal laws.

iii. *Agency preferred cleaning option.* Sand blasting and epoxy coating is not required to satisfy rule requirements. However, the Agency recognizes this as the most effective cleaning method available and recommends its use in meeting the required 0.1 ppm PCP concentration level. Sand blasting and epoxy coating would cost approximately $2,500 per facility for the average dip tank and green chain operation. Spray chamber facilities would not be able to employ this method. The most effective alternative for these facilities would be to replace their equipment at costs ranging from $40,000 to $60,000 per facility. None of the above estimates include testing or waste disposal costs.

While sand blasting and epoxy coating (equipment replacement for spray operations) is preferred to ensure the most effective cleaning possible, the Agency recognizes that industry will logically choose the least cost cleaning method available to meet rule requirements. As a result, final cost estimates presented in section C.(b) reflect this assumption.

D. Benefits of Proposed F033 Listing

a. Methodology

i. *Overview.* The objective of the benefits analysis was to estimate the number of cancer cases that could be avoided as a result of the implementation of the proposed rule. To derive this estimate, EPA identified the constituents of concern, identified the exposure pathways, determined the risk to individuals associated with each of the pathways, and correlated the individual risk to the population as a whole by multiplying by the estimated number of exposed persons.

When estimating the potential benefits of the proposed rule, it is important to distinguish between risks that result from past practices and risks from future actions. Because the proposed rule, by its own terms, will not require remediation of existing contamination, it will affect only future actions and will not mandate action with respect to contamination from past practices. The risk analysis conducted in support of this proposed rule examined both risk from past practices as well as incremental risk from action affected by the proposed rule. This proposal addresses only incremental risks, as a result, only the incremental risks are discussed in this section of today's notice.

ii. *Identification of constituents of concern and the measurement of their risks.* The constituents of concern used in the risk assessment include pentachlorophenol (PCP), polychlorinated dibenzo-p-dioxins (PCDD), and polychlorinated dibenzofurans (PCDF). Because of limited quantitative data on the toxicity of the specific isomers and congeners of the latter two constituents, PCDDs and PCDFs were modeled using quantitative values for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD), an isomer of dioxin. Tetrachlorophenol (TeCP) is also a constituent of chlorophenolic formulations and was included in the full risk analysis. However, because it is not a carcinogen, results for this constituent are not discussed in this section of today's notice.

As PCP and TCDD are both Class B_2 carcinogens (probable human carcinogens), the magnitude of their risks was measured using carcinogenic slope factors. The slope factors for PCP and TCDD are 1.2×10^{-1} $(mg/kg/d)^{-1}$ and $1.56\times10^{+5}(mg/kg/d)^{-1}$ respectively.

iii. *Identification of exposure pathways and population risks.* EPA modeled risks for three pathways: Ground water ingestion, fish and shellfish ingestion, and soil ingestion. There are also potential exposures from surface water ingestion, soil and dust inhalation, and dermal exposure to soil, but preliminary analysis suggested that these pathways were unlikely to pose significant risks. The exposure scenarios for each of the modeled pathways are as follows:

(A) *Ground-water ingestion.* Hazardous constituents from surface protection wastes can migrate through the soil to ground water. People can be exposed to the contaminated ground water when it is used for drinking water. PCP was used as the constituent of concern for the ground-water analysis because it is more mobile through the soil column than dioxins, which tend to bind to the soil. Contamination of the upper aquifer, from which residential wells might be drawn, was modeled. Thus the potentially exposed population consists of people drinking contaminated water from residential wells located near the source of the contamination. The lower aquifer, from which community wells might be drawn, was not modeled because of the lack of site-specific information on the location of community wells near sawmill facilities.

Standard exposure assumptions used to translate the estimated constituent concentrations in ground water into health risks included ingestion of 1.4 liters of contaminated ground water per day by a 70 kg adult for an average of nine years. The excess lifetime cancer risk to an individual drinking contaminated ground water was estimated to be 5×10^{-7}. This means that an individual exposed to the contamination would have a one in 2,000,000 incremental risk of contracting cancer over his or her lifetime.

To calculate population risk, the Agency assumed that one residential well serving a family of four would be located directly downgradient of each potentially regulated facility. In addition, the population risk estimate was calculated for eight cohorts of individuals consuming contaminated water over a 70 year period. Because cancer cases were not discounted, the exact timing of the onset of cancer was not important. Under these assumptions, an estimated 17,000 individuals would be exposed to contaminants from ground water consumption. The population risk estimate also assumes that exposed individuals would be drinking contaminated ground water during the 70 years that constituent concentrations are at their highest.

(B) *Fish and shellfish ingestion.* Wastes from surface protection processes can be carried into streams and rivers located near potentially regulated sawmills through soil runoff. The Agency assumed that dioxins, which tend to bind with soil, would be present in the runoff.

Risks from fish ingestion were estimated using a five step process.

First, the Agency estimated the expected soil concentrations of dioxins that would be released through cross contamination. Second, it estimated constituent concentrations in stream sediment resulting from erosion of contaminated soils based on erosion rates for the entire drainage basin in which the sawmill is located. Third, using fish-to-sediment bioaccumulation factors, the concentrations of constituents in fish tissue were estimated. Fourth, human exposure to contaminants were estimated based on assumptions about consumption of freshwater and estuarine fish and shellfish. Finally, the carcinogenic slope factor for TCDD was multiplied by the rate of ingestion of TCDD to estimate risk of cancer from ingestion of contaminated fish.

Based on data from the Department of Agriculture 1977–1978 National Food Consumption Survey (NFCS), it was assumed that each person in the US consumes freshwater and estuarine fish and shellfish at a rate of 5.9 grams per day. It was further assumed that consumption of fish would occur for 25,550 days (70 years). The excess lifetime cancer risk from individuals eating contaminated fish was estimated to range from 9.6×10^{-11} to 4.4×10^{-9}, depending upon analytical approach. The Agency's best estimate for this pathway is 8.0×10^{-10}.

Because sawmills are located in the drainage basins that drain into the primary areas for freshwater and estuarine commercial fishing and because commercial fish landings are marketed nationally, it was assumed that the total population of the US would be exposed to contaminated fish and that 24 percent of the commercial fish and shellfish would be contaminated. (The 24 percent figure is based on the assumptions that sawmills which surface protect are located in 40 percent of the drainage basins and that 60 percent of those sawmills will be affected by the rule.) Thus, to estimate population risk, the general population risk was multiplied by the estimated population of the US (250 million).

(C) *Soil ingestion.* Direct human ingestion of contaminated soil, usually by young children, is another potential exposure route. Such exposure would most likely occur under a scenario in which the land on which the sawmill is located is converted to residential use, without significant cleanup of the contaminated soil. Again, the Agency assumed that dioxins would be present in the soil, while PCP would not. The Agency assumed that all facilities would be converted to residential use and that remediation of soil contamination would not take place prior to construction of the residential units. The excess lifetime cancer risk to children eating contaminated soil was estimated to range from 1×10^{-7} to 2×10^{-6}, depending on the analytical approach. The Agency's best estimate for this pathway is 7×10^{-7}.

In estimating population risk, it was assumed that 540 children would be exposed over a 70 year period. The derivation of this population estimate is lengthy and is discussed in the risk assessment background document for today's proposal.

b. Results

EPA estimated the expected decrease in the number of cancer cases that would result from implementation of the proposed rule for each exposure pathway. The best estimate for risks from the ingestion of fish and shellfish (0.2 cancer cases) are substantially higher than risks from ground water and soil ingestion. The results are shown in Table 1 below.

TABLE 1.—ESTIMATED INCREMENTAL CANCER CASES AVOIDED AS A RESULT OF THE PROPOSED RULE

Exposure pathway	Estimated statistical cancer cases avoided over 70 year lifetime
Ground water ingestion	0.005
Fish and shellfish ingestion (general population)	0.200
Soil ingestion	0.0004
Total	0.2054

E. Cost Effectiveness Analysis

a. Results

One measure EPA uses to determine the cost-effectiveness of its regulations is the cost per cancer case avoided. The proposed rule would lead to reduction of an estimated 0.2054 cancer cases (this is a statistical estimate and therefore does not have to be a whole number) at a total cost ranging from $2.3 to $4.5 million. Thus, the cost per cancer case avoided ranges from $10.2 to $21.8 million, using the Agency's best estimate for the fish and shellfish pathway. Alternative analytical approaches for determination of the fish and shellfish pathway result in a cost effectiveness range from $2.1 to $152.4 million. The soil ingestion and ground water pathways have a very minor impact on overall cost effectiveness.

b. Caveats

The cost-effectiveness estimate is very sensitive to the assumptions used to estimate the benefits of the proposed rule. The primary factor leading to overestimation of benefits is that the analysis assumes that *all* of the contaminants remaining in the surface protection equipment will be eliminated as a result of the proposed F033 listing. However, this is likely not to be the case because:

(i) The performance test measures PCP not dioxin, the constituent of concern in the fish and shellfish pathway. Facilities that pass the PCP test may still have small amounts of dioxin remaining in the equipment.

(ii) Facilities would not be required to dispose of the wastes from the cleaning process as F033 hazardous waste prior to the effective date of the final rule. As such, facilities can legally avoid the costs of disposing of any cleanup wastes as F033 hazardous wastes. The Agency believes, however, that facilities will choose to manage wastes from the cleaning process as Subtitle C wastes prior to the effective date of the rule, as reflected in the cost analysis. The Agency recognizes the possibility that this listing determination could, in some cases, actually expedite the contamination process, not prevent it, should facilities choose to discard wastes on-site prior to the effective date of the rule.

The results of the analysis may also underestimate the benefits of the proposed rule, and thus the cost-effectiveness. The primary factor leading to a potential underestimate is the fact that all potential exposure pathways were not included in the final benefits estimate. Exposure pathways not estimated include fish ingestion by subsistence fishers whose intake may be much higher than the general population.

XII. Regulatory Requirements

A. Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 et. seq.) requires that whenever an agency publishes a notice of rulemaking, it must prepare a Regulatory Flexibility Analysis (RFA) that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small governmental jurisdictions). EPA has prepared such an analysis and a copy is in the public docket for this notice. A brief summary of the analysis follows.

1. Definition of Small Entity

For the purposes of this analysis, EPA has defined a small entity as a sawmill that produces less than 100 million board feet of lumber annually. No other small organizations or governmental jurisdictions are believed to be affected by the proposed rule. The definition is designed to be consistent with the classifications used in the cost analysis and as inclusive as possible.

2. Sales Test

One way the Agency determines whether regulatory impacts are significant is to conduct a sales test. Facilities are assumed to pass this test if compliance costs are projected to be less than one percent of their annual gross sales. The compliance costs used are the same as those in the EA. Sales are estimated by multiplying the number of board feet produced by $0.20 per board foot, a low-end estimate of the price of lumber. All potentially regulated facilities pass the sales test. According to the analysis, the most adversely affected facilities would be those that own dip tanks and produce less than five million board feet per year. These facilities are estimated to incur cost impacts of approximately 0.89 percent of sales.

3. Profits Test

A second way the Agency determines whether regulatory impacts are significant is to conduct a profits test. Facilities are assumed to pass this test if compliance costs are projected to be less than 10 percent of average annual profits. Profits were assumed to be 1.8 percent of sales based on data from Robert Morris Associates, an often used source of such information.

Facilities producing over five million board feet per year pass the profits test. Those producing less than five million, approximately 400 facilities, nationwide, do not. Compliance costs could be equivalent to as much as 55% of annual profits for some of these entities.

It should be noted that in practice small businesses may not be as adversely affected as the analysis suggests because both estimates of compliance costs and sales are considered conservative. In addition, compliance costs would be incurred only in the first-year, rather than on an annual basis.

B. Paperwork Reduction Act

The information collection requirements in today's proposed rule has been submitted for approval to the Office of Management and Budget (OMB) under the Paperwork Reduction Act, 44 U.S.C. 3501 et. seq. An Information Collection Request document has been prepared by EPA (ICR No. 1638.1) and a copy may be obtained from Sandy Farmer, Information Policy Branch, EPA, 401 M Street, SW., (PM–223Y), Washington, DC 20460 or by calling (202) 260–2740.

A revised public reporting burden for this collection of information is estimated to average between six and twenty-six hours per facility, including time for reviewing instructions, searching existing data sources, gathering and maintaining the required data, and completing and reviewing the collection of information.

Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Chief, Information Policy Branch, PM–223Y, U.S. Environmental Protection Agency, 401 M Street SW., Washington, DC 20460; and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503, marked "Attention: Desk Officer for EPA."

List of Subjects

40 CFR Part 260

Administrative practice and procedure, Confidential business information, Hazardous waste, Incorporation by reference.

40 CFR Part 261

Hazardous materials, Waste treatment and disposal, Recycling.

40 CFR Part 264

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

40 CFR Part 265

Air pollution control, Hazardous materials, Packaging and containers, Reporting requirements, Security measures, Surety bonds, Waste treatment and disposal, Water supply.

40 CFR Part 270

Administrative practice and procedure, Confidential business information, Hazardous materials transportation, Hazardous waste, Reporting and recordkeeping requirements.

40 CFR Part 302

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

Dated: March 31, 1993.

Carol M. Browner,

Administrator.

For the reasons set out in the preamble, it is proposed to amend title 40 of the Code of Federal Regulations as follows:

PART 260—HAZARDOUS WASTE MANAGEMENT SYSTEM: GENERAL

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

Authority: 42 U.S.C. 6905, 6912(a), 6921–6927, 6930, 6934, 6935, 6937, 6938, 6939, and 6974.

Subpart B—Definitions

2. Section 260.11 is amended by revising the "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" reference of paragraph (a) to read as follows:

§ 260.11 References.

(a) * * *

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW–846 (Third Edition (November, 1986), as amended by Updates I, II and IIA). The Third Edition of SW–846 and Updates I, II, and IIA (document number 955–001–00000–1) are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402, (202) 783–3238.

* * * * *

PART 261—IDENTIFICATION AND LISTING OF HAZARDOUS WASTE

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

Authority: 42 U.S.C. 6905, 6912(a), 6921, 6922, 6934, and 6938.

4. In § 261.31, in the table in paragraph (a), add the F033 listing, as follows:

§ 261.31 Hazardous wastes from non-specific sources.

(a) * * *

Industry and EPA hazardous waste No.	Hazardous waste	Hazard code
*	* * *	*
F033	Process residuals, wastewaters that come in contact with protectant, discarded spent formulation, and protectant drippage from wood surface protection processes at operations that use surface protection chemicals having an in-process formulation concentration of pentachlorophenate [expressed as pentachlorophenol during analysis] exceeding 0.1 ppm.	(T)
*	* * *	*

5. Add the following entries in numerical order to appendix VII of part 261:

APPENDIX VII TO PART 261—BASIS FOR LISTING HAZARDOUS WASTE

EPA hazardous waste No.	Hazardous constituents for which listed
*	* * * * * *
F033	Pentachlorophenol, 2,3,4,6-tetrachlorophenol, 2,4,6-trichlorophenol, tetra-, penta-, hexa-, heptachlorodibenzo-p-dioxins, tetra-, penta-, hexa-, heptachlorodibenzofurans.
*	* * * * * *

6. Add the following hazardous constituents (with CAS Numbers) in alphabetical order, to appendix VIII of part 261:

APPENDIX VIII TO PART 261—HAZARDOUS CONSTITUENTS

Common name	Chemical abstracts name	Chemical abstracts No.	Hazardous waste No.
* * *	* * *		*
Octachlorodibenzofuran	Same	39001-02-0	
Octachlorodibenzo-p-dioxin	Same	3268-87-9	
Potassium pentachlorophenate	Pentachlorophenol, potassium salt	7778-73-6	
2,3,4,6-tetrachlorophenol, potassium salt	Potassium tetrachlorophenate	53535-27-6	
Sodium pentachlorophenate	Pentachlorophenol, sodium salt	131-52-2	
2,3,4,6-tetrachlorophenol, sodium salt	Sodium tetrachlorophenate	25567-55-9	
* * *	* * *		*

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

7. The authority citation for part 264 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a), 6924, and 6925.

8. Add subpart T to part 264 to read as follows:

Subpart T—Surface Protection Plants

Sec.
264.560 Applicability.
264.561 Formulation analysis and recordkeeping requirements.
264.562 Operating requirements.

Subpart T—Surface Protection Plants

§ 264.560 Applicability.

(a) Owners and operators of wood surface protection operations using in-process protectant formulations that contain (by design or cross-contamination) a pentachlorophenate concentration equal to or less than 0.1 ppm and who do not handle their wastes as F033 wastes are subject to § 264.561.

(b) Owners and operators of wood surface protection operations using in-process protectant formulations that contain (by design or cross-contamination) a pentachlorophenate concentration greater than 0.1 ppm are subject to § 264.562 and are required to manage their wastes in accordance with the requirements of either subpart J or subpart W of this part.

§ 264.561 Formulation analysis and recordkeeping requirements.

(a) Owners and operators must sample and test their surface protectant formulations to determine the concentration of pentachlorophenate (expressed as pentachlorophenol during analysis) contained therein, using a method found in EPA Publication SW-846. The formulation sample to be tested must be taken immediately following operation. Such testing must be conducted by a qualified analytical laboratory. If analysis shows that the concentration of pentachlorophenate in an operation's formulation is equal to or less than 0.1 ppm, the owner/operator must sign the following certification:

> I certify, under penalty of law, that the surface protection formulation used by [insert name of operation] has been sampled and tested using a method found in EPA Publication SW-846 and the samples analyzed by (insert name of laboratory and address). The results of this analysis indicated that the concentration of pentachlorophenate (expressed as pentachlorophenol during analysis) in the in-process surface protection formulation is (insert the results of the analysis). I am aware that there are significant penalties for submitting false information, including the possibility of fine and/or imprisonment.

This certification may be provided by a responsible official of the operation or by a registered, professional engineer.

(b) Owners and operators must maintain records on-site until operations cease. These records must include the following:

(1) A description of the method used for sampling and testing;

(2) Results of the analysis conducted in accordance with § 264.561(a); and

(3) A copy of the signed certification required under § 264.561(a).

§ 264.562 Operating requirements.

(a) Owners and operators must hold newly treated wood in the process area after treatment to allow excess drippage of surface protectant to cease and to allow all entrained liquids (from dipping operations) to be removed prior to transfer of the wood to the storage yard. Treated wood must not be removed from the process area until all free liquid drainage has ceased.

(b) Owners and operators of surface protection operations that store treated wood in areas unprotected from precipitation must cover the tops of the wood bundles prior to a precipitation event to prevent precipitation from mobilizing pentachlorophenol constituents into the environment.

(c) Owners and operators of surface protection operations must develop and maintain a contingency plan for immediate response to protectant drippage in the storage yard. In the event of storage yard drippage, the owner/operator must implement this contingency plan by:

(1) Cleaning up the drippage;

(2) Documenting the cleanup and retaining this documentation for three years; and

(3) Managing the contaminated media in accordance with all applicable RCRA regulations.

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

9. The authority citation for part 265 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a), 6924, 6925, and 6935.

10. Add Subpart T to part 265 to read as follows:

Subpart T—Surface Protection Plants

Subpart T—Surface Protection Plants

§ 265.435 Applicability.

(a) Owners and operators of wood surface protection operations using in-process protectant formulations that contain (by design or cross-contamination) a pentachlorophenate concentration equal to or less than 0.1 ppm and who do not handle their wastes as F033 wastes are subject to § 265.436.

(b) Owners and operators of wood surface protection operations using in-process protectant formulations that contain (by design or cross-contamination) a pentachlorophenate concentration greater than 0.1 ppm are subject to § 265.437 and are required to manage their wastes in accordance with the requirements of either subpart J or subpart W of this part.

§ 265.436 Formulation analysis and recordkeeping requirements.

(a) Owners and operators must sample and test their surface protectant formulations to determine the concentration of pentachlorophenate (expressed as pentachlorophenol during analysis) contained therein, using a method found in EPA Publication SW-846. The formulation sample to be tested must be taken immediately following operation. Such testing must be conducted by a qualified analytical laboratory. If analysis shows that the concentration of pentachlorophenate in an operation's formulation is equal to or less than 0.1 ppm, the owner/operator must sign the following certification:

> I certify, under penalty of law, that the surface protection formulation used by (insert name of operation) has been sampled and tested using a method found in EPA Publication SW-846 and the samples analyzed by (insert name of laboratory and address). The results of this analysis indicated that the concentration of pentachlorophenate (expressed as pentachlorophenol during analysis) in the in-process surface protection formulation is (insert the results of the analysis). I am aware that there are significant penalties for submitting false information, including the possibility of fine and/or imprisonment.

This certification may be provided by a responsible official of the operation or by a registered, professional engineer.

(b) Owners and operators must maintain records on-site until operations cease. These records must include the following:

(1) A description of the method used for sampling and testing;

(2) Results of the analysis conducted in accordance with § 265.436(a); and

(3) A copy of the signed certification required under § 265.436(a).

§ 265.437 Operating requirements

(a) Owners and operators must hold newly treated wood in the process area after treatment to allow excess drippage of surface protectant to cease and to allow all entrained liquids (from dipping operations) to be removed prior to transfer of the wood to the storage yard. Treated wood must not be removed from the process area until all free liquid drainage has ceased.

(b) Owners and operators of surface protection operations that store treated wood in areas unprotected from precipitation must cover the tops of the wood bundles prior to a precipitation event to prevent precipitation from mobilizing pentachlorophenol constituents into the environment.

(c) Owners and operators of surface protection operations must develop and maintain a contingency plan for immediate response to protectant drippage in the storage yard. In the event of storage yard drippage, the owner/operator must implement this contingency plan by:

(1) Cleaning up the drippage;

(2) Documenting the cleanup and retaining this documentation for three years; and

(3) Managing the contaminated media in accordance with all applicable RCRA regulations.

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

11. The authority citation for part 270 continues to read as follows:

Authority: 42 U.S.C., 6905, 6912, 6924, 6925, 6927, 6939, and 6974.

Subpart B—Permit Application

12. Section 270.6 (a) is revised to read as follows:

§ 270.6 References.

(a) When used in part 270 of this chapter, the following publications are incorporated by reference:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW–846 [Third Edition (November, 1986), as amended by Updates I, II, and IIA]. The Third Edition of SW–846 and Updates I, II, and IIA (document number 955–001–00000–1) are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402, (202) 783–3238.

* * * * *

PART 302—DESIGNATION, REPORTABLE QUANTITIES, AND NOTIFICATION

13. The authority citation for part 302 continues to read as follows:

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

14. Section 302.4 is amended by adding an entry for F033 in Table 302.4 to read as follows. The appropriate footnotes to Table 302.4 are republished without change.

§ 302.4 Designation of hazardous substances.

* * * * *

TABLE 302.4.—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Proposed RQ	
			RQ	Code †	RCRA waste No.	Category	Pounds (Kg)
*	*	*	*	*	*	*	*
F033 Process residuals, wastewaters that come in contact with protectant, discarded spent formulation, and protectant drippage from wood surface protection processes at operations that use surface protection chemicals having an in-process formulation concentration of pentachlorophenate [expressed as pentachlorophenol during analysis] exceeding 0.1 ppm. (T).	....	....	1*	4	F033	X	1(0.454)
*	*	*	*	*	*	*	*

† Indicates the statutory source as defined by 1, 2, 3, 4 or below.

* * * * * * *

[4] Indicates that the statutory source for designation of this hazardous substance under CERCLA is RCRA Section 3001.

[1*] Indicates that the 1-pound RQ is a CERCLA statutory RQ.

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