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Title III Section 313 Release Reporting Guidance

Estimating Chemical Releases From Paper and Paperboard Production

Estimating Chemical Releases From Paper and Paperboard Production

Facilities engaged in paper and paperboard production may be required to report annually any releases to the environment of certain chemicals regulated under Section 313, Title III, of the Superfund Amendments and Reauthorization Act (SARA) of 1986. If your facility is classified under SIC codes 20 through 39 (paper and paperboard facilities generally fall under SIC codes 2621 and 2631) and has 10 or more full-time employees, for calendar year 1987 you must report all environmental releases of any Section 313-listed chemical or chemical category manufactured or processed by your facility in an amount exceeding 75,000 pounds per year or otherwise used in an amount exceeding 10,000 pounds per year. For calendar years 1988 and 1989 (and beyond), the threshold reporting quantity for manufactured or processed chemicals drops to 50,000 and 25,000 pounds per year, respectively.

This document has been developed to assist those engaged in paper and/or paperboard production in the completion of Part III (Chemical Specific Information) of the Toxic Chemical Release Inventory Reporting Form. Included herein is general information on toxic chemicals used and process wastes generated, along with several examples to demonstrate the types of data needed and various methodologies available for estimating releases. If your facility performs other operations in addition to paper or paperboard production, you must also include any releases of toxic chemicals from these operations.

Step One

Determine if your facility processes or uses any of the chemicals subject to reporting under Section 313.

A suggested approach for determination of the chemicals your facility uses that could be subject to reporting requirements is to make a detailed review of the chemicals and materials you have purchased. If you do not know the specific ingredients of a chemical formulation, consult your suppliers for this information. If they will not provide this information, you must follow the steps outlined to handle this eventuality in the instructions provided with the Toxic Chemical Release Inventory Reporting Form.

The list presented here includes chemicals typically used in paper and paperboard production that are subject to reporting under Section 313. This list does not necessarily include all of the chemicals your facility uses that are subject to reporting, and it may include many chemicals that you do not use. You should also determine whether any of the listed chemicals are created during processing at your facility.

Papermaking Additives

Sizing agents: Styrene-maleic anhydride copolymer (precursors), sulfuric acid, styrene-butadiene, acrylamide

Wet- and dry-strength agents: Epichlorohydrin-based resin (precursors), melamine resin (precursors), urea-formaldehyde resin (precursors), formaldehyde

Adhesives: Acrylamide, ammonia

Dyes and pigments: Acid Blue 9, Acid Green 3, Basic Red 1, Direct Blue 6, Direct Brown 95, Direct Black 38, Phthalocyanide Blue, potassium dichromate, lead compounds, benzidine, o-tolidine, cobaltic oxide, urea-formaldehyde resin (precursors)

Binders: Styrene-butadiene (precursors), polyvinyl acetate (precursors)

Pigment fillers/coatings: Aluminum oxide, barium sulfate, styrene-butadiene polymer (precursors), titanium dioxide, zinc oxide, zinc sulfide, asbestos, phosphoric acid

Humectants: Melamine-formaldehyde resin (precursors), urea-formaldehyde resin (precursors)

Coatings: Ammonia, dibutyl phthalate, sodium hydroxide, potassium ferric cyanide.

Oil-resistant additives: Fluorochemical chrome complex, ethylene glycol monobutyl ether (a glycol ether)

Flame retardants: Ammonium sulfate, antimony trioxide

Machine Operating Aids

Retention aids: Dicyano diamide, epichlorohydrin copolymer (precursors), asbestos

Biocides and slime control agents: Acrolein, phenyl mercuric acetate, pentachlorophenol, ethylene glycol, 1,1,1-trichloroethane, trichlorophenol

Waste Paper Pulp Preparation Chemicals

Deinking agents: Sodium hydroxide and solvents

Bleaching chemicals: Chlorine, chlorine dioxide, zinc hydrosulfite, sodium hydroxide, sulfuric acid, methanol, chromic sulfate

Chemicals imported in waste paper: Ink pigments, coating agents, binders, adhesives

Other chemicals commonly found in paper mill wastes: Chloroform, phenol, toluene

Many of these chemicals are polymers, which are not listed as toxic; however, their monomer precursors are. These polymers usually contain a small percentage of the unreacted or free monomer. For example, urea-formaldehyde resin used as wet-strength agent usually contains less than 1.5 percent free formaldehyde. The toxic chemicals in the wastepaper your facility imports probably contain many of the same chemical additives used in your process plus various inks and coatings.

Step Two

Determine if your facility surpassed the threshold quantities established for reporting of listed chemicals last year.

You must submit a separate Toxic Chemical Release Inventory Reporting Form for each listed chemical that is "manufactured," "processed," or "otherwise used" at your facility in excess of the threshold quantities presented earlier. Manufacture includes materials produced as byproducts or impurities. Toxic compounds that are incorporated into your products (for example, a papermaking additive) would be considered "processed" because they become part of the marketed finished product. Degreasing solvents, cleaning agents, and other chemicals that do not become part of the finished product (for example, machine operating aids) would be considered "otherwise used."

The amount of a chemical processed or otherwise used at your facility represents the amount purchased during the year, adjusted for beginning and ending inventories. To ascertain the amount of chemical in a mixed formulation, multiply the amount of the mixture (in pounds) by the concentration of the chemical (weight percent) to obtain the amount of chemical processed.

Example: Determining whether 1,1,1-trichloroethane was used in sufficient quantity last year to require reporting under Section 313.

A slime control agent used on a Fourdrinier paper machine contains 7.2 percent 1,1,1-trichloroethane. In 1987, a plant purchased 18,000 pounds of this agent, had 3,000 pounds in storage at the beginning of the year, and had 6,000 pounds in storage at the end of the year. The quantity of 1,1,1-trichloroethane used by this facility equals:

(3,000 lb x 0.072) (beginning inventory) +

(18,000 lb x 0.072) (purchased) –

(6,000 lb x 0.072) (ending inventory)

= 1,080 lb

The slime-control agent is considered "otherwise used," so the threshold reporting quantity is 10,000 pounds per year. Therefore, this facility did not have to report emissions of 1,1,1-trichloroethane for 1987 (assuming this was the only source of this chemical).

A listed chemical may be a component of several formulations you purchase, so you may need to ask your supplier for information on the concentration (percentage) of the chemical in each. For chemical categories, your reporting obligations are determined by the total amounts of all chemicals in the category. For metal compounds, base threshold determinations on the amount of metal compound, not the amount of parent metal.

You must complete a report for each chemical for which a threshold is exceeded. The thresholds apply separately; therefore, if you both process and use a chemical and either threshold is exceeded, you must report for both activities. If neither threshold is exceeded, no report is needed.

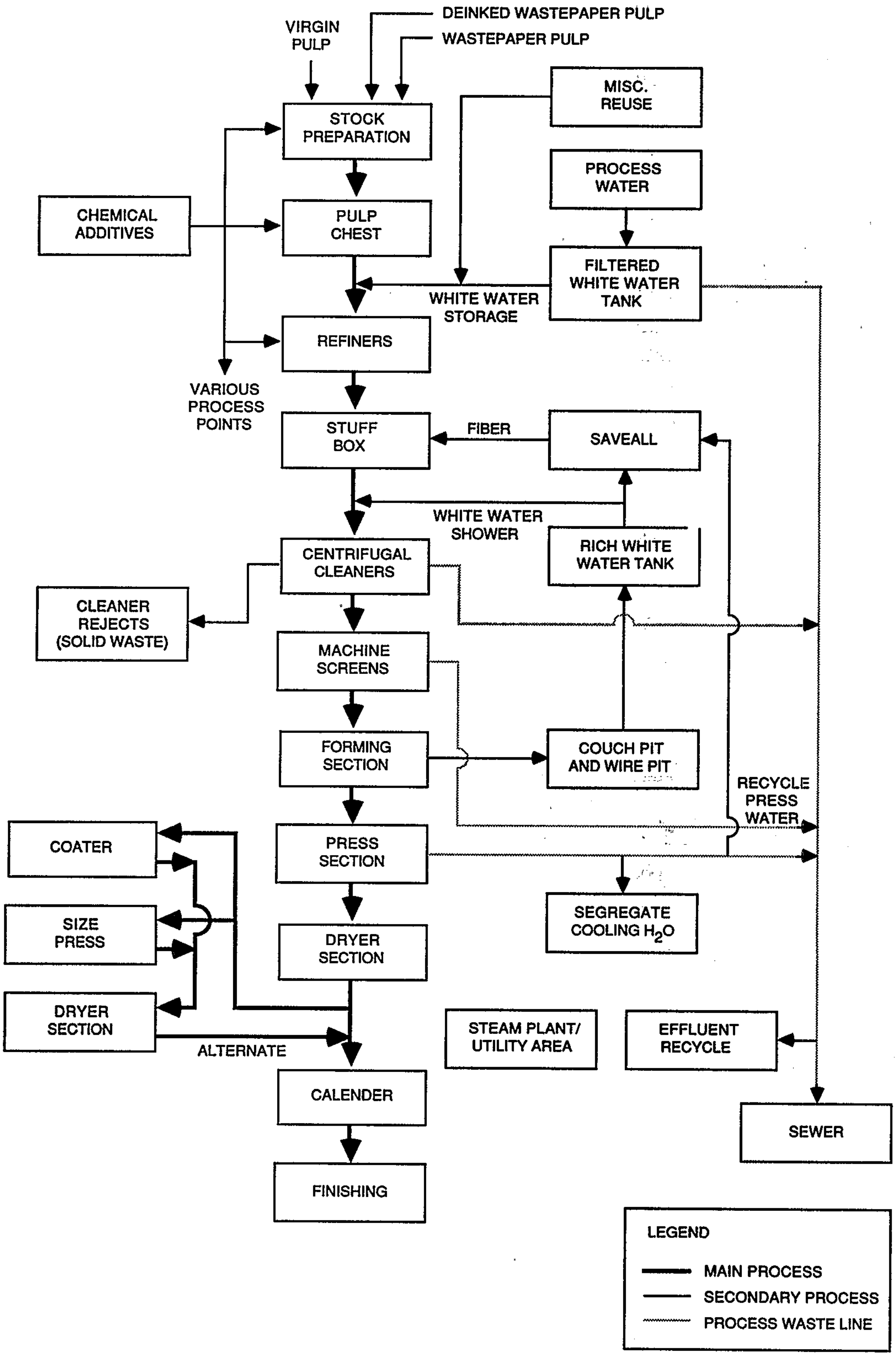
Step Three

Identify points of release for the chemical(s) subject to reporting.

An effective means of evaluating points of release for listed toxic chemicals is to draw a process flow diagram identifying the operations performed at your facility. The figure shown on the next page is an example flow diagram for papermaking. Because each facility is unique, you are strongly urged to develop a flow diagram for your particular operations that details the input of materials and chemicals and the waste sources resulting from the operation of each unit.

The primary sources of wastewater at papermaking facilities are as follows:

- Excess white water from savealls, sealing pits, or other tank overflows
- Rejects from stock-cleaning devices (centrifugal cleaners, screens, and junk traps)
- Deinking wastewater from centrifugal cleaners, washers, deckers, and thickeners
- Bleaching wastewater generated during preparation of hypochlorite and chlorine dioxide and that coming from various washers
- Felt- and wire-cleaning waters
- Cooling-water discharges
- Boiler blowdown and other miscellaneous discharges



Example Flow Diagram of Paper Manufacturing Process

The primary sources of solid waste are as follows:

- Fibers, fillers, and broke from the paper machine
- Coating residue and broke from finishing operations
- Cleaner and junker rejects from wastepaper processing
- Wastewater treatment sludge

Air emissions from papermaking facilities are generally fugitive and they usually occur in the following process areas:

- Bleach plant
- Paper dryers
- Paper machine
- Coating and finishing machines
- Mixing vats
- Wastewater treatment volatilization

You must account for all releases in your reporting.

Step Four

Estimate releases of toxic chemicals.

After all of the toxic chemicals and waste sources have been identified, you can estimate the releases of the individual chemicals. Section 313 requires that releases to air, water, and land and transfers to offsite facilities be reported for each toxic chemical meeting the threshold reporting values. The usual approach entails first estimating releases from waste sources at your facility (that is, wastewater, air release points, and solid waste) and then, based on the disposal method used, determining whether releases from a particular waste source are to air, water, land, or an offsite disposal facility.

In general, there are four types of release estimation techniques:

- **Direct measurement**
- **Mass balance**
- **Engineering calculations**
- **Emission factors**

Descriptions of these techniques are provided in the EPA general Section 313 guidance document, Estimating Releases and Waste-Treatment Efficiencies for the Toxic Chemical Release Inventory Form.

Provisions of the Clean Air Act, Clean Water Act, Resource Conservation and Recovery Act, and other regulations require monitoring of certain waste streams. If available, data gathered for these purposes can be used to estimate releases. When only a small amount of direct measurement data is available, you must decide if another estimation technique would give a more accurate estimate. Mass balance techniques and engineering assumptions and calculations can be used in a variety of situations to estimate toxic releases. These methods of estimation rely heavily on process operating parameters; thus, the techniques developed are very site-specific. Emission factors are available for some industries in publications referenced in the general Section 313 guidance document. Also, emission factors for your particular facility can be developed in-house by performing detailed measurements of wastes at different production levels.

Direct measurements of waste streams (sources) for most of the listed toxic chemicals typically found at papermaking facilities are not made routinely. Also, emission factors are not generally available; however, you may have developed some factors for your own facility. Mass balances can be performed if information is available on the quantity of chemical purchased and the quantity retained in the paper product. The difference between these two quantities represents the quantity of chemical released, assuming none of the chemical is destroyed during processing or treatment. This does not provide information on the media into which the chemical is released, however. If this information is unknown, you will have to use engineering calculations or assumptions to complete the estimation.

The following subsections present information on the estimation of releases via wastewater, air emissions, and solid waste. The discussions focus primarily on mass balances and engineering estimates. The following table presents generalized assumptions regarding the fate of chemicals in paper production. These general assumptions are based on their point of input in the process and their relative volatility. These assumptions may prove helpful during emission estimation; however, you should approach each reported chemical individually. The fates of compounds considered semivolatile or reactive are more difficult to follow, and the assumptions in this table may not be applicable.

Toxic Releases Via Wastewater

Typically, wastewater from all parts of a papermaking facility are centrally collected and treated before they are discharged to a nearby body of water (direct discharge), a publicly owned treatment works (indirect discharge), or a land-application operation. Listed toxic compounds in the wastewater are considered released to water, transferred to an offsite facility, or released to land, depending on the method of discharge.

Your facility probably discharges wastewater under the authority of an NPDES permit (direct discharge) or a local pretreatment permit (indirect discharge). These permits likely have discharge limits on zinc, pentachlorophenol (PCP), and trichlorophenol (TCP), and they may also have limits on other compounds. You can use the direct measurement data collected to monitor compliance with these permits to estimate releases of these chemicals. You also may use any other direct measurements of toxic compounds.

Chemical Fate Assumptions in Papermaking

Chemical reporting status	Process input point	Relative volatility	Probable fate in process
Otherwise used or imported	Wet end	Nonvolatile	Wastewater, solid waste
		Volatile	Air emissions
	Dry end	Nonvolatile	Solid waste
		Volatile	Air emissions
Processed	Wet end	Nonvolatile	Paper product, wastewater, solid waste
		Volatile	Air emissions
	Dry end	Nonvolatile	Paper product, solid waste
		Volatile	Air emissions

When direct measurement data are not available, an alternative method of estimation is needed. Mass balances can be made if sufficient information is available on the quantity of chemicals purchased and the quantity of chemicals retained in the product. An engineering assumption can then be used to determine what fraction of the waste chemical is released to wastewater, air, or solid waste.

This method of estimation lends itself well to those chemicals that are considered "otherwise used" (that is, they do not become part of the product), such as deinking agents, bleaching chemicals, chemicals imported in the wastepaper, and slime-control agents. Because these chemicals do not become part of the paper product, the quantity as waste equals the amount used or imported (except for compounds that undergo chemical transformation during processing or waste treatment).

Example: Using a mass balance and engineering assumption to estimate releases of ethylene glycol via wastewater.

In 1987, a papermaking facility used 12,200 pounds of ethylene glycol (EG) in a biocide formulation applied on the wet end of its paper machine. To estimate releases of this compound, it can be assumed that EG does not become part of the paper product, because its miscibility in water causes it to be removed almost completely from the paper web during the forming and pressing functions. It can further be assumed that fugitive air emissions of EG are unlikely because of its low volatility (vapor pressure = 0.1 mmHg at 18°C).

After forming and pressing functions are completed, the white water in the system carries the EG through a saveall. A portion of the filtered white water is discharged as wastewater, and the rest is recirculated. Assuming that none is retained in the product or emitted to air, on a mass balance basis, all of the EG will eventually end up in the wastewater. All 12,200 pounds of EG was therefore contained in this facility's wastewater.

If the facility discharged the wastewater to a POTW, a transfer of 12,200 pounds of EG to an offsite disposal facility would be reported. If the wastewater was pretreated before discharge, the amount of EG removed from the wastewater would be subtracted from the 12,200 pounds.

Mass balance estimation is more difficult and less accurate for papermaking additives that become part of the paper product. In this case, engineering calculations and assumptions can be used alone. For nonvolatile paper additives that enter the process before the forming section, the concentration of chemicals in the white water discharged as wastewater can be set (by engineering assumption) to be equal to their solubility in water. The engineering assumption is developed as follows. The finished solution entering the paper machine is saturated with the paper additive because it is retained as a solid in the paper as the web is formed. The white water generated from the forming section is also saturated because more solids are removed from solution at the saveall. The wastewater discharged from the saveall or reused in the sealing pits or cooling water and subsequently discharged can thus be assumed to be saturated. The solubility of a chemical in water is thus an approximation of the concentration of that chemical in the wastewater discharged from this section of the plant. Solubility data for many of the Section 313 chemicals can be found in Appendix B of the Section 313 general guidance document.

Example: Using an engineering assumption to estimate releases of zinc oxide via wastewater.

During 1987, a papermaking facility discharged an average of 200,000 gallons of treated wastewater per day to a nearby river. Zinc oxide, which was used as a paper filler, was added to the refiner. An estimated 45 percent (or 90,000 gallons per day) of the wastewater from the entire *facility was generated from the area in which the zinc oxide was used. Assuming that the zinc oxide concentration in the wastewater is equal to its solubility in water (0.00042 pound per 100 pounds H_2O), the quantity of zinc in the raw wastewater can be calculated as follows:*

Amount of Zn in raw wastewater =

$0.00042\ lb\ ZnO/100\ lb\ H_2O\ x$

$8.34\ lb\ H_2O/1\ gal\ H_2O\ x$

$90{,}000\ gal\ H_2O/1\ day\ x$

$0.802\ lb\ Zn/1\ lb\ ZnO$

$= 2.52\ lb$

If the plant operated 350 days during the year, the total amount of zinc released from the process into the wastewater would therefore be 882 pounds.

The preceding calculations were used to estimate the quantity of zinc in the raw wastewater. The operators of this facility developed a treatment factor to consider the treatment before discharge for various toxic compounds. They reviewed the literature on waste treatment in papermaking facilities (see the reference section at the end of this pamphlet), focusing on information applicable to the production process and treatment system at their facility. They found that 80 percent of the zinc is removed from the facility wastewater. Because zinc cannot be destroyed during treatment, the amount removed was actually transferred to the wastewater sludge, which was subsequently landfilled on site. Thus, this zinc must be considered as having been released as solid waste. The remaining 20 percent of the zinc (176 pounds) passed through treatment and was released to water; 80 percent (706 pounds) was partitioned to the wastewater sludge, which is subsequently landfilled on site. Using this approach, the plant in this example could therefore report a release to land of 710 pounds of zinc.

The waste treatment efficiency in the preceding example was derived from the literature. The best method of estimating treatment efficiency is by direct measurement of the treatment process influent and effluent. A treatment efficiency can be developed for any number of chemicals by conducting a direct measurement test program (monitoring the influent and effluent throughout the year is not necessary). In lieu of direct measurement, the use of literature sources is probably the best method of estimating treatment efficiency.

If your facility uses a listed mineral acid or base, but that acid or base is effectively neutralized in use or during wastewater treatment (to pH 6 to 9, as required by most effluent standards), no release quantities should be reported for these substances. If the acid or base is transformed into a reportable substance, however, the quantity of this substance manufactured must be estimated to determine if the "manufactured" threshold value has been reached. For example, sulfuric acid neutralized by sodium hydroxide yields sodium sulfate, which is a listed chemical.

Toxic Releases Via Solid Waste

Solid wastes are rarely measured directly for most of the listed toxic compounds, and emission factors are not generally available. Mass balances can be performed to determine toxic releases, provided sufficient data are available on the quantity of chemicals in the product and/or wastewater. Engineering calculations that assume the chemical concentration in the solid waste is the same as that in the paper product can also be used. In the case of wastewater sludge, however, direct measurement would be required or an estimate would have to be based on the treatment of the raw wastewater.

Example: Using a mass balance and an engineering assumption to estimate releases of titanium dioxide.

During 1987, a papermaking facility produced 150,000 reams (1 ream = 3,300 *square feet) of a fine paper with a coating weight of 45 pounds per ream. The coating was applied by air knife at the dry end of the facility. According to operating records, the coating contained 4.3 percent titanium dioxide (TiO_2) on a dry basis. EPA has proposed to remove TiO_2 from the Section 313 list; however, this example is also representative of the use of a mass balance and an engineering assumption to estimate releases of other similar compounds. The quantity of TiO_2 leaving the facility in the product can thus be calculated as follows:*

Amount of TiO_2 =

150,000 reams x

45 lb dry coating/1 ream x

0.043 lb TiO_2/1 lb dry coating

= 290,250 lb

A review of purchasing and storage records at the facility shows that 300,000 pounds of TiO_2 was processed last year. By mass balance, the quantity of TiO_2 lost to waste is calculated by determining the difference between the amount processed and the amount in the product.

Amount of TiO_2 released as solid waste =

300,000 lb processed –

290,250 lb in product

= 9,750 lb

Because TiO_2 is nonvolatile, no air emissions would be expected, and all of the TiO_2 waste is assumed to be released as a solid waste (coating residue and broke from finishing). Using this approach, the plant in this example could therefore report releases via solid waste of 9,800 pounds of TiO_2.

Toxic Releases to Air

Because of the fugitive aspect of most air releases, these emissions are not often measured directly, and emission factors are generally not available for most compounds. For bleach plant air releases of chlorine and chlorine dioxide, however, the following emission factors (taken from the EPA publication, Environmental Pollution Control in the Pulp and Paper Industry) can be used.

- When vacuum rotary drum washers are used, total uncontrolled chlorine emissions from the bleach tower vent and from the hood vent of the succeeding washing stage amount to about 1.0 pound of Cl_2 per ton of pulp.
- If a bleach plant has two chlorine dioxide stages, ClO_2 is emitted from both the washer hood vents after the bleach towers and from the ClO_2 manufacturing process. If vacuum rotary drum washers are used, total ClO_2 emissions amount to about 0.6 pound of ClO_2 per ton of pulp.
- Plants that use pressure washers or continuous diffusers will have lower emissions for both Cl_2 and ClO_2.

Air emissions of paper additives and machine operating aids can occur from numerous locations in the process (for example, mixing and formulation, paper forming, drying, coating, finishing). As a result, all emissions of highly volatile compounds are likely to be to air. The release estimate will thus consist of simply determining how much of the chemical was introduced in the process and then assuming that all of it is emitted to air.

Estimating the release of other compounds that are only semivolatile or that chemically react during the process is not as simple. You must first evaluate the physical properties of the chemicals (for example, solubility and vapor pressure) and then use simplifying engineering assumptions and calculations based on operating conditions of the process to estimate emissions.

Example: Using a mass balance with an engineering assumption to estimate air releases of formaldehyde.

During 1987, a papermaking facility used 100 tons of urea-formaldehyde resin as a wet-strength agent in the wet end of its process and 200 tons as a coating component in the dry end. The urea-formaldehyde resin contained approximately 1.5 percent of the free-formaldehyde precursor. Thus, 3,000 and 6,000 pounds of free formaldehyde were processed as part of the resin. An additional 17,000 pounds of formaldehyde was used as a wet-strength additive. Altogether, a total of 26,000 pounds of formaldehyde was processed at the facility.

Formaldehyde is volatile, but it is also highly soluble in water. Formaldehyde releases can be estimated for both the wet end and the dry end of the process. In the dry end, the free formaldehyde is contained in the coating formulation. After the coating is added, the paper is transported through a dryer, where all of the formaldehyde can be assumed to be released to air (6,000 pounds).

In the wet end of the process, the free formaldehyde is contained in the finish that enters the paper machine. During paper forming, a portion of the formaldehyde will volatilize as the web forms on the paper machine, a portion will leave in the white water during pressing, and another portion will remain in the web and volatilize as the web passes through the dryer. One portion of the white water is recovered in the saveall and returned to the process; another portion is released to the facility sewer or recycled as sealing water or cooling water for subsequent release to the sewer. In either case, it is probably safe to assume that all of the formaldehyde will be volatilized either in the process or during wastewater treatment. Determining which portions of less-volatile chemicals are released to water or air would require an assumption based on the specific layout of the facility.

Other Toxic Releases

Other wastes in the paper and paperboard production industry from which toxic chemicals may be released include:

- **Residues from pollution control devices**
- **Wash water from equipment cleaning**
- **Product rejects**
- **Used equipment**
- **Empty chemical containers**

Releases from these sources may already have been accounted for, depending on the release estimation methods used. These items (and any other of a similar nature) should be included in your development of a process flow diagram.

The contribution of sources of wastes such as cleaning out vessels or discarding containers should be small compared with process losses. If you do not have data on such sources (or any monitoring data on overall water releases), assume up to 1 percent of the vessel content may be lost during each cleaning occurrence. For example, if you discard (to landfill) "empty" drums that have not been cleaned, calculate the release as 1 percent of normal drum content. If the drums are washed before disposal, this may contribute 1 percent of the content to your wastewater loading.

Step Five

Complete the Toxic Chemical Release Inventory Reporting Form.

After estimating the quantity of each chemical released via wastewater, solid waste, and air emissions, you must determine the amount of each chemical released to water, land, or air or transferred to an offsite disposal facility. This determination will be based on the disposal method you use for each of your waste streams. Enter the release estimates for each chemical or chemical category in Part III of the Toxic Chemical Release Inventory Reporting Form. Also enter the code for each treatment method used, the weight percent by which the treatment reduces the chemical in the treated waste stream, and the concentration of the chemical in the influent to treatment (see instructions). Report treatment methods that do not affect the chemical by entering "0" for removal efficiency.

For More Information

Emergency Planning and Community Right-to-Know Hotline	(800) 535-0202 or (202) 479-2449 (in Washington, D.C. and Alaska)
Small Business Ombudsman Hotline	(800) 368-5888 or (703) 557-1938 (in Washington, D.C. and Virginia)

The EPA brochure, Emergency Planning and Community Right-to-Know Act, Section 313 Release Reporting Requirements (EPA 560/4-88-001) presents an overview of the new law. It identifies the types of facilities that come under the provisions of Section 313, the threshold chemical volumes that trigger reporting requirements, and what must be reported. It also contains a complete listing of the chemicals and chemical categories subject to Section 313 reporting. The EPA publication, Estimating Releases and Waste-Treatment Efficiencies for the Toxic Chemical Release Inventory Form (EPA 560/4-88-002), presents more detailed information on general release estimation techniques than is included in this document.

Additional Sources of Information on Releases From Paper and Paperboard Production

U.S. Environmental Protection Agency. Fate of Toxic and Nonconventional Pollutants in Wastewater Treatment Systems Within the Pulp, Paper, and Paperboard Industry. EPA-600/2-81/158. NTIS PB81-247405. Cincinnati, Ohio. August 1981.

U.S. Environmental Protection Agency. Development Document for Effluent Limitations Guidelines and Standards for the Pulp, Paper, and Paperboard Point Source Category. EPA-440/1-82/025. NTIS PB83-163949. Washington, D.C.

U.S. Environmental Protection Agency. Paper Production and Processing - Occupational Exposure and Environmental Release Study. EPA-600-2-84-120. NTIS PB84-215730. Cincinnati, Ohio. July 1984.

U.S. Environmental Protection Agency. Compilation of Air Pollutant Emission Factors, Fourth Edition. AP-42. Research Triangle Park, North Carolina. September 1985.

U.S. Environmental Protection Agency. Environmental Pollution Control in the Pulp and Paper Industry - Part I/Air. EPA-625/7-76-001. NTIS PB-261708. Cincinnati, Ohio.

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