A Select Inventory of Chemicals Used in Wisconsin's Lower Fox River Basin

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Editing • Stephen Wittman
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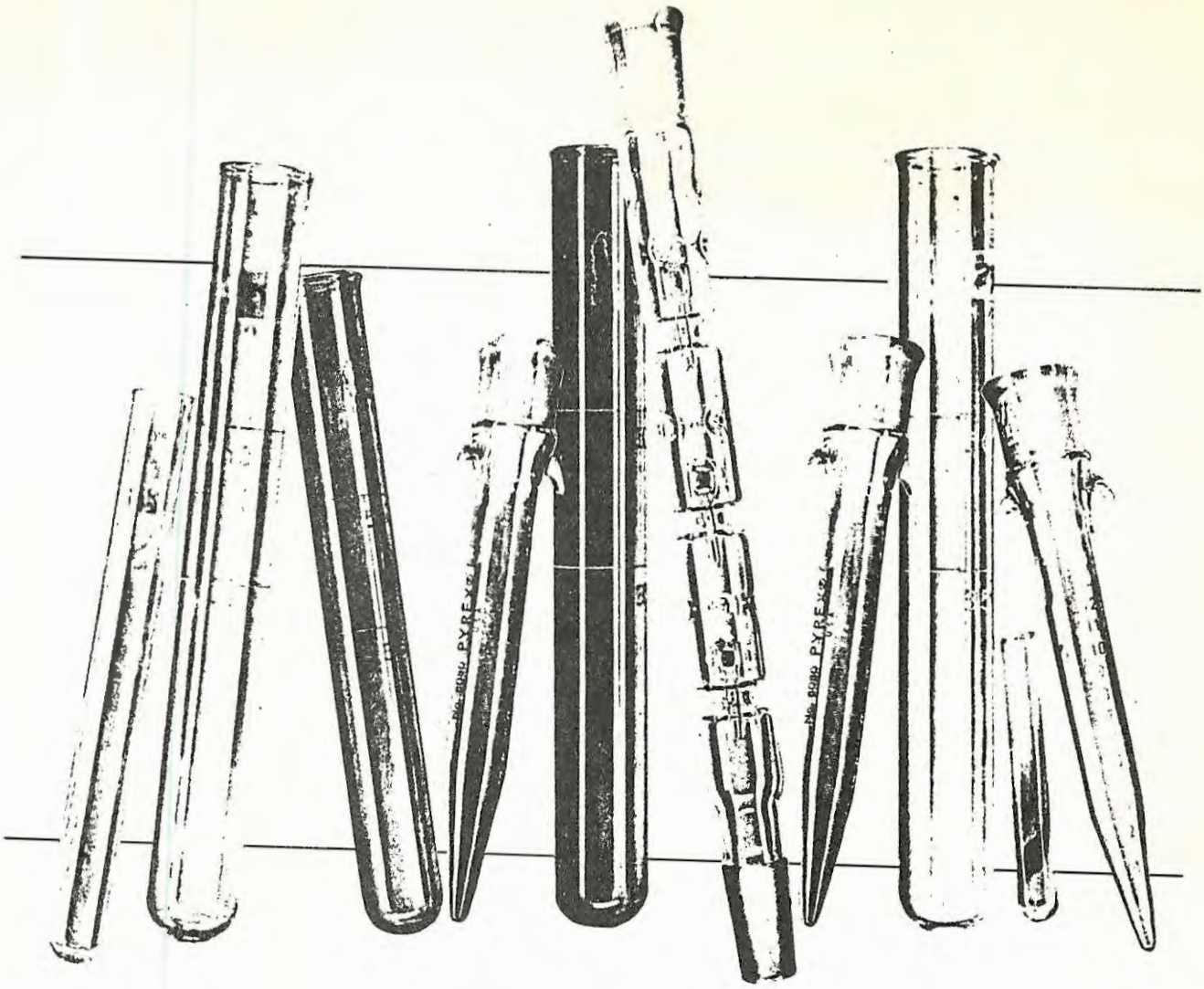

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Preface

The development of this chemical inventory was stimulated by various events, including research meetings and legislation at the state and federal levels. A major impetus was the recommendation made at a University of Wisconsin Sea Grant-sponsored research workshop on Green Bay in 1978 that high priority be given to the research objective of compiling information about the chemicals manufactured and/or used in the Lower Fox River Basin to provide a data base for present and future investigations. The inventory that appears in this report was designed to satisfy that research objective.

Many people assisted us in various ways, especially by providing information or reviewing parts of this report. Among them are Thomas Aten, Charles Case, Thomas Sheffy and Linn Veltema, all of the Wisconsin Department of Natural Resources; Professor (Emeritus) John McGovern of the University of Wisconsin-Madison; Robert Dellinger of the U.S. Environmental Protection Agency; John Tarbell of the Edward C. Jordan Co., Inc., and Robert White of the International Joint Commission.

A considerable amount of information was also provided by the industries and municipalities located in the Lower Fox River Basin and the manufacturers of the chemicals used in production and pollution control activities in the basin. We regret that we cannot individually identify all of the industrial, municipal and manufacturing representatives who sent us information.

We want to emphasize here that inclusion of a chemical in the inventory does not necessarily mean that it is presently being discharged to the Lower Fox River. It was not possible to assess the role and ultimate fate of each and every chemical that is listed in the inventory. Some chemicals are assumedly fully incorporated into products with little or no waste; others may be almost completely removed from process streams by pollution control equipment, though their incorporation into sludge residues means that they must be disposed elsewhere. On the other hand, many chemicals may be discharged from pollution control facilities that do not appear in the inventory. This may be due to the formation of new compounds during industrial processing (e.g., bleaching of pulp with chlorine) or disinfection of municipal wastewaters (again, involving chlorine). Only thorough laboratory analyses can identify these chemical reaction products.

Among future research activities that should be performed to extend the usefulness of this inventory are:

(1) sorting the chemicals by known structure/activity relationships;
(2) performing acute and chronic toxicity assays on heavily used chemicals that haven't been tested yet;
(3) correlating chemical use with occurrence in plant process wastewaters and final effluent discharges;
(4) performing mass balance studies within plants to determine the fate of heavily used chemicals; and
(5) continuing to monitor biota, particularly fish, in the Lower Fox River for bioaccumulation of process chemicals and/or reaction products resulting from various in-plant activities (e.g., formation of chlorinated derivatives of organic compounds used or released during pulping and papermaking).

This project was made possible by a grant from the University of Wisconsin Sea Grant Institute with funds provided by the State of Wisconsin and the Office of Sea Grant, NOAA, U.S. Department of Commerce. The interest and support of the Wisconsin Sea Grant Institute administrators and staff is appreciated, and we extend our special thanks to Stephen Wittman, Christine Kohler and Linda Campbell, who edited, designed and prepared this report for publication.

John R. Sullivan
Water Chemistry Laboratory
University of Wisconsin
Madison WI 53706

Joseph J. Delfino, Ph.D.
Laboratory of Hygiene and Dept. of
Civil & Environmental Engineering
University of Wisconsin
Madison WI 53706

1. Introduction

Controlling pollution from toxic substances in the Great Lakes Basin is a special challenge.

The knowledge that toxic substances exist in the basin is not new. The first serious alert concerning toxic chemicals in the environment, particularly pesticides, was sounded by Rachel Carson in Silent Spring in 1962, but it was not until the late 1960s and early 1970s that the combination of increased environmental awareness and laboratory analytical capability led to the discovery of pesticide pollution throughout the Great Lakes Basin.[1] Since this discovery, extensive research has been undertaken and stricter environmental laws have been enacted.

Yet we are now just realizing the real threat of toxic chemicals through such incidents as the Love Canal area in New York, where air monitoring equipment detected pollution levels as high as 5,000 times the maximum safe level.[2] Certainly, the 1980s will be the decade where control of toxic chemicals in the environment will surface as one of the main environmental challenges confronting the nation today.

With the passage of the Toxic Substances Control Act (PL 94-469) in 1976 and the 1977 amendments to the federal Water Pollution Control Act (PL 92-500), the government was given broad authority to gather information on the potential of chemicals to damage human health and the environment and to control them where necessary. These new and amended environmental laws have led to the development of an inventory of chemicals used and produced in the United States. A large effort launched by the U.S. Environmental Protection Agency (USEPA) has resulted in the registering of more than 55,000 chemicals produced in the United States. Now any new chemical proposed for production may be required to undergo rigorous testing before it can be manufactured.

The above actions have set the stage for a more in-depth look at certain drainage basins and site-specific areas. For example, the International Joint Commission (IJC) has started a chemical manufacturer inventory in the Great Lakes Basin. Unfortunately, much of the information on the manufacture and use of potentially toxic chemicals is confidential, so compilation of a complete list of all substances manufactured in the Great Lakes Basin will be very difficult to complete. The State of Virginia, though, recently completed a geographical chemical inventory of that state's manufacturing establishments. The inventory required reports on chemical substances used as raw materials, catalysts, process solvents and final products. Taking the process one step further, we have attempted in this study to identify the use of chemicals within a specific environment -- Wisconsin's Lower Fox River Basin, which drains into Green Bay, Lake Michigan.

The Lower Fox River Basin was chosen as the target site for a number of reasons. Mile for mile, the Lower Fox River is one of the most densely developed industrial rivers in the U.S. The Wisconsin Department of Natural Resources (WDNR) recently identified over 100 organic compounds in the water, wastewaters, sediments and biota of the Lower Fox River; 20 of these compounds appear on the USEPA's list of priority pollutants.[3]

Also, scientists involved in the Great Lakes Ecosystem Rehabilitation (GLER)[4] project have expressed interest in toxic substances, which could threaten renewed efforts to rehabilitate this river basin.

Severely impaired water quality has caused fish mortalities on the Lower Fox River as far back as 1925.[5] Little additional fishery information is available, but as recently as the middle to late 1960s most stretches of the river supported few fish because of low dissolved oxygen levels.[6] With increased attention directed at water pollution abatement in the 1970s, interest in the fishery was renewed. Fishery investigations below the DePere Dam in 1973 by the WDNR revealed a fishery dominated by bullhead, carp, white bass and white sucker populations, which accounted for 80% of fish captured.[7] A later survey in 1976 of six points upstream from the DePere Dam revealed 70% of the fish population consisting of the same four species.[8]

Much of the blame for the decline in the fish population was placed on low dissolved oxygen levels caused by high biochemical oxygen demand (BOD) loadings discharged into the river by industry and muncipal wastewater treatment plants. Little, if any, thought was given to the possibility that acute or sublethal effects due to the discharge of toxic substances may also have been a major factor in the decimation of the fish population of the Lower Fox River. Considerable investment was made by industry and municipalities to upgrade or install new pollution abatement equipment. This new equipment was designed to reduce the input of BOD and suspended solids to the river. Today, oxygen levels have improved in the river, and a new fish population is being established from Green Bay to DePere due to efforts of the WDNR. Also, transitory fish from Lake Winnebago are reestablishing themselves within the Fox River environment. Since many toxic chemicals adsorb onto suspended solids, it is not known whether higher dissolved oxygen concentrations or reduced toxic substance levels are the main reason for the river's ability to once again support a viable fishery. Concentrations of toxic compounds are just now beginning to be monitored in the river, so one can only speculate about the previous decline in the fish population. Undoubtedly, a combination of factors may have been involved.

The river is still not yet free of problems. High PCB levels in the fish[1,3] have resulted in a warning to the public to limit consumption of fish taken from the river. Sediments in some areas are classified as polluted, and if dredged, special measures must be taken for their disposal.

Chemical Inventory Objectives

Increased awareness of the sources, distribution and fate of chemicals in natural waters led to an assessment of the use or production of these potentially hazardous materials in the Lower Fox River Basin in northeastern Wisconsin. The inventory is one phase of a program for assessing which organic compounds may be troublesome when they reach the aquatic environment. In effect, the inventory is a companion approach to an analytical effort designed to locate potentially toxic organic pollutants. Rather than doing countless and expensive scans on gas chromatography/mass spectrometry systems to identify organic compounds, certain chemicals can be traced down through an approach outside the laboratory. Though useful itself, the inventory must be interwoven with an analytical program so the findings may be applied to the aquatic environment.

In essense, the inventory provides a means of ascertaining the types of chemicals that may be expected to occur in the aquatic environment; then the analytical program can focus on or intensify its efforts by looking for specific compounds and their structurally altered products. When a chemical is identified from the inventory as being used, produced or manufactured within the basin, further effort can follow.

For example, preventing the entry of a chemical compound directly into a waterway does not necessarily prevent its entry into the environment. It may be transferred to an alternate medium, either the land or air, and realistically the problem is then only transferred from one jurisdiction to another, even though an effluent discharge may presently be within permit limitations. Therefore, by identifying troublesome and potentially toxic compounds through the inventory, their pathways and fates may be assessed and proper regulations developed, if necessary, to ensure public safety and health.

Many compounds identified from the inventory may become altered in industrial processing, during the treatment process or upon reaching the aquatic environment. The major alteration or modification processes are photochemical, chemical and biological, as defined here:

1. Photochemical degradation -- nonmetabolic degradation requiring light energy.

2. Chemical degradation -- degradation effected by chemical agents; nonmetabolic; does not require light energy.

3. Biological degradation (biodegradation) -- degradation caused by living organisms.

The inventory may also be used to determine which raw chemicals may need to be replaced or removed by treatment if undesirable levels of certain compounds are present in an effluent. Also, once investigators have identified certain compounds of concern, particularly organic compounds, within the aquatic environment, they can work back to the inventory to help explain the compound's existence in the ecosystem.

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2. Initial Steps Taken to Develop the Inventory

The first step in developing the chemical inventory was to define, in a broad sense, the degree of specificity required. Then the next step was to review the availability of information about chemical substances.

Information was generally available, but it had to be extracted and compiled before it yielded pertinent knowledge regarding chemical usage. The following is the basic approach that was followed in developing the chemical inventory.

Reviewing the Sources

We first contacted the state natural resources agency, the WDNR. It operates under federal and state laws, and carries out provisions set forth through many environmental laws. We wanted to identify all industrial and municipal point-source discharges and potential nonpoint pollution sources within the study area. Sections 208 and 209 of the federal Water Pollution Control Act of 1972 (PL 92-500) require this information. These sections also require waste treatment and basin planning, respectively, for all basins within each state. Within the 208 Basin Plan available from the state natural resources agency, information identifying point-source discharges and waste treatment facilities is available. Generally, data regarding potential nonpoint pollution areas is also discussed. But this is not a totally comprehensive document, since considerable information may be missing.

Once a majority of the industries and municipalities involved were identified, agency files were reviewed for information regarding chemical usage. In Wisconsin, Section 144.54 of the Wisconsin Natural Resources Laws "directs the WDNR to require by rule that persons discharging industrial wastes, toxic and hazardous substances, or air contaminants submit a report on these discharges in a form prescribed by the Department." Chapter NR 101 of the Wisconsin Administration Code carries out this directive.

When reviewing the NR 101 file, a variety of useful information was found. The name of the company official responsible for filing the form appears on the report; many times this was the person to contact for more detailed information regarding chemical usage. Information pertaining to production also appears in these reports. This may be of importance when sampling routines are established. Each outfall the company operates is identified by number, the flow is given, the percentage composition of daily flow as process, cooling, and sanitary wastes, if storm water is part of the outfall, and finally the name of the surface water, municipal treatment plant, or land disposal sites receiving the discharge. Concentrations and levels are given for the substances that are required to be monitored according to their NR 101 reporting terms. Average and maximum outfall temperatures are also given. Also required is a map or general layout of the plant showing where the various effluent streams enter the waters of the state, the sewerage system, or land disposal systems. This information can be useful if a sampling program is designed to verify information derived from the chemical inventory.

Section NR 101.04 of the Wisconsin Administrative Code entitled "Contents of Reports," subsection 2g requires "a brief description of the manner and amount of raw materials used which produce the industrial wastes or toxic and hazardous substances being reported." Unfortunately, this subsection is not well defined and therefore extremely difficult to enforce. Some industries compiled extensive and comprehensive raw material lists, while others offered only a sketchy description -- or none at all.

At this point, a majority of the industries were identified and a basic list of raw materials was compiled. But if the raw material lists were to give the needed informaton, the chemical composition of these raw materials and trade name chemical products had to be known. The identification of the chemical composition of raw materials and trade name chemical additives was often very difficult to make and will be discussed in detail later.

Section 147.02 of the Wisconsin Natural Resources Laws requires a permit for the lawful discharge of any pollutant into the waters of the state, including ground water. Chapter NR 200 of the Wisconsin Administrative Code sets forth the requirements for filing for a permit, as well as the required form and content. These permits are more commonly known as the Wisconsin Pollution Discharge Elimination System (WPDES) Permits. (At the federal level this is called the National Pollution Discharge Elimination System.) The NR 200 files yielded additional information regarding chemical usage within the study area. The files are open for public inspection and copying upon request. A file can be found for all industries except those discharging to publicly owned treatment works.

The WPDES permit application may contain useful information for an inventory of this type. Again, a specific person to contact regarding the application is given. The nature of the business of the industry is also described. Water intake use is described as well as facility water use. Discharges are described, and a narrative description of the activity producing the discharge is given. Waste abatement practices and codes are included. The characteristics of each discharge in terms of chemical constituents are also included. Water treatment additives are identified, as are the manufacturer(s) of the treatment chemicals.

Each permit application varied in form and content, depending on the industry type, but all were reviewed for possible information. For example, the pulp and paper industries that predominate in the Lower Fox River Basin were required to file a Toxic and Nonconventional Pollutant Study about their discharges to state waters. These studies contain valuable information in terms of potentially toxic chemicals that may be of concern for a given industry. Many times file correspondence between the WDNR and the industry signaled points of concern regarding potentially troublesome discharges or plant operation problems.

Information regarding wastewater treatment plants (WWTPs) was obtained through the WDNR files on municipal facilities. Since these were often voluminous, it often was easier to write the engineer or manager of the municipality and ask for chemicals and quantities used for a particular time period. A list of significant discharges to the municipal WWTP was also very useful, as it was used to identify those industries that do not have a WPDES permit requirement.

When the WDNR files were adequately reviewed, the second phase of the inventory began. This phase dealt largely with attempting to fill in information gaps left by incomplete agency files.

A variety of measures were used to deal with this situation. For example, when an industry failed to file a raw materials list in accordance with Chapter NR 101, a letter was sent requesting this information from the industry. In many cases, prompt and excellent replies were received. In other instances, the opposite was true, and information was not made available to protect company trade secrets.

Identifying the exact chemical composition of various trade name products was not an easy task. Historically, there was no one reference or group of references available for identifying chemical compositions. In fact, until recently, many chemical suppliers themselves did not know what the exact chemical composition of their products were.

With the implementation of the Toxic Substances Control Act (TSCA), which is administered by the USEPA, the nation for the first time has a detailed list of chemicals manufactured in or imported into the United States. This information, which will be updated periodically, is one key step for current and future efforts to identify and evaluate hazards associated with chemical substances already in commercial use. The TSCA Chemical Inventory (May 1979), a four-volume set plus supplements, enables many trade name chemical products to be identified with their exact chemical composition.

Other sources of chemical information were also available. By keeping up to date with industrial regulations mandated through environmental laws, additional information regarding chemical usage was obtained.

For example, Section 308 of the Clean Water Act (PL 95-217) requires the reporting of chemicals used within certain industrial subcategories. To obtain this information, the USEPA Effluent Guidelines Division in Washington, D.C., was contacted. Since the pulp and paper industry dominates the Lower Fox River Basin, this was the subcategory for which chemical information was requested. This information, which had been compiled by a private government contractor, was legally released to us. Confidential data were also released to us, but no individual company was identified as using particular chemicals, thereby preserving the confidential nature of the information. The data were originally submited to the USEPA as trade name chemical products and did not represent the chemical composition of the products. This allowed an initial test of the TSCA inventory discussed earlier. By using the TSCA inventory, chemical compositions of many trade name products were easily determined, but in most cases only a manufacturer of the product could be obtained.

After trade name products were matched to manufacturers, letters were mailed requesting the company to provide the chemical composition of the product or products as well as material data safety sheets as required by the Occupational Safety and Health Act of 1970 (PL 91-596). In general, corporate responses were good, but some companies were hesitant to release chemical compositions to us. The release of information often depended on how tactfully the request for information was written. But ultimately it depended on the chemical manufacturer's policy regarding release of chemical composition information in the absence of a legal mandate to do so.

Another source was information compiled by industry representative groups. For example, a useful contact was the National Council for Air and Stream Improvement (NCASI) of the paper industry. The organization had compiled a list of trade name chemical products that contained the so-called priority pollutants. Although a partial list, it was compiled to help the paper industry comply with the Section 308 requirements of PL 95-217. This information, which was not formally published, was made available to us voluntarily by a representative of a paper mill. This points to the need for continuing communication with industry, since companies often have unpublished data that may be of great value to a study such as this.

3. Existing Organic Pollutant and Heavy Metals Data for the Lower Fox River

Industrial organic pollutants have received increased attention following a June 7, 1976, court settlement involving the USEPA and several environmentally concerned plaintiffs. This court settlement led to the creation of what was commonly known as the "USEPA Consent Decree." One component of the Consent Decree was a list of 65 compounds and classes of compounds. This list eventually formed the Toxic Pollutant List as required under section 307(a)(1) of the Clean Water Act (Table 3-1). Technology-based effluent guidelines are to be established for some or all of the compounds for 21 different industrial subcategories (Table 3-2). Since pulp and paper mills dominate industry along the Lower Fox River, the industrial subcategory of particular interest to this study was the pulp and paperboard mills and converted paper products category.

A number of studies have concentrated on organic pollutants present in industrial effluents, sediments and biota of the Lower Fox River. This section summarizes the data from these studies. A more detailed discussion of the data can be pursued by consulting the references.

More than 100 organic compounds were identified in river water, effluent, sediment and biota samples taken from the Lower Fox River (Table 3-3).[1] Twenty of the compounds identified were on the Toxic Pollutant List.

A number of these organic compounds can be traced to raw materials identified in the chemical inventory itself. Examples of linkages between some of the raw materials used by industry and organic compounds known to exhibit toxicological or organoleptic effects on aquatic organisms are given in Tables 3-4 to 3-8. But questions remain about the concentrations at which these compounds become environmentally significant in a dynamic system such as the Lower Fox River. Obviously, more research is needed to answer these questions.

Many of the pulp and paper mills along the Lower Fox River have analyzed or monitored their own plant discharges. These analytical reports were required for the renewal of their WPDES permits. The WDNR hoped that by requiring characterization of organic compounds in the mill effluents, the pulp and paper industry would be better equipped to deal with federal effluent guidelines once these are promulgated by the USEPA for the pulp and paperboard subcategory. A summary of final effluent concentrations for 92 organic compounds is presented in Table 3-9. These data were extracted from the pulp and paper mill reports on toxic discharges submitted to the WDNR.

Some data exist concerning pollution of bottom sediments in the Lower Fox River. A knowledge of contaminants in sediments is worthwhile because (1) during periods of high flow the sediments are scoured, resuspended, transported and ultimately deposited in Lower Green Bay, which supports more than half of the commercial fishery harvest from Lake Michigan,[2] and (2) contaminants in sediment are known to bioaccumulate through the biological food web and may reach their highest levels in fish or birds of this region.[3,4]

Table 3-1

Toxic Pollutant List

1. acenaphthene
2. acrolein
3. acrylonitrile
4. benzene
5. benzidine
6. carbon tetrachloride
7. chlorobenezene
8. 1,2,4-trichlorobenzene
9. hexachlorobenzene
10. 1,2-dichloroethane
11. 1,1,1-trichloroethane
12. hexachloroethane
13. 1,1-dichloroethane
14. 1,1 2-trichloroethane
15. 1,1,2, 2-tetrachloroethane
16. chloroethane
17. bis(chloromethyl) ether
18. bis(2-chloroethyl) ether
19. 2-chloroethyl vinyl ether
20. 2-chloronaphthalene
21. 2, 4, 6-trichlorophenol
22. parachloro-meta-cresol
23. chloroform
24. 2-chlorophenol
25. 1,2-dichlorobenzene
26. 1,3-dichlorobenzene
27. 1,4-dichlorobenzene
28. 3,3'-dichlorobenzidine
29. 1,1-dichloroethylene
30. 1,2-trans-dichloroethylene
31. 2,4-dichlorophenol
32. 1,2-dichloropropane
33. 1,3-dichloropropene
34. 2,4-dimethylphenol
35. 2,4-dinitrotoluene
36. 2,6-dinitrotoluene
37. 1,2-diphenylhydrazine
38. ethylbenzene
39. fluoranthene
40. 4-chlorophenyl phenyl ether
41. 4-bromophenyl phenyl ether
42. bis(2-chloroisopropyl) ether
43. bis(2-chloroethoxy) methane
44. methylene chloride
45. methyl chloride
46. methyl bromide
47. bromoform
48. dichlorobromomethane
49. trichlorofluoromethane
50. dichlorodifluoromethane
51. chlorodibromomethane
52. hexachlorobutadiene
53. hexachlorocyclopentadiene
54. isophorone
55. naphthalene
56. nitrobenzene
57. 2-nitrophenol
58. 4-nitrophenol
59. 2,4-dinitrophenol
60. 4,6-dinitro-o-cresol
61. N-nitrosodimethylamine
62. N-nitrosodiphenylamine
63. N-nitrosodi-n-propylamine
64. pentachlorophenol

Table 3-1 (Continued)

Toxic Pollutant List

65. phenol
66. bis-(2-ethylhexyl) phthalate
67. butyl benzyl phthalate
68. di-n-butyl phthalate
69. di-n-octyl phthalate
70. dimethyl phthalate
71. diethyl phthalate
72. benzo(a)anthracene
73. benzo(a)pyrene
74. 3,4-benzofluoranthene
75. benzo(k)fluoranthene
76. chrysene
77. acenaphthylene
78. anthracene
79. benzo(ghi)perylene
80. fluorene
81. phenathrene
82. dibenzo (a,h) anthracene
83. ideno(1,2,3-cd) pyrene
84. pyrene
85. tetrachloroethylene
86. toluene
87. trichloroethylene
88. vinyl chloride
89. aldrin
90. dieldrin
91. chlordane
92. 4,4'-DDT
93. 4,4'-DDE
94. 4,4'-DDD
95. a-endosulfan
96. b-endosulfan
97. endosulfan sulfate
98. endrin
99. endrin aldehyde
100. heptachlor
101. heptachlor epoxide
102. alpha-BHC
103. beta-BHC
104. gamma-BHC
105. delta-BHC
106. PCB-1242 (Arochlor 1242)
107. PCB-1254 (Arochlor 1254)
108. PCB-1221 (Arochlor 1221)
109. PCB-1232 (Arochlor 1232)
110. PCB-1248 (Arochlor 1248)
111. PCB-1260 (Arochlor 1260)
112. PCB-1016 (Arochlor 1016)
113. Toxaphene
114. Antimony
115. Arsenic
116. Asbestos
117. Beryllium
118. Cadmium
119. Chromium
120. Copper
121. Cyanide
122. Lead
123. Mercury
124. Nickel
125. Selenium
126. Silver
127. Thallium
128. Zinc
129. 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)

A 1977 study performed by the Region V USEPA classified the sediments below the DePere Dam downstream to an area in Lower Green Bay nine miles from the mouth of the Lower Fox River as heavily or moderately polluted.[5] This classification of sediments was based on comparisons to other Great Lakes harbor sediments tested in the past. The sediments were classified as polluted largely due to their elevated concentrations of mercury and PCBs (see Table 3-10 and Figure 3-1). This study was done to assist the U.S. Corps of Engineers district engineer in performing a Section 404 evaluation required by PL 92-500. This section requires evaluation of sediments that are proposed to be dredged and discharged into navigable waters. Another study[1] looked at PCB concentrations in sediments along the entire length of the river as well as Lower Green Bay. The results of this study also indicate elevated PCB concentrations in sediments of the river and lower bay (see Table 3-11 and Figure 3-2).

Several studies have looked at PCB, heavy metals and pesticide concentrations in fish of this region.[6,7] PCB data for fish taken from the Lower Fox River and Lower Green Bay appear in Table 3-12. Heavy metal and pesticide data are included if sample concentrations were above detection limits. Only those fish samples with an asterisk were screened for compounds other than PCBs. Of 88 samples analyzed as fillets, 41% exceeded the U.S. Food and Drug Administration (USFDA) tolerance guideline of 5 mg/kg for PCBs. Samples ranged from less than 0.2 to 57 mg/kg. Of 41 whole-fish samples, 63% exceeded the USFDA's PCB guidelines. Whole-fish samples ranged from 1.8 to 90 mg/kg. It is suspected that other organic compounds that behave similar to PCBs may also be accumulating in the fish of this region.

Table 3-2

Industrial Point-Source Subcategories

Timber products processing	Plastic and synthetic materials manufacturing
Steam electric power plants	Pulp and paperboard mills and converted paper products
Leather tanning and finishing	Rubber processing
Iron and steel manufacturing	Miscellaneous chemicals Adhesives Gum and wood chemicals Pesticides Pharmaceuticals Explosives manufacturing
Petroleum refining	Machinery and mechanical products manufacturing Aluminum forming Battery manufacturing Coil coating Copper forming Foundries Plastics processing Porcelain enamel Mechanical products Electrical/electronic components
Inorganic chemicals manufacturing	Electroplating
Textile mills	Ore mining and dressing
Organic chemicals manufacturing	
Nonferrous metals manufacturing	
Paving and roofing materials	
Paint and ink formulation and printing Paint and ink Printing and publishing	
Soap and detergent manufacturing	
Auto and other laundries	
Coal mining	

From: L. Keith and W. Telliard, *Environmental Science and Technology* 13(4):416-23, 1975.

Table 3-3

Chlorinated and Nonchlorinated Organic Compounds Identified in Water, Wastewater, Biota and Sediment Samples From the Lower Fox River Watershed[1]

Acenapthene
Acetone, Tetrachloro-
Acetovanillone
Aniline, Trichloro-
Anisole, Pentachloro-
Anthracene (or Phenanthrene)
Benzene, Dichloro-diethyl-
Benzoate, Dimethyl-
Benzoate, Methyl-methoxy-
Benzoic acid
Benzoic acid, Isopropyl-
Benzophenanthrene, Methyl-
(or Benzanthracene, Methyl-)
Benzophenone
Benzothiazole
Benzothiazole, Hydroxy-
Benzothiazole, Methyl-thio-
Benzyl alcohol
Biphenyl
Biphenyl, Methyl-
Bisphenol A
Bisphenol A, Chloro-
Bisphenol A, Dichloro- (2 isomers)
Bisphenol A, Tetrachloro-
Bisphenol A, Trichloro-
Borneol, Iso-
Caffeine
Camphor, Oxo-
Carbazole
*Chlordane
*Chrysene
*DDD
*DDE
*DDT
Dodecane

Fatty Acids

Heptadecanoic Acid
Lauric Acid
Myristic Acid
Oleic Acid
Palmitic Acid
Stearic Acid

Fatty Acids, Methyl Esters

Methyl palmitate
Methyl stearate

*Fluoranthene
Guaiacol
Guaiacol, Dichloro- (3 isomers)
Guaiacol, Tetrachloro-
Guaiacol, Trichloro- (3 isomers)
Heptadecane
*Hexachlorocyclohexane (Lindane)

*Compounds found on USEPA Consent Decree Priority Pollutant List.

Table 3-3 (Continued)

Chlorinated and Nonchlorinated Organic Compounds Identified in Water, Wastewater, Biota and Sediment Samples From the Lower Fox River Watershed[1]

*Hexachlorocyclopentadiene
Hexadecane
Indole, Chloro-p- Menth-4-ene-3-one
Naphthalene, Isopropyl-
Naphthalene, Methyl-
Nonadecane
Octadecane
Pentadecane
*Phenanthrene, Methyl-

*Phenol
Phenol, p-Tertiary Amyl-
*Phenol, Chloro-
Phenol, p-(alpha-chloroethyl)-
Phenol, Decyl
*Phenol, Dichloro- (2 isomers)
Phenol, Ethyl-
Phenol, Nonyl- (3 isomers)
*Phenol, Pentachloro-
Phenol, Tetrachloro-
(2,3,4,6 or 2,3,5,6)
Phenol, Trichloro-
2,4,6,
2,4,5 or 2,3,4)
Phenol, Trichloro-dimethoxy-
Phenol, Undecyl-
Phenyl Decane
Phenyl Dodecane
Phenyl Undecane
Phosphate, Tributyl-

Phthalates

*Dibutyl Phthalate
*Diethyl Phthalate
*Dioctyl Phthalate
*Polychlorinated Biphenyls (PCBs)
Propan-2-one, 1-(4-hydroxy-3-methoxy phenyl) or guaiacyl acetone
*Pyrene

Resin Acids

6,8,11,13 Abietatetraen-18-oic Acid
Dehydroabietic Acid
Oxo-dehydroabietic Acid
Pimaric Acid
Sandaracopimaric Acid

Resin Acids, Methyl Esters

Methyl Dehydroabietate

Resin Acids, Chlorinated

Chlorodehydroabietic Acid (2 isomers)
Dichlorodehydroabietic Acid

Table 3-3 (Continued)

Chlorinated and Nonchlorinated Organic Compounds Identified in Water, Wastewater, Biota and Sediment Samples From the Lower Fox River Watershed[1]

Resin Acid Methyl Esters, Chlorinated

Methyl Chlorodehydroabietate
Methyl Dichlorodehydroabietate

Salicylic Acid
Syringaldehyde
Syringaldehyde, Chloro-
Tetradecane
Toluene, Dichloro-
Vanillin
Vanillic Acid
Veratrole, Dichloro-
Veratrole, Trichloro-
Xylene, Dichloro
Xylene, Trichloro-

Table 3-4

Raw Materials Used
And Their Known Environmental Significance

Category:	Organic Halides
Raw Materials:	Trichloroethylene Tetrachloroethylene 1,1,1-Trichloroethane (Chloroethane) NC-123 (contains tetrachloroethylene)
Estimated Usage:	40 tons/yr.
Industrial Applications:	Cutting fluids, degreasers, solvents; also chemical aids used in the deinking of certain wastepapers.
Environmental Significance:	Tri- and tetrachloroethylene are suspected of being human carcinogens. Available data has led to an estimated criterion for protection of freshwater aquatic life .

Compound	Proposed Freshwater Aquatic Life Criteria*	Human Health Criteria*
Trichloroethylene	1500 ug/L 24-hr. average	0
Tetrachloroethylene	310 ug/L 24-hr. average	0

*Note: Criteria are not rules, and they have no regulatory impact. Rather, these criteria present scientific data and guidance on the environmental effects of pollutants which can be useful to derive regulatory requirements based on considerations of water quality impacts.

Source: Federal Register, Vol. 44, No. 52, March 15, 1979

Table 3-4 (Continued)

Raw Materials Used
And Their Known Environmental Significance

Category:	Phenols and Chlorinated Phenols
Raw Materials:	Known to contain trichlorophenol salts: Nalco 7623 Nalco 7633-S Nalco 7631 Known to contain pentachlorophenol salts: Dowacide G Nalco 7633-S Nalco 7631
Estimated Usage:	4 tons/yr.
Industrial Application:	The chlorinated phenols are used as microbiocides by the paper industry to keep the microbial population in water systems at an acceptable level.
Environmental Significance:	In general, phenol and the chlorinated phenols exhibit an organoleptic effect on water and aquatic organisms. Federal criteria for protection of freshwater aquatic life for more chlorophenols are based on the organoleptic effects, the exceptions being tetra and pentachlorophenol. The highly chlorinated phenols, tetra and penta, have their criteria based on toxicological effects.

Compound	Proposed Freshwater Aquatic Life Criteria*	Human Health Criteria*
Pentachlorophenol	6.2 ug/L 24 hr. avg.	140 ug/L
2,4,5-Trichlorophenol	10 ug/L 24 hr. avg.	10 ug/L
2,4,6-Trichlorophenol	100 ug/L 24 hr. avg.	100 ug/L

Table 3-4 (Continued)

Raw Materials Used
And Their Known Environmental Significance

Category:	Fatty and Resin Acids
Raw Materials:	Rosin sizes (general) contain resin and fatty acids. Specific trade name products: Monsize, Neuphor 100, Mersize, Accostrength 410.
Estimated Usage:	2,900 tons/yr. Pulp (Resin and fatty acids may be extracted from wood during the pulping process.)
Industrial Application:	Rosin sizes are used as internal sizeing agents in the making of paper.
Environmental Significance:	Certain resin and fatty acids and their chlorinated derivatives are considered potential fish toxicants in pulp mill effluents. They may also cause taste and odor problems. (See Tables 3-5 to 3-8.)

Table 3-5

Principal Toxic Chemicals Formed in Pulping Process[8]

Pulping Process	Toxic Chemicals Formed
Debarking	Resin acids include abietic, dehydroabietic, isopimaric, palustric, pimaric, sandaracopimaric, and neoabietic. Unsaturated fatty acids include oleic, linoleic, and palmitoleic. Diterpene alcohols include pimarol, isopimarol, abienol, 12E-abienol, and 13-epimanool.
Kraft pulping	Resin acids includ abietic, dehydroabietic, isopimaric, palustric, pimaric, sandaracopimaric, and neoabietic. Unsaturated fatty acids include oleic, linoleic, linolenic, and palmitoleic.
Sulfite pulping	Resins acids include abietic, dehydroabietic, isopimaric, palustric, pimaric, sandaracopimaric, and neoabietic. Unsaturated fatty acids include oleic, linolenic, linoleic, and palmitoleic. Juvabiones include juvabione, juvabiol, delta$^{1'}$-dehydrojuvabione, and delta$^{1'}$-dehydro- juvabiol. Lignin degradation products include eugenol, isoeugenol, and 3,3'dimethoxy-4- and 4'dihydroxy-stilbene.
Mechanical pulping	Resin acids include abietic, dehydroabietic, isopimaric, palustric, pimaric, sandaracopimaric, and neoabietic. Unsaturated fatty acids include oleic, linolenic, and palmitoleic. Diterpene alcohols include pimarol, isopimarol, abeinol, 12E-abienol and 13-epimanool. Juvabiones include juvabione, juvabiol, delta$^{1'}$-dehydro-juvabione, and delta$^{1'}$-dehydrojuvabiol.
Bleaching and caustic extraction	Chlorinated resin acids include monochloro- and dichloro-dehydroabietic. Unsaturated fatty acid derivatives include epoxystearic acid and dichloro-stearic acid. Included also are 3,4,5-trichloroguaiacol and 3,4,5,6-tetrachloroguaiacol.

Table 3-6

Principal Toxic Constituents in Pulpmill Waste Streams[9]

Effluent Source and 96-hr. LC50 Range (% v/v)	Major Contributor to Toxicity	Other Identified Contributors
Debarking (0.2-40)	Resin Acids	Diterpene alcohols
Mechanical Pulping (2-10)	Resin Acids	Diterpene alcohols, Unsaturated fatty acids, Juvabiones
Kraft Pulping (2-40) (unbleached whitewater)	Resin Acids	Unsaturated fatty acids
Sulfite waste liquor (0.2-0.5)	Resin Acids	Juvabiones
Acid bleach (10-80) (chlorination stage)	Chlorolignins	---
Caustic extraction (2-40)	Chlorinated phenolics Chlorinated resin acids Chlorinated stearic acids	Liquid pitch dispersants

Table 3-7

Concentrations and Acute Toxicities of Resin Acids Found in Softwood Pulping and Debarking Effluents[9]

Resin Acid	96-hr. LC50 (mg/L)[a]	Concentration Ranges (mg/L) in Effluents			
		Debarking	Mechanical Pulping	Kraft Pulping	Sulphite Waste Liquor
Abietic	0.41	2.0-22.1	2.6-16.0	0.7-19.9	67.4
Dehydroabietic	0.75	3.4-22.9[c]	2.6-15.7[c]	0.4-22.1	51.8
Isopimaric	0.22	2.4-33.4[d]	2.7-35.0[d]	0.6-17.2	8.7
Palustric	0.55[b]	---	2.8-7.7	---	---
Pimaric	0.32	0.8-7.6	0.1-5.9	0.2-8.7	9.8
Sandaracopimaric	0.36				
Total	---	10.4-78	12.1-61.8	2.3-54.8	141.8
Number of Samples	---	88	24	21	1
Number of Mills	---	10	2	10	1

[a]Toxicant solutions renewed every 4-8 hrs.; test fish was coho salmon (Oncorhynchus kisutch).

[b]No solution replacement; test fish, rainbow trout (Salmo gairdneri).

[c]Includes neoabietic acid.

[d]Includes palustric acid.

Table 3-8

Toxicity to Juvenile Coho Salmon of Long-Chain Fatty Acids Present in Debarking and Pulping Effluents[9]

Fatty Acid	Palmitic	Stearic	Oleic	Linoleic	Linolenic	Palmitoleic
Carbon No.	C_{16}	C_{18}	C_{18}	C_{18}	C_{18}	C_{16}
Lt50 (min)[a] at 12 mg/L	96h+	96h+	2000	220	160	150

[a]Lt 50 = Time to death for 50% of the test fish.

Table 3-9 Concentrations of Selected Pollutants in the Final Effluents of Pulp and Pape

(All concentrations in ug/L unless specified.)

LEGEND

Concentration (Range)
Number of Samples
Type of Sample

ND - Not Detected
NM - Not Quantifiable
G - Grab Sample
C - Composite
U - Unknown
* - Not Reported

	Acrylonitrile	Benzene	Carbon Tetrachloride	Chlorobenzene	1,2,4–Trichlorobenzene	Hexachlorobenzene	1,2–Dichloroethane	1,1,1–Trichloroethane	Hexachloroethane*	1,1–Dichloroethane*	1,1,2–Trichloroethane	1,1,2,2–Tetrachloroethane*	Chloroethane*	Bis (Chlo
Consolidated Papers (Appleton Division) Appleton, Wis.														
Midtec Paper Corporation Kimberly, Wis.	<20 3 G	<10 3 G												
Proctor & Gamble Green Bay, Wis.							0.9–6.3 3 G							
Thilmany Pulp & Paper Kaukauna, Wis.														
Riverside Paper Corp. Appleton, Wis.										<1 4 U				
Kimberly–Clark (Lakeview) Town of Menasha, Wis.			<1 2 G				3.9 2 G							
Kimberly–Clark (Neenah & Badger Globe) Neenah, Wis.			<1 2 G				<1 2 G							
Unidentified Secondary Fiber Mill			ND–10 3 C				ND 3 C							
Green Bay Packaging Green Bay, Wis.														
Appleton Papers (Locks Mill) Combined Locks, Wis.														
Nicolet Paper Co. DePere, Wis.														
American Can Co. Green Bay, Wis.		<1 3 C	<1 3 C		<1–<20 3 C	<1 3 C								
Unidentified Secondary Fiber Mill		<1–3 4 C		ND 1 C			1 1 C	ND 1 C						

r Mills Located on the Lower Fox River, Wisconsin[8]

Bis (2-Chloroethyl) Ether*	2-Chloroethyl Vinyl Ether*	2-Chloronapthalene*	2,4,6-Trichlorophenol	Parachloromeia Cresol	Chloroform	2-Chlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	Ethylbenzene	Fluoranthene	Dichloromethane	Isophorone	Napthalene	2-Nitrophenol	Ethylene Chloride	2,4,5,6-Tetrachlorophenol
		63		1500				ND								
		1		1				1								
		C		G				G								
		< 10		10–12				< 10		< 10						
		3		3				3		3						
		C		G				G		G						
		0.6–0.9		22–210												
		3		3												
		C		G												
		< 1–< 2.5		< 1–289												
		4		4												
		U		U												
				< 1–30.8						<25–< 1000				< 1000		
				2						2				2		
				G						G				G		
				6.4–15.8						<25–< 1000				< 1000		
				2						2				2		
				G						G				G		
				8–152												
				3												
				C												
		< 10	< 10		< 10	< 10	ND–< 10						< 10			
		3	1		1	1	3						1			
		G	G		G	G	G						G			
		ND–10						NM								ND
		3						3								3
		C						C								C
		< 10		27–49				< 10–32				< 10				
		3		3				3				3				
		C		G				G				C				
				21–48				NM								
				3				3								
				C				C								
		8–43		< 1–61		2–4			ND–3	19	ND	ND				
		4		4		3			4	1	1	1				
		C		C		C			C	C	C	C				

Table 3-9 (Continued) Concentrations of Selected Pollutants in the Final Effluents of Pul

(All concentrations in ug/L unless specified.)

LEGEND

Concentration (Range)
Number of Samples
Type of Sample

ND - Not Detected
NM - Not Quantifiable

G - Grab Sample
C - Composite
U - Unknown
* - Not Reported

	4-Nitrophenol	2,4-Dinitrophenol	4,6-Dinitro-O-Cresol	Pentachlorophenol	Phenol	Bis (2-Ethylhexyl) Phthalate	Di-N-Butyl Phthalate	Diethyl Phthalate	Anthracene	Tetrachloroethylene	Toluene	Trichloroethylene	Vinyl Chloride	Aldrin
Consolidated Papers (Appleton Division) Appleton, Wis.				<10	<10	<10	ND				<10			
				1	1	1	1				1			
				C	C	C	C				G			
Midtec Paper Corporation Kimberly, Wis.				<10		<10–30					<10			
				3		3					3			
				C		C					G			
Proctor & Gamble Green Bay, Wis.					0.2–1.4		0.2–0.4	0.5–2.8			3.4–5.7			
					3		3	3			3			
					C		C	C			G			
Thilmany Pulp & Paper Kaukauna, Wis.														
Riverside Paper Corp. Appleton, Wis.						<10–10	<10			<1–64	<5	<1–54		
						4	4			4	4	4		
						U	U			U	U	U		
Kimberly-Clark (Lakeview) Town of Menasha, Wis.										<1		2.3–29		
										2		2		
										G		G		
Kimberly-Clark (Neenah & Badger Globe) Neenah, Wis.										<1		<1		
										2		2		
										G		G		
Unidentified Secondary Fiber Mill										1–10	1.8–100	1.6–10		
										3	3	3		
										C	C	C		
Green Bay Packaging Green Bay, Wis.	<10	<20	<10	ND–<10	150–400									
	1	1	1	3	3									
	G	G	G	G	G									
Appleton Papers (Locks Mill) Combined Locks, Wis.				ND									<.05–<1	<.05–
				3									4	
				C									U	
Nicolet Paper Co. DePere, Wis.						<10–120	<10			<10	<10			
						3	3			3	3			
						C	C			G	G			
American Can Co. Green Bay, Wis.				<1–<10	6–11						4–6	<1	<1–<50	<1
				3	3						3	3	3	3
				C	C						C	C	C	C
Unidentified Secondary Fiber Mill				27–38	ND	ND–5	ND–12		ND		ND–1	ND		
				3	1	4	3		1		2	1		
				C	C	C	C		C		G	G		

p and Paper Mills Located on the Lower Fox River, Wisconsin[8]

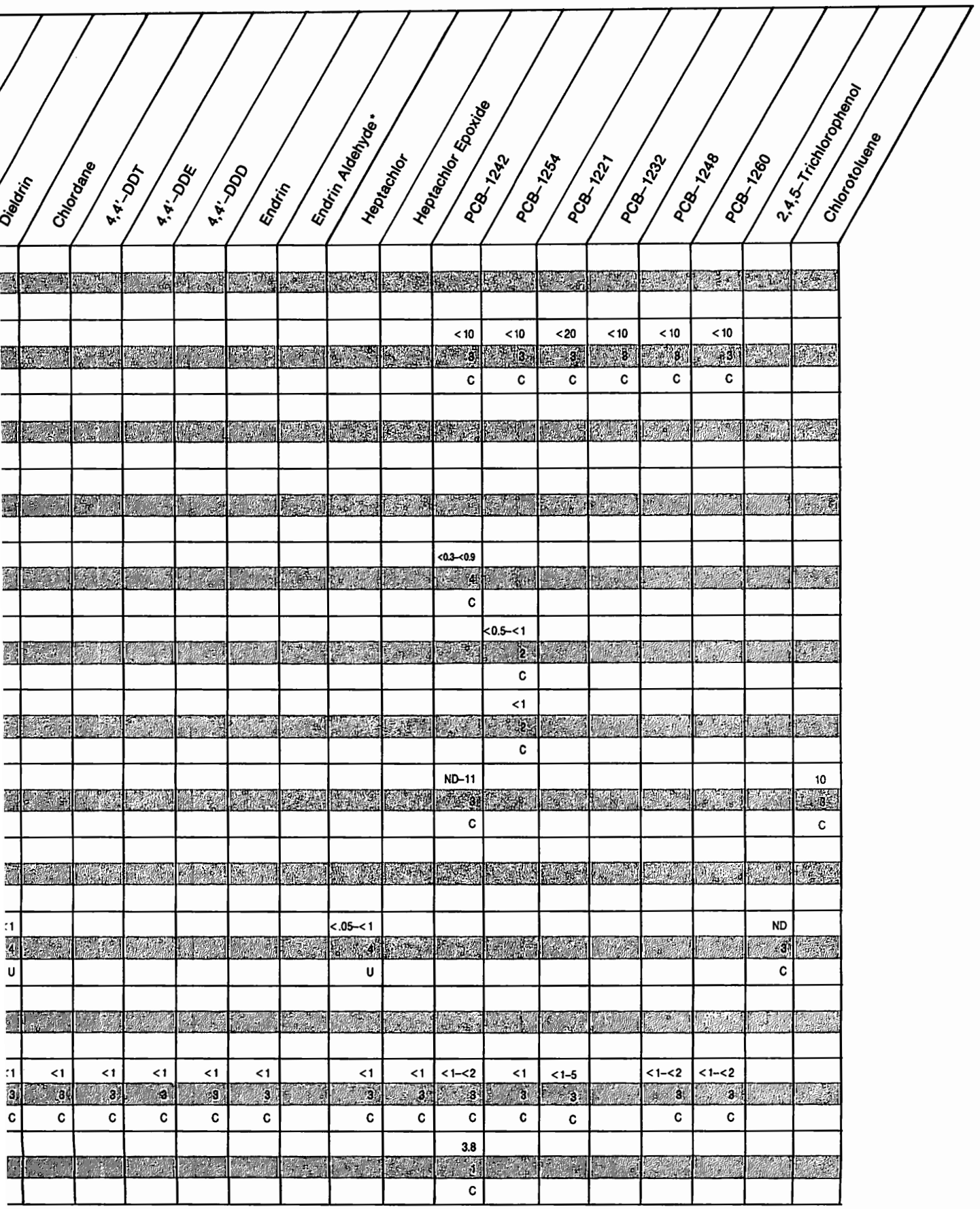


Table 3-9 (Continued) Concentrations of Selected Pollutants in the Final Effluents of Pu

(All concentrations in ug/L unless specified.)

LEGEND

Concentration (Range)
Number of Samples
Type of Sample

ND - Not Detected
NM - Not Quantifiable
G - Grab Sample
C - Composite
U - Unknown
* - Not Reported

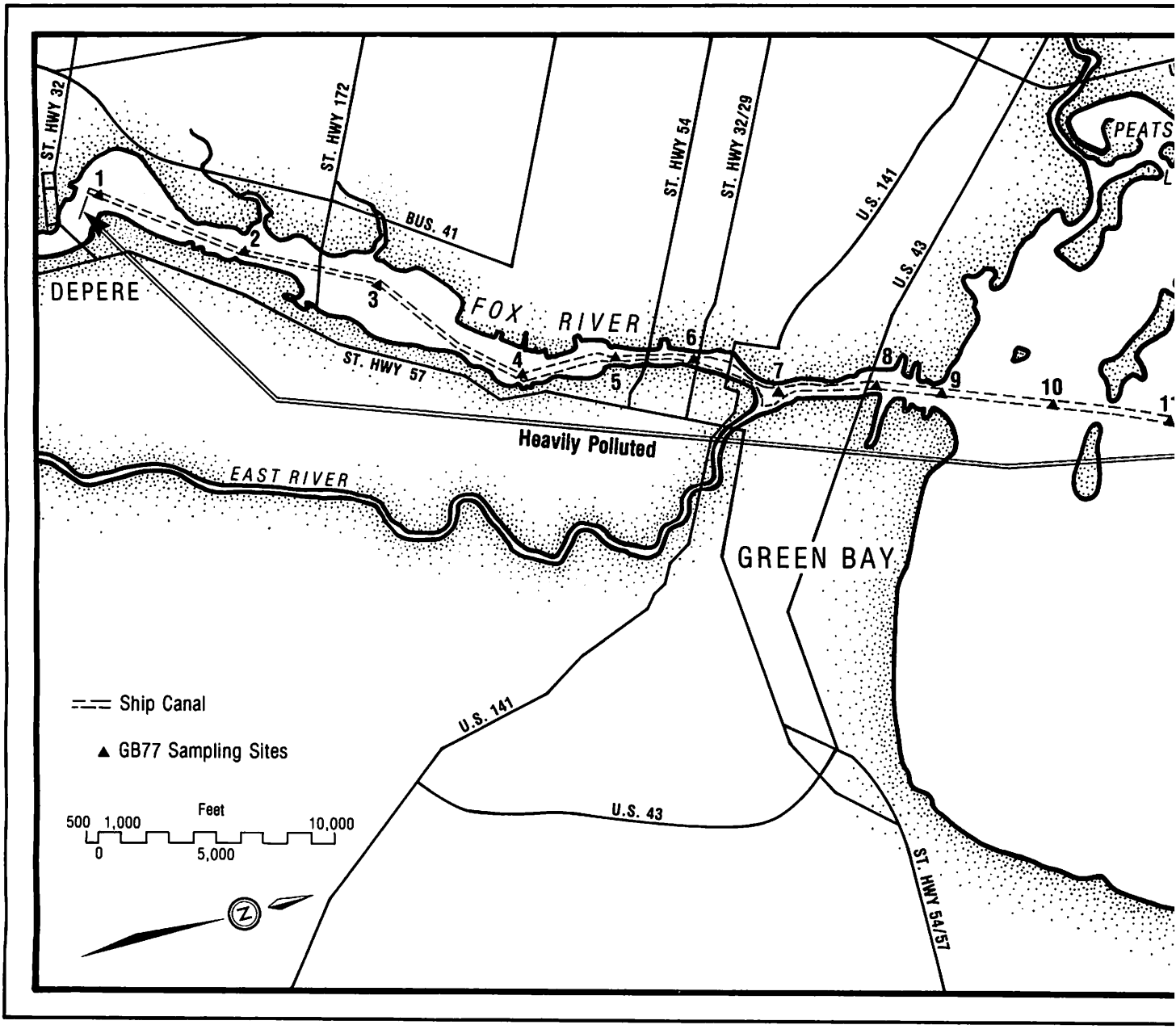
	PCB–1016	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Cyanide	Lead	Mercury	Nickel	Selenium	Silver	Thallium
Consolidated Papers (Appleton Division) Appleton, Wis.														
Midtec Paper Corporation Kimberly, Wis.	< 10 3 C												< 100 3 C	
Proctor & Gamble Green Bay, Wis.			14–61 3 C		< 10 3 C	10–20 3 C	11–19 3 C				< 80 3 C			
Thilmany Pulp & Paper Kaukauna, Wis.														
Riverside Paper Corp. Appleton, Wis.														
Kimberly–Clark (Lakeview) Town of Menasha, Wis.						< 5 2 C	6–16 2 C		< 5–6 2 C		< 5 2 C			
Kimberly–Clark (Neenah & Badger Globe) Neenah, Wis.						< 5 2 C	< 5–6 2 C		< 5–6 2 C		< 5–7 2 C			
Unidentified Secondary Fiber Mill	ND–3.6 3 C							23–100 3 C						
Green Bay Packaging Green Bay, Wis.														
Appleton Papers (Locks Mill) Combined Locks, Wis.					< 20–< 30 4 U	< 25 4 U	< 30 4 U		< 20 4 U	< 0.5–1 4 U	< 50–320 4 U			<
Nicolet Paper Co. DePere, Wis.														
American Can Co. Green Bay, Wis.		ND 3 C	ND–7 3 C	ND 3 C	ND–10 3 C	ND 3 C	ND–10 3 C	ND 3 C	ND–50 3 C	ND–0.1 3 C	ND 3 C		ND 3 C	ND 3 C	2
Unidentified Secondary Fiber Mill		< 1 1 C	< 2 1 C	< 1 1 C	2 1 C	6–20 4 C	12–50 4 C	< 10–200 4 C	< 1–22 4 C	< 0.5–4.3 4 C	< 2–12 4 C	< 2 1 C	< 1 1 C	< 2 1 C	5

lp and Paper Mills Located on the Lower Fox River, Wisconsin[8]

Zinc	Abietic Acid	Dehydroabietic Acid	Isopimaric Acid	Pimaric Acid	Oleic Acid	Linoleic Acid	Linolenic Acid	9,10-Dichlorostearic Acid	Monochlorodehydroabietic Acid	Dichlorodehydroabietic Acid	3,4,5-Trichloroguaiacol *	Tetrachloroguaiacol	Xylene	Palmitic Acid	Stearic Acid
	258	382	64	17	13	ND	83		469						
	1	1	1	1	1	1	1		1						
	C	C	C	C	C	C	C		C						
	50–250	<30	<20	<20	<150	<150					<20	<10			
	3	3	3	3	3	3	4				3	3			
	C	C	C	C	C	C					C	C			
					<10										
					3										
					C										
	40–80	20–80	<20–100	<20–30	60–260	<20–70	<20–40								
	3	3	3	3	3	3	3								
	G	G	G	G	G	G	G								
	30–320	510–3710	<10–200	200–230	40–60	20–80	<10								
	4	4	4	4	4	4	4								
	C	C	C	C	C	C	C								
7–14	<10	160				25									
2	1	1				1									
C	C	C				C									
6–12		<10					<10	<10							
2		1					1	1						0	
C		C					C	C							
	<10–30	<10–200	<10–30	<10	50–540	20–380	<10–10								
	3	3	3	3	3	3	3								
	C	C	C	C	C	C	C								
0–63	20–70	40–140	<20–20	<10–<20	20–30	30–90	<10–<20								
4	3	3	3	3	3	3	3								
U	C	C	C	C	C	C	C								
	<50	<30													
	3	3													
	C	C													
0–40		1–7			ND–12	ND	ND							15–34	7–24
3		6			6	6	6							6	6
C		C			C	C	C							C	C
1–82	ND–140	ND–630		ND	ND–750	ND			ND–26				16		
1	4	4		1	4	1			3				1		
C	C	C		C	C	C			C				C		

Figure 3-1 Sediment Sampling Sites – Lower Fox River and Green Bay Harbo

(Data in Table 3-10)



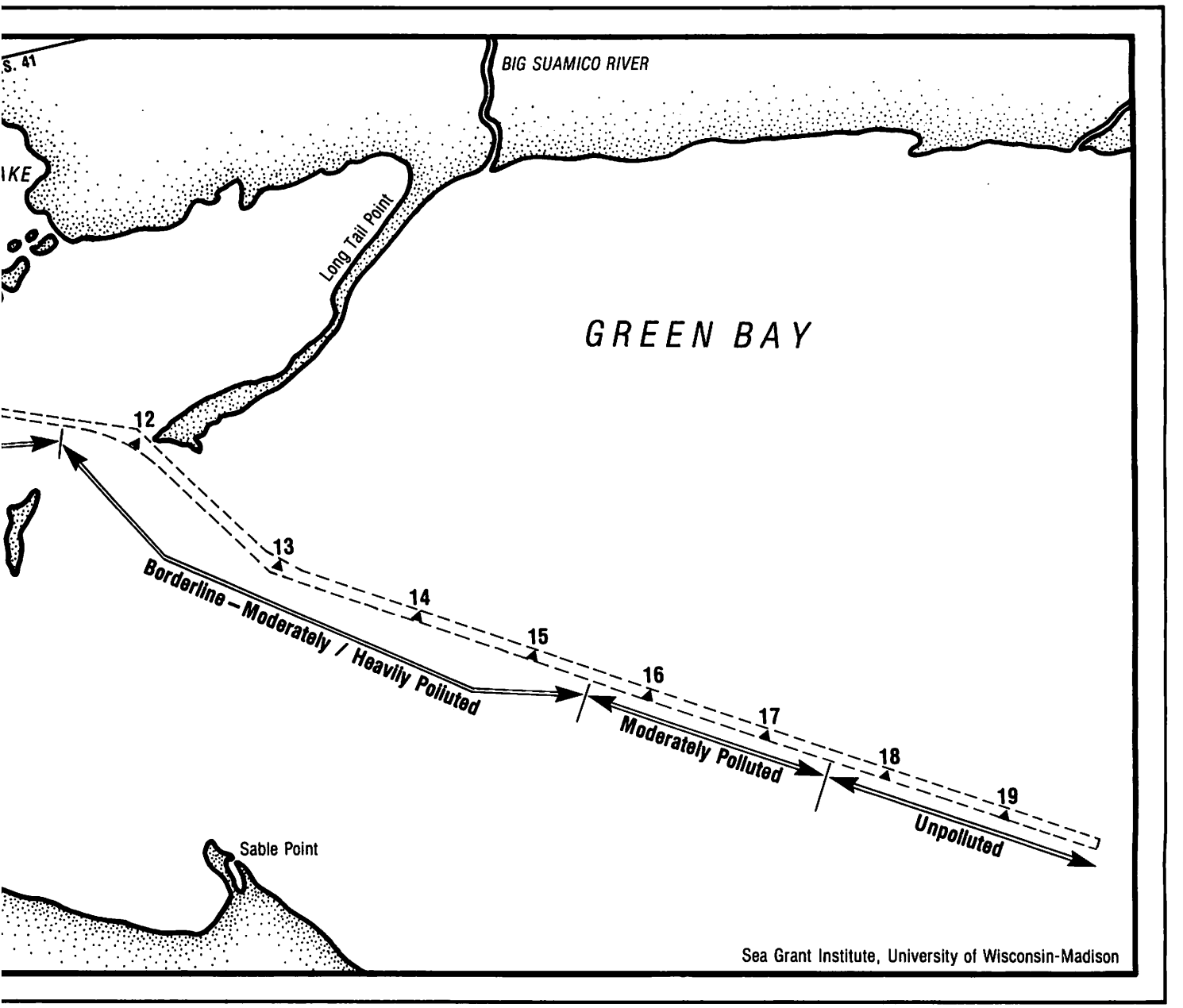

BIG SUAMICO RIVER
Long Tail Point
GREEN BAY
12
13
14
15
16
17
18
19
Borderline – Moderately / Heavily Polluted
Moderately Polluted
Unpolluted
Sable Point
Sea Grant Institute, University of Wisconsin-Madison

Table 3-10

Bulk Sediment Chemistry PCB and Pesticide Analysis[5] Lower Fox River and Green Bay Harbor – October 1977
(see Figure 3-1)

COMPOUND	SAMPLE SITES																			
	GB77-1	GB77-2	GB77-3	GB77-4	GB77-5	GB77-5/ Rep.	GB77-6	GB77-7	GB77-8	GB77-9	GB77-10	GB77-11	GB77-12	GB77-13	GB77-14	GB77-14/ Rep.	GB77-15	GB77-16	GB77-17	GB77-18	GB77-19
Hexachlorobenzene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
beta Benzenehexachloride	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Lindane	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Treflan	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Aldrin	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Isodrin	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Heptachlor Epoxide	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
gamma Chlordane	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
o,p–DDE	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
p,p'–DDE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
o,p–DDD	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
o,p–DDT	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
p,p'–DDD	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	•		•	•	•	•	•	•	•	•	•	•
p,p'–DDT	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Methoxychlor	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Mirex	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
2,4–D, Isopropyl Ester	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Endosulfan I	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Dieldrin	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Endrin	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	•	•	•	•	•	•	•	•	•	•	•
Endosulfan II	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
DCPA	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Tetradifon	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Aroclor 1016 (1242)	10.110	0.630	4.160	9.140	7.440	5.700	6.370	0.980	2.770	3.730	2.200	1.880	0.390	1.180	0.660	1.130	1.710	1.040	1.590	0.300	0.160
Aroclor 1248	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Aroclor 1254	1.450	0.040	0.580	0.680	0.450	0.320	0.820	0.290	0.540	0.350	0.400	0.360	0.080	0.250	0.110	0.190	0.350	0.170	0.110	0.020	•
Aroclor 1260	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Total PCB	11.560	0.670	4.740	9.820	7.890	6.020	7.190	1.270	3.310	4.080	2.600	2.240	0.470	1.430	0.770	1.320	2.060	1.210	1.700	0.320	0.160
Mercury	7.4	<0.1	1.4	1.0	0.6	0.6	0.7	0.2	0.9	1.3	<0.1	0.6	0.3	0.7	0.1	<0.1	<0.1	0.5	0.4	<0.1	<0.1

*Means concentration was less than 0.01 mg/kg

All units in mg/kg (dry weight).

Table 3-11

PCB Concentrations in Fox River and Lower Green Bay Sediment[1]
(see Figure 3-2)

	Station No. and Location	Collection Date	PCB (mg/kg) (dry weight)	Other Compounds* (mg/kg)
1.	Menasha Channel	05/23/77	<0.05	
2.	Directly below Bergstrom	05/23/77	1.4	
3.	300 yards below Bergstrom	05/23/77	61.0	DHA - 2.7 PCP - 0.22
4.	Little Lake Butte des Morts CNWRR Bridge	05/23/77	1.3	
5.	Little Lake Butte des Morts CNWRR Bridge	11/24/76	5.5	
6.	Little Lake Butte des Morts outlet	05/23/77	21.0	
7.	Appleton Yacht Club	11/24/76	8.2	
8.	Above lower Appleton Dam	05/23/77	9.0	
9.	Below Consolidated	05/23/77	1.2	
10.	One mile below Consolidated	06/22/77	3.6	
11.	Above Kimberly Dam below Midtec	05/23/77	0.9	
12.	Above lower Little Chute Dam	05/23/77	5.1	
13.	Below Thilmany Paper	06/04/77	4.8	
14.	Above Rapide Croche Dam	06/04/77	5.8	PCP - 0.22
15.	Above Little Rapids Dam	06/04/77	5.0	PCP - 0.28
16.	Above DePere Dam	06/22/77	0.18	
17.	Across from Ft. Howard outfall	05/23/77	0.96	
18.	Below Ft. Howard, CNWRR bridge	05/23/77	18.3	
19.	Near mouth of East River	05/24/77	13.0	
20.	Above Green Bay STP near mouth	05/24/77	2.1	
21.	Below Green Bay STP outfall	11/24/76	38.0	
22.	Green Bay	05/24/77	7.5	
23.	Green Bay	05/24/77	7.2	
24.	Green Bay	05/24/77	4.7	
25.	Green Bay	05/24/77	0.12	
26.	Green Bay	05/24/77	1.8	
27.	Green Bay	05/24/77	0.46	
28.	Green Bay	05/24/77	5.6	
29.	Green Bay	05/24/77	<0.05	
30.	Green Bay	05/24/77	11.0	
31.	Green Bay	05/24/77	2.6	
32.	Green Bay	05/24/77	<0.05	
33.	Green Bay	05/24/77	0.02	
34.	Green Bay	05/24/77	0.075	

*DHA = Dehydroabietic Acid
PCP = Pentachlorophenol

Figure 3-2

Sediment Sampling Sites – Fox River and Lower Green Bay
(Data in Table 3-11)

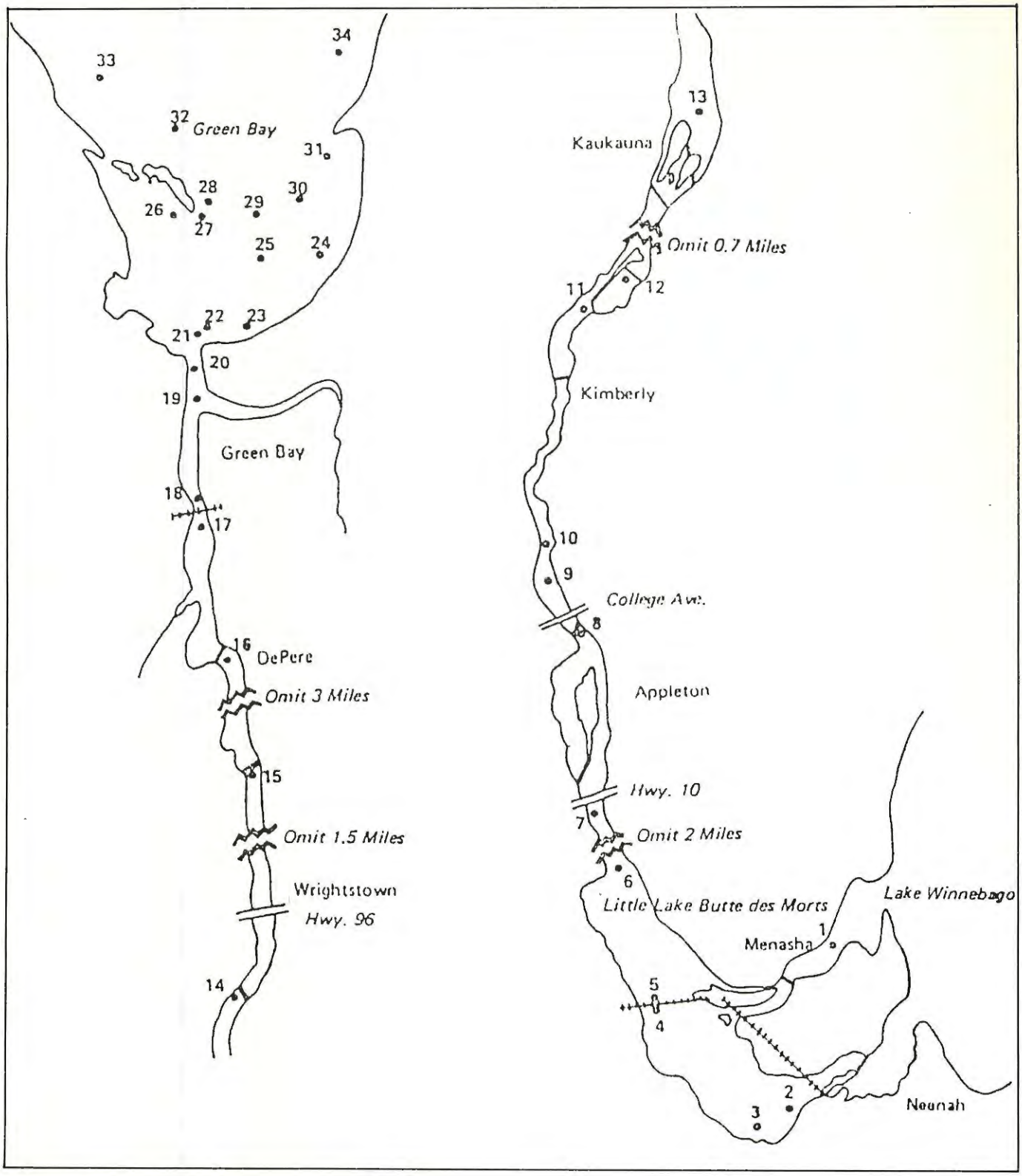


Table 3-12

Lower Fox River and Lower Green Bay Fish Contaminant Data[6,7]

Sample Location	Date	Species	Quantity	Form	Length (mm)	% Fat	PCB** (mg/kg)	Other Chloro-organics or metals (mg/kg)
Little Lake Butte Des Morts	2/76	Yellow Perch	05	F	133	0.4	0.8	
			05	F	152	0.2	0.6	
			05	F	152	0.4	0.8	
			05	F	203	0.2	0.9	
	6/76	Carp	03	F	508	7.9	26.0	
			02	F	279	5.9	12.0	
			03	F	391	6.7	24.0	
			03	F	615	15.9	39.0	
	8/76	Brown Bullhead	04	F	257	5.9	5.2	
			04	F	213	13.6	6.0	
		Green Sunfish	02	EP	170	3.1	2.4	
		Yellow Perch	05	F	203	0.7	1.4	
			05	EP	147	1.1	1.3	
		Walleye	05	F	368	0.6	1.7	
			05	F	262	0.3	1.2	
		White Bass	03	EP	325	6.5	9.8	
			03	EP	193	3.2	9.3	
	4/77	*Northern Pike	01	F	688	0.5	2.4	Pentachloroanisole<0.005
			01	F	770	0.8	2.3	Pentachloroanisole 0.020
		*Walleye	01	F	412	1.5	1.8	Pentachloroanisole 0.060
		*Carp	01	F	424	2.4	5.2	Pentachloroanisole 0.036
		Carp	01	F	406	1.2	2.7	
			01	F	445	1.7	10.0	
			01	F	406	2.0	4.3	
			01	F	470	2.3	13.0	
			01	F	546	4.6	16.0	
			01	F	584	5.4	28.0	
			01	F	558	5.8	30.0	
			01	F	508	6.1	18.0	
			01	F	533	6.1	20.0	
			01	F	570	9.0	39.0	
			05	WF	519	12.5	50.0	
	5/77	Carp	05	WF	519	10.6	41.0	
			05	WF	493	9.2	35.0	
			01	F	570	9.0	39.0	
	8/78	Brown Bullhead	05	WF	203	5.8	4.4	
			05	WF	229	5.0	4.1	
			05	WF	191	5.0	3.8	
			05	WF	216	5.2	3.1	
			05	WF	203	4.7	3.6	
		Carp	01	F	640	6.3	16.0	
			01	F	457	8.1	8.9	
			01	F	356	3.3	3.3	
			01	F	447	4.2	3.4	
			01	F	325	2.2	1.8	
		Northern Pike	01	F	610	2.2	6.0	
			01	F	541	1.7	2.8	
			01	F	432	2.9	1.6	
		White Sucker	01	F	455	2.9	3.5	
			01	F	417	5.5	3.6	
	8/78	White Sucker	01	F	419	4.7	2.7	
			01	F	399	10.0	5.0	
			01	F	386	5.2	9.2	
		Walleye	01	F	340	6.4	2.7	
			01	F	318	2.1	3.6	
		Yellow Perch	05	WF	173	3.1	1.8	
			05	WF	165	3.9	3.5	
			05	WF	203	3.3	2.0	
			05	WF	191	3.4	2.2	
			05	WF	178	3.2	1.8	
	9/78	Carp	03	WF	533	11.4	17.0	
		White Sucker	05	WF	406	7.4	9.6	
		Walleye	05	WF	404	6.9	7.9	

FORM
F — Fillet
WF — Whole Fish
EP — Edible Portion

*Fish samples were screened for compounds other than PCBs.
**Quantitated by matching to the nearest Aroclor or Aroclor mixture.

Table 3-12 (Continued)

Lower Fox River and Lower Green Bay Fish Contaminant Data[6,7]

Sample Location	Date	Species	Quantity	Form	Length (mm)	% Fat	PCB** (mg/kg)	Other Chloro-organics or metals (mg/kg)
Little Lake Butte Des Morts (continued)	8/79	Brown Bullhead	10	F	236	4.7	1.3	
		Northern Pike	02	F	597	0.9	1.0	
		Walleye	03	F	389	2.7	1.4	
		Yellow Perch	10	F	224	3.0	0.3	
			15	F	180	1.1	0.6	
		*Northern Pike	03	WF	592	3.1	6.8	Mercury 0.22 Copper 0.70 p,p'DDE 0.06
		*White Sucker	04	WF	394	3.2	2.5	Chromium 0.50 Mercury 0.08 Copper 2.90
Kaukauna	8/78	Carp	01	F	432	10.5	57.0	
			01	F	450	6.7	26.0	
			01	F	485	5.2	17.0	
			01	F	523	1.3	38.0	
			01	F	429	6.1	22.0	
		Northern Pike	01	F	584	4.7	11.0	
		Yellow Perch	03	WF	152	0.7	3.5	
	6/79	Brown Bullhead	03	F	224	4.2	2.7	
		Carp	05	F	439	3.0	11.0	
		Northern Pike	02	F	490	0.6	1.0	
		White Sucker	04	F	333	1.8	1.4	
		Walleye	04	F	394	4.9	8.0	
		Yellow Perch	01	F	277	0.4	<0.2	
DePere (below dam)	5/77	Bowfin	01	F	648	0.4	0.5	
		Carp	01	WF	259	6.9	4.4	
			01	WF	325	1.6	6.6	
			01	WF	376	8.8	90.0	
			01	F	439	0.7	2.5	
		Northern Pike	01	F	498	1.0	3.0	
			01	F	531	0.7	3.2	
			01	F	455	0.5	2.5	
		White Sucker	01	F	432	2.3	4.2	
			01	F	429	0.6	1.4	
			01	F	483	0.6	2.5	
		*White Sucker	01	F	483	1.0	2.3	Dieldrin 0.008
		White Sucker	01	F	452	1.8	3.2	
			01	F	381	1.0	4.4	
		Walleye	01	F	330	4.9	4.5	
			01	F	452	2.6	6.8	
		Yellow Perch	05	F	203	1.0	1.0	
			04	WF	173	2.8	6.6	
			05	WF	185	3.2	5.4	
			05	F	196	2.6	5.3	
	8/78	Carp	05	WF	483	13.2	65.0	
			05	WF	406	6.2	14.0	
		Walleye	05	WF	457	10.0	25.0	
	9/78	Chinook Salmon Eggs				10.0	11.0	
		Chinook Salmon	01	F	871	4.2	9.4	
			01	F	914	5.8	12.0	
			01	F	876	4.3	9.1	
	4/79	*Carp	05	WF	518	9.0	17.0	Mercury 0.12 Copper 1.50 p,p'DDE 0.50
		*White Sucker	03	WF	387	3.6	5.9	Chromium 0.50 Mercury 0.12 Copper 2.10 p,p'DDE 0.14
		*Walleye	02	WF	401	10.0	16.0	Chromium 0.50 Mercury 0.14 Copper 1.80 Dieldrin 0.03 p,p'DDE 0.34

FORM	
F	— Fillet
WF	— Whole Fish
EP	— Edible Portion

*Fish samples were screened for compounds other than PCBs.
**Quantitated by matching to the nearest Aroclor or Aroclor mixture.

Table 3-12 (Continued)

Lower Fox River and Lower Green Bay Fish Contaminant Data[6,7]

Sample Location	Date	Species	Quantity	Form	Length (mm)	% Fat	PCB** (mg/kg)	Other Chloro-organics or metals (mg/kg)
DePere (below dam) (continued)		Walleye	01	F	386	1.3	3.7	
			01	F	434	2.6	3.3	
			01	F	290	1.4	3.3	
			06	F	239	2.6	1.5	
			02	F	305	3.3	3.2	
Fox River Mouth	10/79	*Carp	05	WF	460	11.0	5.8	Mercury 0.10 Alpha BHC 0.01 Copper 1.30 p,p'DDE 0.50
		*Walleye	05	WF	381	11.0	16.0	Mercury 0.14 p,p'DDE 0.06 Alpha Chlordane (Cis) 0.05 Trans-Nonachlor 0.05 Alpha BHC 0.01 Copper 0.80 Dieldrin 0.03 p,p'DDE 0.46
	4/79	*Yellow Perch	10	WF	178	3.2	8.4	Mercury 0.04 Copper 0.80 p,p'DDE 0.12
		*Brown Bullhead	05	WF	211	1.3	3.1	Mercury 0.06 Copper 0.90 p,p'DDE 0.10
			06	WF	213	2.3	5.4	Mercury 0.05 Copper 1.40 p,p'DDE 0.13
		*Carp	04	WF	439	11.0	6.1	Mercury 0.15 p,p'DDD 0.07 Alpha BHC 0.01 Copper 0.90 p,p'DDE 0.52
Lower Green Bay (Grid 1001)	4/77	Lake Whitefish	01	F	533	11.8	17.3	
		*Alewife	05	WF	187	4.4	7.4	Mercury 0.09 p,p'DDD 0.09 Copper 1.10 Dieldrin 0.05 p,p'DDE 0.63
		*Brown Bullhead	05	WF	231	2.9	8.5	Mercury 0.04 Copper 1.40 p,p'DDE 0.16 Gamma BHC 0.02
		*Carp	05	WF	366	8.0	5.9	Mercury 0.11 p,p'DDD 0.05 Copper 1.80 p,p'DDE 0.18
		*White Sucker	01	WF	269	6.0	4.4	Mercury 0.05 Copper 1.00 p,p'DDE 0.11
		*Yellow Perch	05	WF	165	7.5	8.5	Mercury 0.03 Copper 1.00 p,p'DDE 0.12 Gamma BHC 0.04

FORM
F — Fillet
WF — Whole Fish
EP — Edible Portion

*Fish samples were screened for compounds other than PCBs.
**Quantitated by matching to the nearest Aroclor or Aroclor mixture.

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4. Nonpoint Pollution Considerations

The contributions of organic pollutants to the aquatic environment from nonpoint sources is becoming better documented. For instance, it is known that the agricultural use of pesticides and herbicides can lead to runoff containing these compounds. The use of pesticides by highway departments and the U.S. Forest Service is another potential source. Organic chemical use by these agencies is known, and the existence of these chemicals in the aquatic environment is not a surprise. Other sources of organic pollutants exist, such as runoff or leachate from landfills and sludge disposal sites. These can effect both surface and ground waters.

The use of pesticides and herbicides in the Lower Fox River Basin has been documented in a report prepared by the Lower Fox Valley Water Quality Planning Agency.[1] Pesticide data collected by the WDNR[2] indicate no elevated levels of chlorinated pesticides in fish from the Lower Fox River. Therefore, nonpoint runoff of persistent pesticides apparently is not a major problem in the basin. Yet the monitoring of biota for pesticides should continue since the types of chemicals used, their application levels and the time of year they are applied varies from year to year.

The contribution of organic pollutants to the aquatic environment from sludge disposal sites and landfills is not well documented in Wisconsin. A pulp and paper mill sludge analysis appears in Table 4-1, and Figure 4-1 shows the PCB content of a different paper mill's sludge from 1977 to 1980. The data indicate that PCBs are present in sludges from some pulp and paper mills. It has been shown that PCB levels in effluent will decline as suspended solids removal increases.[3] This is explained by a partitioning effect, where PCBs become attached to sludge particles in waste treatment processes and are removed from effluents and disposed of through sludge disposal. It is suspected that other organic pollutants exhibiting behavior similar to PCBs will also be partially removed from the wastewater to the sludge. Heavy metals also exist in industrial and municipal sludges (Tables 4-1 and 4-2). Recent heavy metals data for fish from the Lower Fox River do not indicate hazardous levels of these compounds.[2] However, since sludges do contain a variety of potentially hazardous pollutants, they must be landfilled in a manner such that nonpoint runoff as well as leaching into ground water does not occur.

On a global scale, the atmosphere is a major transport route of PCBs.[4,5] In drainage basins that have a high water-to-land ratio, atmospheric input can be a major source of PCBs. The Lake Michigan drainage basin is an example.[6,7] However, in the Lower Fox River drainage basin, the ratio of water surface to land area is relatively small.[8] Here, the amount of PCBs entering the water column directly from the atmosphere should be very small.

Snowmelt samples collected in the Fox-Wolf drainage basin showed very low concentrations (less than 0.2 ug/L) of PCBs in 2-2.5 liters of snowmelt.[3] From these data -- and considering the small water-to-land ratio in the Lower Fox River Basin -- it can be assumed that the input of PCBs from the atmosphere directly to the water is insignificant when compared to industrial and municipal effluents that have and continue to discharge PCBs.

Table 4-1

Lakeview Mill Sludge Analyses*

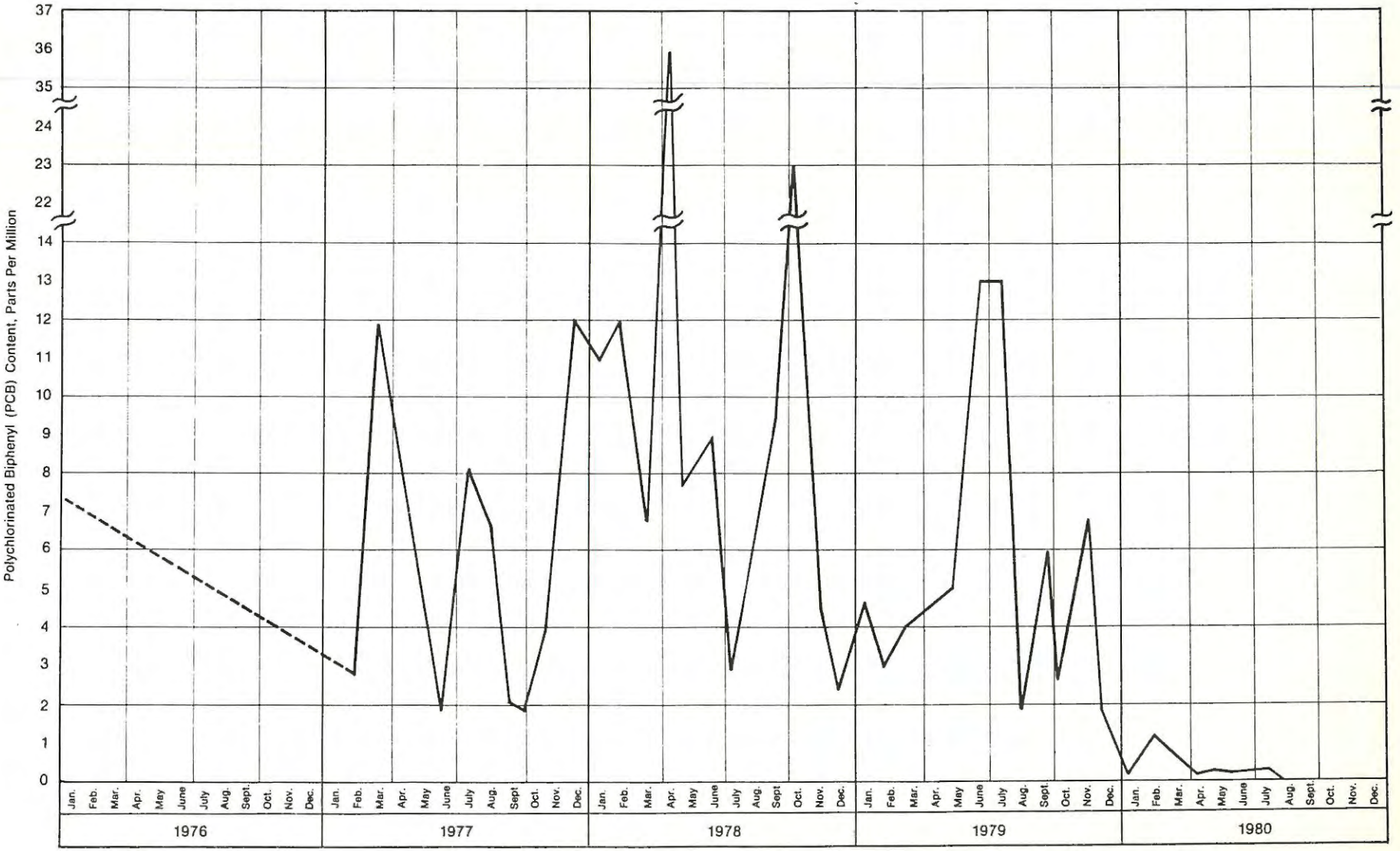
	Percentage
Ash Solids	15
Volatile Solids	85
Total Organic Carbon	40
Total Nitrogen	0.174
Organic Nitrogen	0.170
Ammonia Nitrogen	0.002
Nitrate & Nitrite	0.002
	mg/kg
Total Phosphorus	970
Potassium	280
Sulfate	200
Calcium	1420
Magnesium	870
Iron	1780
Chloride	<2,000
Zinc	32
Copper	160
Nickel	11
Lead	13
Cadmium	<1
Manganese	12
Mercury	0.2
Arsenic	0.2
Aluminum	24,000
Barium	3
Cobalt	11
PCBs	1

*All analyses are on a dry weight basis except PCBs, which are on a liquid sludge basis.

From: Investigation of the Nature and Quantities of Toxic and Nonconventional Pollutants Associated with WPDES Permit WI-0000680-2 (Lakeview Mill), December 1979.

Figure 4-1

PCB Content of Mill Sludge



From: Preliminary study for P. H. Glatfelter Co., Bergstrom Division, Neenah, Wis., on the impact of Bergstrom's landfills on groundwater in Winnebago County, February 1981.

Table 4-2

Concentrations of Metals In the Influent, Effluent and Final Digested Sludge From Selected Wisconsin Sewage Treatment Plants

	Chromium			Copper			Lead			Zinc			Cadmium			Mercury			Nickel		
	I*	E*	S*	I	E	S	I	E	S	I	E	S	I	E	S	I	E	S	I	E	S
Appleton	0.32	1.4	5,400	0.13	0.056	1,200	0.28	0.08	3,300	0.88	0.08	3,600	0.008	0.016	13	0.0005	0.0005	11.5	0.04	0.08	15
Beaver Dam	0.1	0.02	690	0.04	0.02	370	0.1	0.05	440	0.2	0.04	1,500	0.02	0.02	15	0.0005	0.0005	2.7	0.28	0.2	950
DePere	0.12	0.08	1,250	0.012	0.028	400	0.08	0.08	700	0.8	0.34	4,100	0.008	0.008	37	0.0008	0.0003	5.9	0.04	0.04	20
Fond du Lac	14.0	1.8	32,000	0.13	0.04	350	0.3	0.1	990	0.42	0.08	1,550	0.09	0.03	40	0.0013	0.0005	5.8	0.12	0.12	90
Green Bay MSD	0.20	0.12	290	0.06	0.044	440	0.20	0.16	300	0.38	0.18	1,920	0.010	0.008	13	0.0007	0.0005	2.4	0.14	0.12	110
Kaukauna	0.08	0.03	640	0.56	0.02	1,300	0.2	0.08	2,200	0.18	0.09	1,400	0.02	0.008	10	0.08	0.0005	3.6	0.08	0.04	20
Madison MSD	0.08	0.06	350	0.08	0.025	670	0.08	0.08	410	0.37	0.12	4,200	0.008	0.008	22	0.013	0.0005	17.5	0.04	0.04	55
Milwaukee MSD																					
Jones Is.	2.1	0.1	7,400	0.07	0.05	500	0.16	0.08	850	1.0	0.16	3,400	0.06	0.02	185	0.006	0.0008	—	0.12	0.05	140
S. Shore	5.6	1.5	16,000	0.48	0.36	270	0.3	0.08	1,350	0.68	0.2	2,900	0.02	0.02	15	0.001	0.0008	2.5	0.2	0.1	340
Neenah-Menasha	0.16	0.05	70	0.11	0.15	140	0.2	0.1	200	0.32	0.2	490	0.01	0.01	12	0.0015	0.001	7.3	0.05	0.05	25
N. Fond du Lac	3.6	2.9	8,500	0.11	0.10	1,780	0.006	0.004	680	0.56	0.48	4,200	0.002	0.002	30	0.005	0.004	18.0	3.0	2.6	7,500
Oshkosh	0.2	0.06	310	0.04	0.02	176	0.1	0.1	190	0.2	0.08	1,200	0.01	0.01	7	0.0005	0.0005	2.4	0.04	0.04	15

*I = Influent (concentration expressed as mg/L) Wastewater
E = Effluent (concentration expressed as mg/L) Wastewater
S = Sludge (concentration expressed as mg/kg dry weight)

From: "Survey of Toxic Chemicals Use and Distribution—Characterization of Nonpoint Waste Sources," 1977.

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5. The Pulp and Paper Industry on the Lower Fox River

The State of Wisconsin has 52 pulp and paper mills. Nationally, it ranks second in the number of mills (Figure 5-1) and ranks first in total production of paper products.[1] More specifically, the Fox River Valley accounts for nearly 40% of the state's daily production capacity from pulp, paper and paperboard mills (Table 5-1).

Water pollution legislation in the early 1970s enabled federal and state agencies to set effluent guidelines for industries and municipalities. In a few cases, noncompliance by industry and municipalities prompted the USEPA and the WDNR to initiate a series of enforcement actions.[2] Since the implementation of water pollution legislation, specifically PL 92-500, the Lower Fox River has shown improvement in terms of dissolved oxygen levels and, conversely, a reduction in the biochemical oxygen demand.[3,4] This progress has been expensive for both industries and municipalities. Industries alone have spent $220 million on technology to clean their effluents.[5] This has meant the internalization of what used to be externalities to the pulp and paper industry and other industries along the river as well. Now, with increased awareness of toxic chemicals in the environment, the industries along the Lower Fox River and elsewhere may be subject to even more governmental regulation. But before these regulations can be properly imposed on any industry, more knowledge is needed regarding organic chemicals and their possible toxicity.

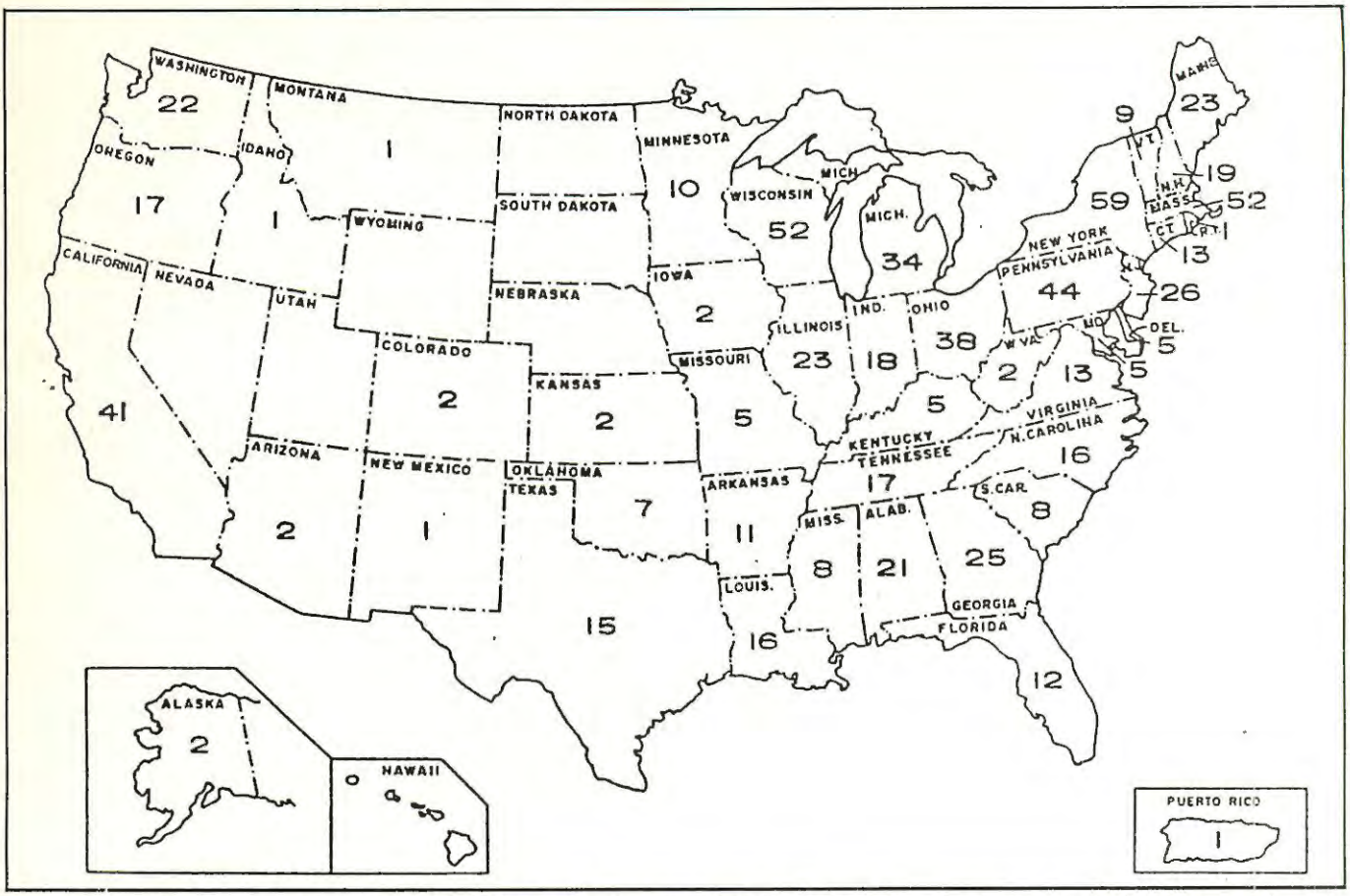
Toxic chemicals may be introduced to the aquatic environment in a variety of ways. They may come directly from chemical usage; for example, phenolic compounds used in slimicides and biocides. An indirect source is the recycling of paper products. Such is the case with PCBs, which were used in making of carbonless copy paper and, when recycled, were released to the aquatic environment.[6] Toxic compounds may also be formed through chemical alteration during a production process; the reaction products of chlorination are an excellent example. Chlorine is widely used as a bleaching agent and lignin breakdown chemical by the pulp and paper industry. As a class, lipophilic chlorinated compounds bioaccumulate in aquatic organisms.[7] Also, it has been found that chlorination of many organic compounds often present in water sources -- especially phenols and their derivatives -- produce a postive Ames test for mutagenicity,[8,9,10] so a knowledge of process streams using chlorine in the pulp and paper industry is very important.

The industrial subcategorization discussed in the following section is based on that described by the E.C. Jordan Company of Portland, Maine.[11] These subcategories were developed to assist the USEPA in establishing effluent guidelines for relatively homogeneous groups of mills within the United States. Ultimately, the revised industry subcategorization should enable effluent discharge levels for selected priority pollutants to be set for each particular subcategory.

The industry has been divided into four major categories: (A) integrated mills, (B) secondary fiber mills, (C) nonintegrated mills and (D) miscellaneous. These are further divided into subcategories (Table 5-2).

Figure 5-1

Location of Operating Mills in the Industry



From: Development Document for Effluent Limitations Guidelines and Standards for the Pulp, Paper and Paperboard and the Builders' Paper and Board Mills, December 1980.

Table 5-1

Number and Daily Capacity of Wisconsin Paper Mills*

	Wisconsin		Fox River Valley	
	Number	Daily Capacity (tons)	Number	Daily Capacity (tons)
Pulp Mills	52	7,965	15 (29%)	2,942 (36%)
Wood	26	5,335	7	1,487
Recycled	21	2,550	5	1,385
Rag	5	80	3	40
Paper and Paperboard Mills	52	11,917	19 (37%)	5,084 (43%)

*Compiled from Lockwood's Directory (1979).

Integrated mills are those where pulp is produced and processed into pulp bales, paper or paperboard at the same location. Of major concern for integrated mills in terms of subcategorization is the particular pulping process employed, the liquor recovery systems used and the bleaching sequence applied. Also of interest is the type of wood species pulped (Table 5-3). Nonintegrated mills produce no pulp onsite. They use purchased wood pulp or other fiber sources to produce a paper or paperboard product. Of primary concern in terms of subcategorizing the nonintegrated mills is losses associated with stock preparation and the papermachine operation. At the secondary fiber mills no new pulp is produced onsite. The new material furnish is generally waste paper or internally generated broke. Of concern here is the process performed on that particular furnish.

The following is a brief introduction to the various subcategories of pulp and paper mills located in the Lower Fox River Basin (Table 5-1 and Table 5-4).

A. INTEGRATED PAPER MILLS

1. Sulfite Papergrade Subcategory (Blow Pit and Drum Wash)

Generally, sulfite pulps are associated with the production of both tissue and fine papers. The sulfite pulp is produced by a full cook process using strong solutions of magnesium, ammonium, calcium or sodium bisulfite, and sulfur dioxide. Historically, calcium-base sulfite pulping was practiced. It produced a bright, unbleached chemical pulp that could easily be bleached to a high brightness. In the past 30 years, other bases were used in the sulfite pulping process. This allowed the pulping of pine species that previously were not suitable for the sulfite process. Also, bases other than calcium are now being used to improve pulp quality and, most importantly, to enable recovery of the spent liquor.

The chemistry of the sulfite pulping process has been studied for many years. The primary reaction of the sulfite process occurs between the bisulfite ions of the cooking liquor and the lignin of the wood. The rate of the reaction is very temperature-dependent, and the concentration of the sulfite ion is important if a good quality pulp is to be produced. With increased regulations regarding air and water discharges, the recovery of the pulping liquor is economically very important. Recoveries of 70-90% of the base chemicals used are being experienced, depending on whether a blow pit or drum wash recovery system is employed.

Lower Fox River paper mills included in this subcategory are American Can in Green Bay, a calcium sulfite mill (drum wash); Consolidated Papers in Appleton, a calcium bisulfite mill (blow pit wash); and Proctor & Gamble in Green Bay, an ammonium-based sulfite mill (drum wash).

2. Unbleached Kraft Subcategory

Alkaline pulping -- commonly known as the Kraft process -- accounts for over 80% of the chemical pulp produced in the U.S.[13] Kraft mills produce a papergrade market wood pulp in a full cook process using a highly alkaline sodium hydroxide cooking liquor. Sodium sulfide is also present in the cooking liquor to accelerate the rate of delignification, with less damage to the cellulose and hemicellulose fibers.

Table 5-2

Categories and Subcategories of Mills[11]

A. INTEGRATED

Dissolving Kraft
Market Bleached Kraft
BCT Bleached Kraft
Fine Bleached Kraft
Soda
Unbleached Kraft
- Linerboard
- Bag and Other Mixed Products

Semi-Chemical
Unbleached Kraft and Semi-Chemical
Dissolving Sulfite Pulp
- Nitration
- Viscose
- Cellophane
- Acetate

Papergrade Sulfite (Blow Pit Wash)
Papergrade Sulfite (Drum Wash)
Groundwood -- Thermo-Mechanical
Groundwood -- Coarse, Molded and News (C, M, N) Papers
Groundwood -- Fine Papers
Groundwood -- Chemi-Mechanical

B. SECONDARY FIBERS

Deink
- Fine Papers
- Tissue Papers
- Newsprint

Tissue from Wastepaper
Paperboard from Wastepaper
Wastepaper -- Molded Products
Builders' Paper and Roofing Felt

C. NONINTEGRATED

Nonintegrated -- Fine Papers
Nonintegrated -- Tissue Papers
Nonintegrated -- Lightweight Papers
Nonintegrated -- Filter and Nonwoven Papers
Nonintegrated-Paperboard

D. MISCELLANEOUS MILL GROUPINGS

Integrated -- Miscellaneous, including:
- Alkaline-Miscellaneous
- Groundwood Chemi-Mechanical
- Nonwood Pulping

Secondary Fiber Miscellaneous
Nonintegrated Miscellaneous

Table 5-3

Wood Species Pulped

Pulp Mill	Wood Species Pulped
1) Green Bay Packaging Green Bay, Wis.	Mixed Hardwoods--approximately 35% red oak, 25% maple, 20% elm, 8% ash, 3% birch and 9% miscellaneous hardwoods.
2) American Can Company Green Bay, Wis.	Mixed hardwoods--depends on availability, but usually a mixture of oak, aspen and maple
3) Proctor and Gamble Green Bay, Wis.	Hardwood--aspen from Minnesota, Wisconsin and the Upper Peninsula of Michigan.
4) Thilmany Pulp and Paper Kaukauna, Wis.	90% softwood--mostly jack pine and minor amounts of red pine, balsam fir, spruce, hemlock and tamarack from Wisconsin; 5% of softwood is from western ponderosa pine; 30% softwood chips (western ponderosa and lodgepole pine) and 10% hardwoods (mostly maple and oak, with lesser amounts of birch and elm).
5) Appleton Papers, Inc. Combined Locks, Wis.	Hardwood--100% aspen.
6) Midtec Paper Kimberly, Wis.	Hardwood--100% aspen.
7) Consolidated Papers Appleton, Wis.	Softwoods--mostly black spruce, with lesser amounts of white spruce from Canada.

Table 5-4

Fox River Paper Mill Subcategorization

(Based on E. C. Jordan's Revised Industry Subcategorization)

A. Integrated Paper Mills

Semi-chemical
1. Green Bay Packaging, Inc. (Mill Division)
   a) Pulp mill: Neutral Sulfite Semichemical

Papergrade Sulfite (Blow Pit Wash)
1. Consolidated Papers, Inc. (Appleton)
   a) Pulp mill: Calcium Bisulfite Base

Papergrade Sulfite (Drum Wash)
1. American Can Company
   a) Pulp mill: Calcium Base Sulfite
2. Proctor and Gamble Paper Products Company
   a) Pulp mill: Ammonia Base Sulfite

Groundwood-Fine
1. Midtech Paper Corporation

Groundwood-Chemi-mechanical
1. Appleton Papers, Inc. (Locks Mill)
   a) Pulp mill: Chemi-mechanical, ultra high-yield sulfite-caustic

B. Secondary Fiber Mills

Deink-Fine and Tissue
1. Bergstrom Paper Corporation
2. Fort Howard Paper Company
3. Riverside Paper Corporation
4. Wisconsin Tissue Mills

Wastepaper-Tissue
1. Kimberly Clark-Badger Globe

Wastepaper-Board
1. John Strange Paper Company
2. U.S. Papers Mills Corporation

C. Nonintegrated Mills

Nonintegrated-Fine
1. George A. Whiting Paper Company
2. Gilbert Paper Company
3. Fox River Paper Company
4. Kimberly-Clark (Neenah Paper Mill)

Nonintegrated-Tissue
1. Nicolet Paper Company
2. Kimberly-Clark Corporation (Lakeview)

The type of pulp desired dictates the degree of breakdown of hemicellulose, cellulose and lignin. For most papermaking grades, hemicellulose is desirable because it helps increase paper strength through a cementing effect between fibers. For dissolved pulp, which is used to produce rayon, the absence of hemicellulose and lignin is desirable. This process is also temperature-dependent and will vary in cooking liquor makeup, depending on the desired pulping end product. Recovery of the pulping liquor is, again, an economic and environmental necessity.

Thilmany Pulp and Paper Corporation in Kaukauna is an example of an unbleached, Kraft-type pulp and paper mill. It should be noted that Thilmany is a specialty mill and produces a wide variety of products not fitting into any unbleached subcategory. It is likely, therefore, that when effluent guidelines are established, the mill will be among those considered on a case-by-case basis.

3. Semi-chemical Subcategory

There are a variety of pulping processes that are generally recognized as semi-chemical. The following discussion concerns only the neutral sulfite semi-chemical (NSSC) process. The NSSC process is the most widely used process for semi-chemical pulping, though recently the number of NSSC mills has declined. This decline is related to the recovery economics of the pulping chemicals.

The neutral sulfite name was derived from the pH of the cooking liquor, which is kept around pH 7 with a buffering agent. The buffering agent is used to help control corrosion of equipment and increase the yield of pulp, though corrosion is still a major problem in mills of this nature. A variety of ways exist to prepare the cooking liquor, and discussion of this is beyond the scope of this text. Interested readers are referred to Pulp and Paper -- Chemistry and Chemical Technology, edited by J.P. Casey.[14] The rate of reaction time is temperature-dependent, but independent of the cooking liquor concentration. The neutral sulfite cooking liquor is relatively specific for lignin and often is the major natural wood component removed. The actual condition of the process depends on whether a high grade pulp or coarse grade pulp is desired. A typical temperature for making a coarse grade pulp is 170°C and pressures of 100 psi, with approximately 14% chemical in the cooking liquor on the basis of wood.[14]

The NSSC process will pulp a variety of wood species, including oak, maple, elm and birch. The process produces pulps that are more rigid than the normal alkaline pulp, which is an advantage for making a corrugated medium.

The Green Bay Packaging, Inc., Mill Division in Green Bay is representative of this subcategory. This mill produces a corrugated medium that is shipped to the corporation's corrugated division for final product finishing. The mill operates with an essentially closed whitewater system. Excess water is removed from the system by a reverse osmosis plant. A more detailed discussion is available.[15]

4. Groundwood Fine Subcategory

At mills in this subcategory, groundwood pulp is produced using stone grinders or refiners. Groundwood pulp differs from chemical pulp in that it contains most of the lignin of the original wood and the fibers and their associated fragments. The yields from groundwood refining are much greater than those from a chemical pulping operation. After grinding, the pulp is next filtered by a series of screens that select the desirable fiber and rid the pulp of foreign matter, which is generally heavier. In this subcategory, no separate steaming vessel is used before the defiberation. Purchased fibers are generally used in addition to groundwood pulp to produce fine-type paper, including writing, business and printing papers.

Midtec Paper Corporation in Kimberly is an example of this type of mill.

5. Chemi-Mechanical Groundwood

Chemi-mechanical pulping is considered a type of semi-chemical pulping, since both involve chemical pretreatment of wood chips, followed by mechanical refining. This subcategory is kept separated from the semi-chemical subcategory because the chemicals used and the final product produced are often very different compared to other semi-chemical processes.

Appleton Papers, Inc., (Locks Mill) is classified as a groundwood chemi-mechanical type paper mill. Basically, the process is as follows: Woodchips are produced by a mechanical chipper and then digested by a chemical process to soften them. The softened chips are next fed into presses, where they are broken down into individual fibers. After further refining, they are ready for use in the papermaking process. The virgin pulp is generally combined with purchased secondary fibers to produce the final product.

B. SECONDARY FIBER MILLS

1. Deink Subcategory (Fine, Tissue and Newsprint)

From mills in this subcategory, a deinked pulp is produced from waste paper. In the past, and still to some extent today, the deinking of waste papers released PCBs into the aquatic environment. In the past, PCBs were incorporated into carbonless copy paper. When the paper was recycled and deinked, the PCBs were released to the environment. Since PCBs have been discontinued for this use, the problem will evenutally alleviate itself, but some damage has already occurred. The Lower Fox River does have some PCB problems, which originated from effluent discharges, and PCBs can now be found in the river's sediments and fish.[15]

The deinked waste paper is usually combined with purchased virgin pulp to produce printing, writing, business and tissue papers, but it may also include products like wallpaper, converting stock and wadding.

Mills in this subcategory include Bergstrom Paper Corporation in Neenah, Wisconsin Tissue Mills in Menasha, Riverside Paper in Appleton and Fort Howard Paper Company in Green Bay.

2. Wastepaper Tissue Subcategory

Mills in this subcategory derive a majority of their paper stock furnish from waste paper without deinking. The principal products include facial and toilet paper, paper towels, glassine, paper diapers and wadding.

The Kimberly-Clark Badger Globe plant in Neenah is an example of this type of mill.

3. Wastepaper-Board Subcategory

Mills in this subcategory use a furnish derived from waste paper without employing a deinking process. A number of different products are made, including folding boxboards, tube stock, chip board, gypsum liner, corrugating medium and linerboard. A variety of other specialty products may also be produced.

Mills included in this subcategory are the John Strange Paper Company in Menasha and U.S. Paper Mills Corporation in DePere.

C. NONINTEGRATED PAPER MILLS

1. Nonintegrated-Fine Subcategory

Nonintegrated mills in this subcategory produce fine papers from purchased wood pulp or secondary fibers. No deinking of waste paper is carried out at these mills. Principal products include printing, writing, business and rag-type papers.

Mills representing this subcategory include the George A. Whiting Paper Company in Menasha, the Gilbert Paper Company in Menasha, the Fox River Paper Company in Appleton, and the Kimberly-Clark Neenah Paper Mill in Neenah. With the exception of the Whiting Paper Company, these industries do produce small amounts of cotton pulp and are known for their cotton content papers.

2. Nonintegrated-Tissue Subcategory

Mills included in this subcategory produce sanitary or industrial tissue grade papers from purchased pulp or secondary fibers prepared at another location. Once again, no deinking of waste paper is employed. Principal products include facial and toilet paper, paper diapers, paper towels, glassine, wadding and wrapping papers.

This subcategory is represented by the Nicolet Paper Company in DePere and the Kimberly-Clark-Lakeview Division located on Little Lake Butte Des Morts.

D. MISCELLANEOUS MILLS

The subcategorization scheme does not account for all mills in each industry segment. Mills not fitting into the subcategorization scheme often employ a complex variety of pulping processes and/or products manufactured. Their discharge permits are established through prorating from the appropriate subcategories or on a case-by-case basis.

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6. Industries Included in the Inventory

All Wisconsin Pollution Discharge Elimination System (WPDES) permits (required by NR 200.03 of the Wisconsin Administrative Code) and all NR 101 reports (required by NR 101.11 of the Wisconsin Administrative Code) were reviewed for possible inclusion in the chemical inventory. As industries discharging to the river were included in the inventory, their WDNR NR 200 and NR 101 files were reviewed for chemical usage information. This enabled the inclusion of all industrial dischargers having process and cooling waters going directly to the Lower Fox River or its tributaries, and also a major portion of those industries that discharge to municipal wastewater treatment plants that eventually discharge to the Lower Fox River.

Those industries that doh't discharge directly to state surface waters as defined by NR 200.02 (8) of the Wisconsin Administrative Code are not required to have a WPDES permit. These industries have all their process, cooling and sanitary wastes discharging to a wastewater treatment plant (WWTP), and they may or may not be required to file a NR 101 effluent report. To ensure inclusion of all major dischargers, each WWTP discharging to the Lower Fox River was contacted and asked for a list of significant dichargers to their facility. Once these industries were identified, the NR 101 files were again searched for chemical usage information.

Over 150 dischargers were reviewed for inclusion in this inventory. Those selected for the inventory and their locations are given in the inventory chemical users list (Table 6-1). A total of 64 industries and/or organizations and six WWTPs were included in the chemical inventory. All chemical information that could be obtained for these organizations is included in the inventory. In some cases, certain raw materials were not included if they were determined to not be posing a threat to the aquatic environment -- for example, natural products, such as vegetables at canning factories or wheat flours at bakeries. In a few instances, information could not be reported due to the generality of the information obtained -- like cleaning products reported as all-purpose cleaners or detergents. Also excluded were chemicals used in amounts of less than 50 gallons a year. For a small number of industries, especially paper converting facilities, chemical usage information could not be obtained.

A list of the chemical manufacturers that supply the industries included in the inventory and/or industries that manufacture chemicals within the Lower Fox River Basin is presented in Table 6-2.

Table 6-1
Inventory Chemical Users List

User # in Chemical Inventory	Discharger Name & Location	NR 101 # WPDES #	Cooling and/or Noncontact Cooling Water →Receiving Water	Process Water→ Receiving Water	WDNR – NR 101 Raw Material List Available?
1	UNIDENTIFIED PULP AND PAPER MILL (Could be used by 2,3,4,5, 6,8,11,13,14,15,16,17,18, 19,31,32,33,37,39,43,50,62)			Lower Fox River	No
2	FORT HOWARD PAPER CO. Green Bay, Wis.	050008 0001848	Lower Fox River	Lower Fox River	No
3	AMERICAN CAN CO. Green Bay, Wis.	050001 0001261-2	Lower Fox River Green Bay WWTP	Lower Fox River Green Bay WWTP	Yes
4	CONSOLIDATED PAPERS APPLETON DIVISION Appleton, Wis.	450004 0001082	Lower Fox River	Lower Fox River	Yes
5	BERGSTROM PAPER CO. Neenah, Wis.	710003 0001121-2	Lower Fox River	Lower Fox River	Yes
6	NICOLET PAPER De Pere, Wis.	050011 0001473	Lower Fox River Also Boiler Blowdown --Lower Fox River	Lower Fox River	Yes
7	AMERICAN CAN CO. NEENAH PLANT 539 Neenah, Wis.	710001 0030163-2	Lower Fox River: Also Cooling Tower and Boiler Blowdown--Lower Fox River	Neenah-Menasha WWTP	Yes
8	FOX RIVER PAPER CO. Appleton, Wis.	450014 --	None reported	Appleton WWTP	Yes
9	FOREMOST FOODS, INC. Appleton, Wis.	450006 0001228	Lower Fox River	Appleton WWTP Lower Fox River	Yes
10	KIMBERLY-CLARK CORPORATE OFFICE Neenah, Wis.	-- 0027871-2	Little Lake Butte Des Morts	None reported	No
11	MIDTEC PAPER CORP. Kimberly, Wis.	450008 0000698	Lower Fox River	Lower Fox River	Yes

Table 6-1 (Continued) Inventory Chemical Users List

User # in Chemical Inventory	Discharger Name & Location	NR 101 # WPDES #	Cooling and/or Noncontact Cooling Water →Receiving Water	Process Water → Receiving Water	WDNR – NR 101 Raw Material List Available?
12	NEENAH-MENASHA SEWERAGE COMMISSION	-- 0026085-3		Lower Fox River	--
13	GREEN BAY PACKAGING (MILL DIVISION) Green Bay, Wis.	050010 0000973	Lower Fox River	Lower Fox River Green Bay WWTP	Yes
14	GREEN BAY PACKAGING (CORRUGATED DIVISION) Green Bay, Wis.	050089 0033448	Lower Fox River	Green Bay WWTP	Yes
15	THILMANY PAPER and PULP CO. Kaukauna, Wis.	450011 0000825	Lower Fox River	Lower Fox River	Yes
16	PROCTOR and GAMBLE CO. Green Bay, Wis.	050003 0001031	Lower Fox River Green Bay WWTP	Green Bay WWTP Lower Fox River	Yes
17	APPLETON PAPERS, INC. LOCKS MILL Combined Locks, Wis.	450003 0000990	Lower Fox River	Lower Fox River	No
18	GILBERT PAPER CO. Menasha, Wis.	710005 0000302	Lower Fox River	Neenah-Menasha WWTP	Yes
19	RIVERSIDE PAPER CO. Appleton, Wis.	450009 0000591	Lower Fox River; Also Boiler Water Blowdown	Lower Fox River Appleton WWTP	Yes
20	THE LARSEN CO. Green Bay, Wis.	050037 0000451-2	Lower Fox River	Green Bay WWTP	Yes
21	DE PERE WASTEWATER TREATMENT PLANT	-- 0023787-2		Lower Fox River	--
22	GREEN BAY METROPOLITAN SEWERAGE DISTRICT	-- 0031437-1		Lower Fox River	--
23	WISCONSIN PUBLIC SERVICE Green Bay, Wis.	050013 0000965	Mouth of Lower Fox River Green Bay Condenser Cooling	Mouth of Lower Fox River	No

Table 6-1 (Continued) Inventory Chemical Users List

User # in Chemical Inventory	Discharger Name & Location	NR 101 # WPDES #	Cooling and/or Noncontact Cooling Water →Receiving Water	Process Water→ Receiving Water	WDNR– NR 101 Raw Material List Available?
24	HEART of the VALLEY METROPOLITAN SEWERAGE DISTRICT	-- 0031232-3		Lower Fox River	--
25	East TOWN of MENASHA SANITARY DISTRICT #4	-- 0025909-2		Lower Fox River	--
26	West TOWN of MENASHA SANITARY DISTRICT #4	-- 0024686-2		Lower Fox River	--
27	AMERICAN CAN CO. GRAPHIC ARTS 534 Neenah, Wis.	710038 0027260-1	Lower Fox River	Neenah-Menasha WWTP	Yes
28	AMERICAN CAN CO. RIVER/CANAL 543 Menasha, Wis.	710035 0026999-2	Lower Fox River U.S. Canal	Neenah-Menasha WWTP	Yes
29	STOWE-WOODWARD CO. Neenah, Wis.	710084 0027537	Lower Fox River	Lower Fox River	Yes
30	M & T CHEMICALS, INC. Menasha, Wis.	710120 0027669-1	Lower Fox River	Neenah-Menasha WWTP	Yes
31	MENASHA CORP. JOHN STRANGE PAPER CO. (Paperboard Mill) Menasha, Wis.	710006 0001007-2	Lower Fox River	Neenah-Menasha WWTP	Yes
32	KIMBERLY-CLARK NEENAH Neenah, Wis.	710013 0037842-2	Nnne reported	Lower Fox River via joint WWTP	Yes
33	KIMBERLY-CLARK ATLAS MILL Appleton, Wis.	450019 0000710-2	Lower Fox River Appleton WWTP	Appleton WWTP	Yes
34	CHICAGO & NORTHWESTERN TRANS. CO. Green Bay, Wis.	50083 0001074	None reported	Green Bay WWTP	Yes
35	KIMBERLY-CLARK WEST Menasha, Wis.	710074 0041157-2	Lower Fox River via unnamed creek	Menasha Sanitary District #1	Yes

Table 6-1 (Continued) Inventory Chemical Users List

User # in Chemical Inventory	Discharger Name & Location	NR 101 # WPDES #	Cooling and/or Noncontact Cooling Water → Receiving Water	Process Water → Receiving Water	WDNR – NR 101 Raw Material List Available?
36	AMERICAN CAN CO. NEENAH TECH. CENTER Neenah, Wis.	710037 0027081	Lower Fox River	Neenah-Menasha WWTP	Yes
37	KIMBERLY-CLARK BADGER GLOBE Neenah, Wis.	710013 0037842-2	None reported	Lower Fox River via joint WWTP	Yes
38	APPLETON WIRE WORKS Appleton, Wis.	450025 0040185	Lower Fox River	Appleton WWTP	Yes
39	GEORGE A. WHITING PAPER CO. Menasha, Wis.	710085 0001333-2	Lower Fox River	Lower Fox River	No
40	MENASHA CORP. CONTAINER DIVISION Neenah, Wis.	710044 0030694	Neenah Slough	None reported	Yes
41	GREEN BAY PLASTICS Green Bay, Wis.	50026 0026786	Lower Fox River	None reported	No
42	AMERICAN CAN CO. PLANT 545 (Washington St.) Menasha, Wis.	710024 0030147-2	Lower Fox River	Neenah-Menasha WWTP	Yes
43	WISCONSIN TISSUE MILLS PLANT #1 Menasha, Wis.	710023 0037389-2	None reported	Lower Fox River	No
44	KAUKAUNA CLUB CHEESE Little Chute, Wis.	450023 --	None reported	Little Chute WWTP	Yes
45	PA JLY CHEESE CO. Green Bay, Wis.	50084 --	Branch of East River	Green Bay WWTP	Yes
46	L. D. SCHREIBER CHEESE CO., INC. Green Bay, Wis.	50032 0004499	Baird Creek	Green Bay WWTP	Yes
47	GREEN BAY CANNING CORP. Green Bay, Wis.	50036 --	East River	Green Bay WWTP	Yes

Table 6-1 (Continued) Inventory Chemical Users List

User # in Chemical Inventory	Discharger Name & Location	NR 101 # WPDES #	Cooling and/or Noncontact Cooling Water →Receiving Water	Process Water→ Receiving Water	WDNR– NR 101 Raw Material List Available?
48	GALLOWAY CO. Neenah, Wis.	710088 0027553	Neenah Slough	Neenah-Menasha WWTP	Yes
49	ROYAL-MODEL CLEANERS and LAUNDERERS Green Bay, Wis.	50052 --	None reported	Green Bay WWTP	Yes
50	KIMBERLY-CLARK CORP. LAKEVIEW DIAPER PLANT Town of Menasha, Wis.	710073 0000680-2	None reported	Town of Menasha Sanitary Dist. #4	Yes
51	ULTRA PLATING CORP. Green Bay, Wis.	50087 --	Green Bay WWTP	Green Bay WWTP	Yes
52	NEENAH FOUNDRY CO. PLANTS #2 & #3 Neenah, Wis.	710010 0029548	Neenah Slough Neenah-Menasha WWTP	Neenah Slough	Yes
53	DE PERE FOUNDRY, INC. De Pere, Wis.	50005 --	Lower Fox River	De Pere WWTP	Yes
54	NEENAH FOUNDRY CO. PLANT #1 Neenah, Wis.	710009 001287	Neenah Slough Neenah-Menasha WWTP	None reported	Yes
55	BETTER BRITE PLATING DePere, Wis.	50058 --	None reported	De Pere WWTP	Yes
56	BELOIT MANHATTAN, INC. Neenah, Wis.	710081 0032671	Neenah Slough	Neenah Slough	Yes
57	INDUSTRIAL TOWEL and UNIFORM Neenah, Wis.	710082 --	None reported	Neenah-Menasha WWTP	Yes
58	APPLETON MEMORIAL HOSPITAL Appleton, Wis.	450022 0033693	Lower Fox River	Appleton WWTP	Yes
59	GUNDERSON, INC. Menasha, Wis.	710072 --	None reported	Neenah-Menasha WWTP	Yes

Table 6-1 (Continued) Inventory Chemical Users List

User # in Chemical Inventory	Discharger Name & Location	NR 101 # WPDES #	Cooling and/or Noncontact Cooling Water →Receiving Water	Process Water→ Receiving Water	WDNR– NR 101 Raw Material List Available?
60	ST. ELIZABETH HOSPITAL Appleton, Wis.	450020 0039195	Lower Fox River	Appleton WWTP Lower Fox River	Yes
61	EGGERS HARDWOOD PRODUCTS CORP. Neenah, Wis.	710004 --	None reported	Neenah-Menasha WWTP	Yes
62 (Use data included in No. 1)	U.S. PAPER MILL De Pere, Wis.	50018 --	DePere WWTP	DePere WWTP	No
63	KIMBERLY-CLARK LAKEVIEW DIVISION Neenah, Wis.	710007 0000680-2	Lower Fox River	Lower Fox River	No
64	KIMBERLY-CLARK (KIMTECH) Neenah, Wis.	710070 --	Lower Fox River Neenah-Menasha WWTP	Neenah-Menasha WWTP	Yes
65	SCHNEIDER TANK LINES Neenah, Wis.	710045 --	None reported	Neenah-Menasha WWTP	Yes
66	LAKE TO LAKE DAIRY COOPERATIVE De Pere, Wis.	50056 --	None reported	Ashwaubenon Creek	Yes
67	BELLIN MEMORIAL HOSPITAL Green Bay, Wis.	50057 --	Lower Fox River	Green Bay WWTP	Yes
68	NORTHWESTERN COLORGRAPHICS, INC. Menasha, Wis.	710040 --	None reported	Neenah-Menasha WWTP	Yes
69	RESPONSE GRAPHICS Ashwaubenon, Wis.	50019 --	Lower Fox River	De Pere WWTP	Yes
70	MIDWEST INDUSTRIAL SERVICES Green Bay, Wis.	50050 --	Lower Fox River	Lower Fox River	Yes

Table 6-2

Inventory Chemical Manufacturers List

1. Certified Laboratories
   P.O. Box 2493
   Fort Worth, TX 76101

2. Ciba-Geigy Corporation
   P.O. Box 11422
   Greensboro, NC 27409

3. Dearborn Chemical (U.S.)
   300 Genesee St.
   Lake Zurich, IL 60047

4. Cities Service Company
   Industrial Chemical Division
   3445 Peachtree Rd., N.E.
   Atlanta, GA 30302

5. Diversey Chemicals
   1855 S. Mt. Prospect Rd.
   Des Plaines, IL 60018

6. General Electric Co.
   Silicone Products Dept.
   Waterford, NY 12188

7. Haviland Products Co.
   421 Ann St., N.W.
   Grand Rapids, MI 49504

8. E.F. Houghton and Co.
   Madison & Van Buren Aves.
   Valley Forge, PA 19482

9. Mobil Oil Corp.
   150 E. 42nd St.
   New York, NY 10017

10. Madison Bionics
    11250 W. Addison St.
    Franklin Park, IL 60131

11. Mitchell-Bradford Chemical Co.
    160 Wampus Lane
    Milford, CT 06460

12. Norton Company
    3840 Fishoneek Rd.
    Stow, OH 44224

13. Vinings Chemical Co.
    2555 Cumberland Parkway
    Atlanta, GA 30339

14. Betz Laboratories, Inc.
    Somerton Road
    Trevose, PA 19047

15. Buckman Laboratories
    1256 N. McLean Blvd.
    Memphis, TN 38108

16. Graden Chemical Company
    426 Bryan St.
    Haverton, PA 19083

17. The Mogul Corporation
    P.O. Box 200
    Chagrin Falls, OH 44022

18. Universal Industries
    1918 Milwaukee Way
    Tacoma, WA 98421

19. American Cyanamid Co.
    Berdan Avenue
    Wayne, NJ 07470

20. General Mills Chemicals
    1 Mill St.
    Kennedy, TX 78119

21. Eastern Ind. Oil Division,
    Henkel, Inc.
    222 Central St.
    Saugus, MA 01906

22. B.F. Goodrich Chemical Co.
    6100 Oak Tree Blvd.
    Cleveland, OH 44131

23. Bercen Chemical Co.
    285 Valley St.
    Providence, RI 02908

24. Cincinnati Milacron
    Products Division
    Cincinnati, OH 45209

Table 6-2 (Continued)

Inventory Chemical Manufacturers

25. Monsanto Industrial Chemicals Co.
800 N. Lindbergh Blvd.
St. Louis, MO 63166

26. ICI Americas, Inc.
Speciality Chemicals Division
Wilmington, DE 19897

27. Economics Laboratory
Industrial Division
St. Paul, MN 55102

28. Oakite Products, Inc.
50 Valley Rd.
Berkley Heights, NJ 70922

29. D.A. Stuart Oil Company of America
7575 Plaza Court
Willowbrook, IL 60521

30. Rohm and Haas
Independence Mall West
Philadelphia, PA 19105

31. Dow Corning Corporation
S. Saginaw Rd.
Midland, MI 48640

32. Hercules, Inc.
Environmental Services Division
9800 Greenbank Rd.
Wilmington, DE 19899

33. Nalco Chemical Co.
2901 Butterfield Rd.
Oak Brook, IL 60521

34. Purex Corp.
24600 S. Main St.
Carson, CA 90749

35. Colliods, Inc.
394 Frelinghuysen Ave.
Newark, NJ 07114

36. Panther Chemical
P.O. Box 52
Fort Worth, TX 76101

37. Appleton Papers, Inc.
P.O. Box 359
Combined Locks, WI 54113

38. Nicolet Paper Co.
Main Avenue
DePere, WI 54115

39. Thilmany Pulp and Paper
Thilmany Road
Kaukauna, WI 54130

40. Midtec Paper Corp.
N. Main St.
Kimberly, WI 54136

41. Green Bay Packaging
1601 N. Quincy
Green Bay, WI 54301

42. Wisconsin Protective Coating
614 Elizabeth St.
Green Bay, WI 54302

43. Armour and Co.
2490 S. Broadway Ave.
Green Bay, WI 54303

44. American Can Co.
812 Day St.
P.O. Box 790
Green Bay, WI 54305

45. Fort Howard Paper Co.
1919 S. Broadway
P.O. Box 130
Green Bay, WI 54305

46. Pulliam Power Plant
P.O. Box 1200
Green Bay, WI 54305

47. Proctor & Gamble Paper
Products
P.O. Box 400
Green Bay, WI 54305

48. BASF Wyandotte Corp.
Parsippany
100 Cherry Hill Rd.
Parsippany, NJ 07054

49. Texaco, Inc.
4800 Fournace Pl.
Bellaire, TX 77401

Table 6-2 (Continued)

Inventory Chemical Manufacturers

50. E.I. DuPont De Nemours & Co.
1007 Market St.
Wilmington, DE 19898

51. Kelco
Division of Merck & Co., Inc.
8355 Aero Dr.
San Diego, CA 92123

52. Dexter Chemical Corp.
845 Edgwater Rd.
Bronx, NY 10474

53. DuBois Chemicals
3630 E. Kemper Rd.
Sharonville, OH 45241

54. National Chemsearch
P.O. Box 2170
Irving, TX 75061

55. Calgon Corp.
Subsidiary of Merck Co., Inc.
P.O. Box 1346.
Pittsburgh, PA 15230

56. Armak Pioneer Chemical Division
Route 73 & Penna Railroad Bridge
P.O. Box 327
Maple Shade, NJ 08052

57. Atlantic Chemical Corp.
10 Kingsland Rd.
Nutley, NJ 07110

58. Crompton & Knowles Corp.
500 Pear St.
P.O. Box 341
Reading, PA 19603

59. Mobay Chemical Corp.
Penn Lincoln Parkway West
Pittsburgh, PA 15206

60. Proctor & Gamble Co.
P.O. Box 599
Cincinnati, OH 45201

61. A & S Corporation.
(Address unavailable)

62. GAF Corp.
140 W. 51st St.
New York, NY 10020

63. Pennwalt Corp.
III Parkway
Philadelphia, PA 19102

64. Nopco Chemical Corp.
(Address unavailable)

65. MacDermid of Bristol, Inc.
31 Harwinton Ave.
Plymouth, CT 06782

66. Kleer-Flo Company
6600 Washington Ave., S.
Eden Prairie, MN 55344

67. Lawter Chemicals, Inc.
990 Stokie Blvd.
Northbrook, IL

68. Glyco Chemicals, Inc.
P.O. Box 349
Williamsport, PA 17701

69. PPG Industries
P.O. Box 127
151 Colfax St.
Springdale, PA 15144

70. Olin Chemical
New Haven, CT
(Full address unavailable)

71. Ashland Chemical Co.
P.O. Box 2219
5200 Blazer Parkway
Columbus, OH 43229

72. Reichold Chemicals, Inc.
525 N. Broadway
White Plains, NY 10603

73. Texo Corp.
2801 Highland Ave.
Cincinnati, OH 45212

Table 6-2 (Continued)

Inventory Chemical Manufacturers

74. FMC Corp.
River Road
Buffalo, NY 14240

75. Western Lime and Cement Co.
101 James St.
Green Bay, WI 54303

76. Santek Chemical
P.O. Box 1042
Neenah, WI 54956

77. American Color and Chemical Corp.
Mt. Vernon St.
Lock Haven, PA 17745

78. National Starch and Chemical Corp.
10 Finderne Ave.
Bridgewater, NJ 08876

79. Solvox Manufacturing Co.
11725 W. Fairview Ave.
Milwaukee, WI 53226

80. 3M Company
3M Center
St. Paul, MN 55101

81. Stauffer Chemical Corp.
Industrial Chemical Division
Westport, CT 06880

82. Hooker Chemical Corp.
Industrial Chemical Corp.
P.O. Box 344
Niagara Falls, NY 14302

83. Oriental Milling
835 S. 29 St.
Manitowoc, WI 54220

84. Air Products & Chemicals, Inc.
Route 222
Trexlertown, PA 18087

85. Allied Chemical
P.O. Box 91333
Chicago, IL 60693

86. Hydrite Chemical Co.
1237 W. Bruck St.
Milwaukee, WI 52284

87. Diamond Shamrock Corp.
1100 Superior Avenue
Cleveland, OH 77536

88. Dow Chemical U.S.A.
P.O. Box 1847
2040 Dow Center
Midland, MI 48640

89. Sandoz Color and Chemicals
Route 10
East Hanover, NH 07936

90. Dye Specialities, Inc.
100 Plaza Center
Secaucus, NJ 07094

91. Far Best, Inc.
1401 Greenleaf Ave.
Elk Grove Village, IL 60007

7. Introduction to the Inventory

This inventory is not a comprehensive list of all chemicals used in the Lower Fox River area, but it does include a great majority of those chemicals that could eventually reach the Lower Fox River aquatic environment via effluent discharge. The top 10 organic and top 12 inorganic chemicals and the top 10 natural and miscellaneous products identified by the inventory are presented in Tables 7-1 to 7-3. Agricultural pesticides, herbicides and insecticides used in the basin were not included because they have been discussed by other authors (see Ref. 1, Section 4). All chemical composition information obtained was listed unless confidentiality was requested by the suppliers.

The inventory is structured alphabetically. Chemical categories were established as chemical compositions were identified. Categories are very specific in some cases, while others are very broad or general. This was necessary because information received regarding chemical compositions was varied in degree of specificity. All usage data in the inventory is for 1978 unless otherwise noted on the Inventory Chemical Users List (Table 6-1).

How to Use the Inventory

First Column Listed in column one are the trade names for a particular chemical product or compound. If a chemical name appears in this column and a reference is given to another category, this means that the product listed is a mixture of chemical compounds and all the information obtained for that product is listed under the referenced category. Where known, a product consisting of more than one chemical is listed under the category that has the highest percentage in the composition of the mixture.

Second Column In column two, the full or partial chemical composition is listed. When a Chemical Abstracts Service (CAS) registry number is listed, the molecular formula is also listed as it appears in the Toxic Substances Control Act Chemical Substances Inventory. If a molecular formula is not listed along with a CAS registry number, a definition is given of the product where appropriate. If a product has USFDA or U.S. Department of Agriculture (USDA) approval or clearance, it will be noted in column two.

In the case of dyes, if a color index number is given in column two, the structure appears in the "Colour Index" published by the Society of Dyers and Colourists. If "(Confidential)" appears in column two, the chemical composition is known to our group and can be, upon request, revealed to appropriate government regulatory agencies. If "Proprietary" appears in column two, the manufacturer of the product would not release chemical composition information to our group. If only the chemical class is known (e.g., a mixture of fatty acids) the product is listed under that category. If no chemical composition information could be obtained, the trade name product is listed in the unknowns category, the last section of the inventory.

Table 7-1

Top 10 Organic Chemicals Identified in the Inventory

Raw Materials	Amount (tons/yr.)	Number Reporting*
1. Rosin Size[a]	2,900	7 of 9
2. Resins (wet strength)	2,800	5 of 15
3. Urea CAS #57-13-6 M.F. CH_4N_2O	1,727	2 of 2
4. Dyes[b]	1,270	8 of about 20
5. Ethene, homopolymer CAS #9002-88-4 M.F. $(C_2H_4)_x$	930	1 of 4
6. Ethenol, homopolymer CAS #9002-89-5 M.F. $(C_2H_4O)_x$	237	1 of 2
7. Accosize 17[c]	114	1 of 1
8. Slimicides & Biocides[d]	80	5 of about 20
9. Hercofloc 815[e]	60	1 of 1
10. Versene CAS #60-00-4 M.F. $C_{10}H_{16}N_2O_8$	37	1 of 2

*Number of industries reporting quantities out of the total number of industries reporting use of the material.

[a]Typical ingredients: A mixture of resin acids. See fatty and resin acids section of the chemical inventory.

[b]Sum of many: See dye section of the chemical inventory.

[c]Active ingredient: Succinic anhydride.

[d]Typical ingredients:
2-(Thiocyanomethylthio) benzothiazole
3,5-dimethyl-1,3,5, 2H tetrahydrothiadiazine-2thione
Pentachlorophenol, sodium salt
2,4,5-Trichlorophenol, sodium salt

[e]Acrylamide-based copolymer.

Table 7-2

Top 12 Inorganic Chemicals Identified in the Inventory

	Raw Material	Amount (tons/yr.)	Number Reporting*
1.	Hypochlorous acid, calcium salt CAS #7778-54-3 M.F. Ca·2ClHO	125,032 average (Range: 50,500 to 255,000)	5 of 6
2.	Sulfurous acid, calcium salt CAS #13780-03-5 M.F. $Ca·2H_2O_3S$	125,000 average (Range: 50,000 to 250,000)	1 of 1
3.	Sodium Hydroxide CAS #1310-73-2 M.F. HNaO	34,000	24 of 24
4.	Lime, calcium oxide CAS #1305-78-8 M.F. CaO	33,000	9 of 10
5.	Alum (sulfuric acid & aluminum salt [3/2]) CAS #10043-01-3 M.F. Al 3/2 H_2O_4S	25,000	18 of 18
6.	Chlorine CAS #7782-50-5 M.F. Cl_2	22,000	24 of 25
7.	Sulfur CAS #7704-34-9 M.F. S	19,500	4 of 6
8.	Silica Sand	14,500	2 of 2
9.	Calcium Hydroxide CAS #1305-62-0 M.F. CaH_2O_2	12,500 average (Range: 5,000 to 25,000)	2 of 2
10.	Salt Cake (Sulfuric Acid Disodium) CAS #7757-82-6 M.F. $H_2O_4S·2Na$	9,500	1 of 2
11.	Sodium Sulfite CAS #7757-83-7 M.F. H_2O_3S 2Na	9,000	4 of 9
12.	Sodium Carbonate CAS #497-19-8 M.F. CH_2O_3 ·2Na	3,220	4 of 12

*Number of industries reporting quantities out of the total number of industries reporting use of the material.

Table 7-3

Top 10 Natural Products and Miscellaneous Products Identified in the Inventory

Raw Material	Amount (tons/yr.)	Number Reporting*
1. Cellulose, pulp CAS #65966-61-4	945,500 average (Range: 500,000 to 2,000,000)	10 of 10
2. Whey	700,000 (minimum)	(Exact number of users unknown)
3. Waste paper	200,000	4 of 5
4. Starch, oxidized CAS #65996-62-5	32,500	14 of 14
5. Petroleum products (Lubricating oil and greases, emulsion oil, fuel oil, kerosene)	1,417 tons/yr. 4,750,000 gals./yr.	(Exact number of users unknown)
6. Clay	26,000	5 of 11
7. Wax, amorphous CAS #8002-74-2	10,400	5 of 6
8. Sucrose CAS #57-50-1 M.F. $C_{12}H_{22}O_{11}$	9,400	1 of 1
9. Salt CAS #7647-14-5 M.F. ClNa	1,750	16 of 20
10. Cellulose CAS #9004-34-6 M.F. $C_6H_{10}O_5)_x$	1,300	3 of 3)

*Number of industries reporting quantities out of the total number of industries reporting use of the material.

Third Column Column three lists on the left side the code number(s) of the product's manufacturer(s) (see Table 6-2) and on the right the code number(s) for the user(s) of a product (see Table 6-1), separated by a hyphen. If unknown, a "U" is listed in the respective position.

Fourth Column Column four lists quantities of the product used or manufactured, if known. Much of the information received was known at quantities of either less than or greater than 500 pounds per year, so that was the quantity breakpoint used.

For example, a product may be listed at greater than 500 pounds per year, and its actual use could be 100 tons per year. If specific amounts were known, they are listed in tons per yer. The 2,000-pound ton was used since all tonnages received were so measured. Other quantity amounts that appear include gallons per year, and pounds or gallons per million gallons of effluent or boiler water. In most cases, quantity descriptors (e.g., gallons per year) were listed as received to ensure the accuracy of the data. Some information was converted from pounds per year to tons per year for clerical purposes. It should be remembered that the quantities used will vary from year to year, so in most cases the amount used was rounded off. Also, totalling quantities for a particular product is not necessarily the total amount of the product used. The total quantity represents the amount used for the industries included in the inventory for which usage information could be obtained.

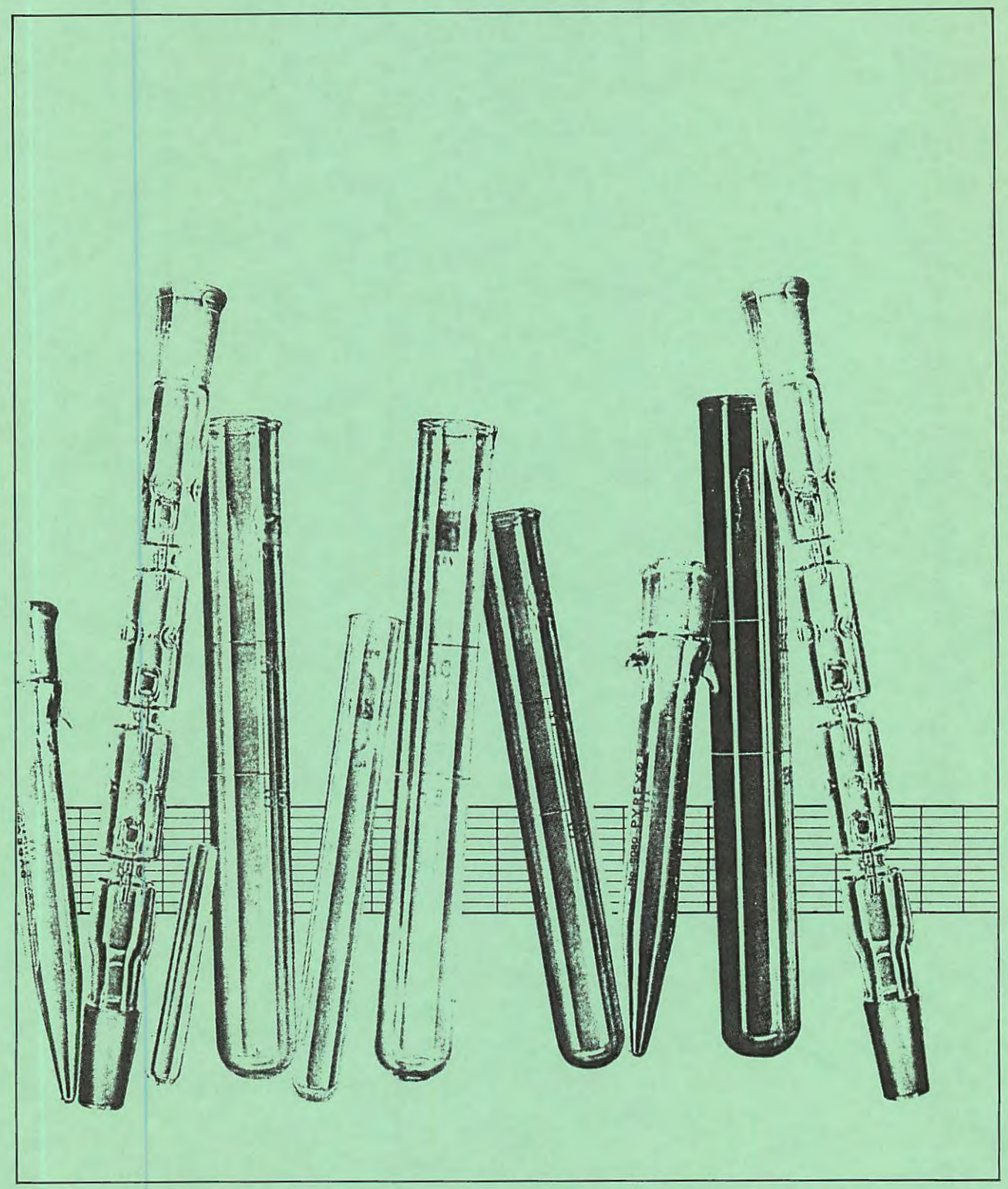
Fifth Column Column five includes a variety of information. If a number appears in parenthesis, it is a use for that product listed according to the product use code (Table 7-4), located at the beginning of the inventory. If a number appears in brackets, it specifies the number of industries known to be using the product. If a number appears in parenthesis next to a chemical name, that number refers to the priority pollutant number assigned that compound by the USEPA. Other information given in column five includes aquatic toxicity data, chemical stability data, decomposition products and proper disposal procedures whenever this information was considered important.

Table 7-4

Product Use Code for General Comments Column in the Inventory

(1)	Adhesives
(2)	Bituminous Materials
(3)	Boil-Out Materials
(4)	Cleaners & Detergents
(5)	Coating Adhesives
(6)	Cutting Fluids
(7)	Defoamers
(8)	Degreasers
(9)	Dispersants
(10)	Dyes
(11)	Fillers
(12)	Flocculants
(13)	Fungicides
(14)	Latexs
(15)	Organic Solvents
(16)	Pigments
(17)	Plasticizers
(18)	Polymers
(19)	Preservatives
(20)	Resins & Rosins
(21)	Slimicides (Biocides)
(22)	Washing Aids
(23)	Felt Cleaner
(24)	Boiler Water Additive

8. The Inventory



Inventory Contents

GUIDE TO NUMBER CODES IN THE INVENTORY

User code # (column 3, right) -- Inventory Chemical Users List, Table 6-1, p. 54.
Manufacturer code # (column 3, left) -- Inventory Chemical Manufacturers List, Table 6-2, p. 60.
General Comments code # in parentheses (column 5) -- Product Use Code, Table 7-4, p. 70.

ACID AND ACID DERIVATIVES
(ANHYDRIDES, ESTERS, HALIDES AND SALTS)

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Thrax	Major components: Sulfuric acid, Silica Minor Component: Petroleum sulfonate	10 - 13	Less than 500 lbs./yr.	Used as a sewer cleaner.
Hydrochloric Acid	CAS Registry #[7647-01-0] Molecular Formula: ClH	U - 12,23,19,15, 27,43,48	User # / Approximate Amount (Tons/Yr.) 12 — 9 23 — 15 19 — 1.3 15 — 50 27 — 3.8 43 — 1,500 (Confidential) — 1,500 48 — 0.5	(3)
Sulfamic Acid	CAS Registry #[5329-14-6] Molecular Formula: H_3NO_3S	U - 16,15	User # / Approximate Amount (Tons/Yr.) 16 — 189 15 — Less than 0.25	(4)
Acidex (63628)	Contains hydrochloric acid and anionic surfactants.	27 - 1	More than 500 lbs./yr.	(23)
Acid/Descaler (71514)	Contains hydrochloric acid.	27 - 1	More than 500 lbs./yr.	Used for rust and scale removal.
Sulfurous Acid, Calcium Salt	Sulfurous Acid, Calcium salt (2:1) CAS Registry #[13780-03-5] Molecular formula: $Ca \cdot 2H_2O_3S$	44 - 3	100 million to 500 million pounds produced and used annually.	
Lignosulfonic Acid, Ammonium Salt	CAS Registry #[8061-53-8]	47 - U	Not Reported	

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Magnus Driac (63818)	Contains sodium bisulfate	27 - 1	More than 500 lbs./yr.	(23) [1]
Magnus 843-BX	Contains sulfuric acid and petroleum distillate.	27 - 1	More than 500 lbs./yr.	(23) [1]
Texo LP-143C	Proprietary	73 - 1	More than 500 lbs./yr.	(23) [1]
Sulfuric Acid	Sulfuric acid, disodium salt CAS Registry #[7757-82-6] Molecular formula $H_2O_4S{\cdot}2Na$	41,37 - 1,15, 16,19, 27,48	Manufacturer #37 produces 5-50 tons annually. Manufacturer #41 produces 5,000-25,000 tons annually. User # — Approximate Amount (Tons/Yr.) 16 — 900 15 — 2,000 27 — 0.8 19 — 4.3 (Confidential) — 85 48 — 0.15	[9] Manufacturers #37 and #41 do not necessarily supply users.
Nalchelate 762	Blend of tri-sodium salt of nitrilotriacetic acid and acrylamide-acrylate.	33 - 5,11	29 lbs./million gallons of boiler water at plant #5: ca. 41 lbs./million gallons of boiler water at plant #11	(24)
Nachelate 763	Blend of tri-sodium salt of nitrilotriacetic acid and sodium humate	33 - 1	More than 500 lbs./yr.	(24)
Carbonic Acid	Carbonic acid disodium salt. CAS Registry #[497-19-8] Molecular Formula:$CH_2O_3{\cdot}2Na$	37 - U	50-500 tons produced annually	
Boric Acid	CAS Registry #[10043-35-3] Molecular Formula: BH_3O_3	U - 12,15	User # — Approximate Amount (Tons/Yr.) 12 — 21 15 — 275	

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Phosphoric Acid	CAS Registry #[7664-38-2] Molecular Formula: H_3O_4P	U - 4,27,43,45	User # / Approximate Amount (Tons/Yr.) 45 — 1 4 — 49 27 — 30 43 — 26	
Nitric Acid	CAS Registry #[7697-37-2] Molecular Formula: HNO_3	U - 16,27,13,68	User # / Approximate Amount (Tons/Yr.) (Confidential) — 28 13 — Less than 0.25 16 — 56 27 — 6 68 — 10	
Citric Acid	CAS Registry #[77-92-9] Molecular Formula: $C_6H_8O_7$	U - 20,45	User # / Approximate Amount (Tons/Yr.) 20 — 200 45 — 50,000	
Acetic Acid	CAS Registry #[64-19-7] Molecular Formula: $C_2H_4O_2$	U - 27	User #27 reports 160 gallons/yr.	
Zeoquest TM 102 Synthetic Resin Defoulant	Hydroxyethylidene= phosphonic acid, potassium salt.	3 - 1	More than 500 lbs./yr.	Designed to prevent accumulation of troublesome desposits, such as metallic oxides, silt, dead microbiological growth, and other suspended matter which may collect in ion exchange resin beds.
Alum	Sulfuric acid, aluminum salt (3:2) CAS Registry #[10043-01-3] Molecular Formula: Al 3/2 H_2O_4S	19,85, - others 5,6,8, 15,16,17, 18,19,21, 22,24,25, 26,31,32, 33,34,40,	Total use is ca. 25,000 tons/yr.	(12) Uses include: as a precipitating agent with rosin sizing; for phosphorus removal in WWTPs, and as a flocculant.

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Strike 15-3	Confidential	53 - 17	User #17 reports ca. 36 tons/yr.	(4,23)
Far Lube	Ingredients: Distearyldimethyl= ammonium chloride, volcanic silica, sodium chloride.	91 - 70	User #70 reports 1,200 lbs./yr.	
Cerfak 515	(see HYDROCARBONS)			
SL-500FP	Trisodium nitrilotriacetate= tetrasodium ethylene diamine= tetra-acetate; sodium polyacrylate.	55 - 17	User #17 adds 100 lbs./million gals. of boiler water	(24)
Chromic Acid Flakes		U - 38	User #38 reports ca. 14 tons/yr.	
Quilon	Acetic acid, lithium salt CAS Registry #[546-89-4] Molecular Formula: $C_2H_4O_2 \cdot Li$	U - 1,6	User #6 reports ca. 6 tons/yr.	[2] Contains chromium (119)
Ca-Sterate		U - 1	More than 500 lbs./yr.	(17) [1]
Aluminum Acetate	CAS Registry #[139-12-8] Molecular Formula: $C_2H_4O_2 \cdot 1/3Al$	U - 1	More than 500 lbs./yr.	(22) [1]
Elvax 420	Acetic acid ethyenyl ester, polymer with ethene. CAS Registry #[24937-78-8] Molecular Formula: $(C_4H_6O_2C_2H_4)_X$	U - 1,15	More than 500 lbs./yr.	Used as a hot melt coating by the paper industry.

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Polyvinyl Acetate or Vinac 881	Acetic acid ethnyl ester, homopolymer CAS Registry #[9003-20-7] Molecular Formula: $(C_4H_6O_2)x$	84, - 1,8,15 others	User #8 reports ca. 9.5 tons/yr. User #15 unknown	(1) [6] Vinac 881 has formaldehyde added as a preservative.
Salt Cake	Sulfuric acid disodium salt CAS Registry #[7757-82-6] Molecular Formula $H_2O_4S \cdot 2Na$	41 - 1,15	More than 500 lbs./yr. User #15 reports ca. 9,500 tons/yr.	[2]
Sodium Gluconate	D-Gluconic acid, monosodium salt CAS Registry #[527-07-1] Molecular Formula $C_6H_{12}O_7 \cdot Na$	U - 1	Less than 500 lbs./yr.	(3) [1]
Zeolex 23P	(See ORGANO-SILICON COMPOUNDS)			
Accosize 17	Active Ingredients: Succinic anhydride alkenyl	19 - 17	User reports ca. 114 tons/yr.	
Fribran 68	Active Ingredients: Succinic anhydride alkenyl	78 - 17	Unknown	
Sodium Silicate	(See INORGANIC COMPOUNDS-Silicates)			
Aluminum Sulfate	(See INORGANIC COMPOUNDS-Sulfates)			
Sorbic Acid	CAS Registry #[110-44-1] Molecular Formula: $C_6H_8O_2$	U - 45, 44	User # / Approximate Amount (tons/yr.) 45 — 125 44 — 29	
Lactic Acid	CAS Registry #[50-21-5] Molecular Formula: $C_3H_6O_3$	U - 44	User #44 reports ca. 5 tons/yr.	

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Eleuate	Phosphoric acid with defoamer.	48 - 44	User #44 reports ca. 600 gals./yr.	
Dividend	Orthophosphonic acid - 30% Dodecyl benzene sulfonic acid - 5% Inert ingredients - 65%	48 - 44	User #44 reports ca. 200 gals./yr.	
Hypochlorous Acid Calcium Salt or Calcium Oxychloride or Solvox KS	Hypochlorous acid, calcium salt CAS Registry # [7778-54-3] Molecular Formula: Ca.2ClHO	44,45, - 2,3,8 40 17,19, 43	User # 2 Unknown 3 100-500 million pounds produced, used annually 8 10.5 tons/yr. 17 6.8 tons/yr. 19 10.5 tons/yr. 43 5 tons/yr. Manufacturer #40 produces 1 million to 10 million lbs./yr.	(22) Manufacturers do not necessarily supply users.
Sodium Chlorite	Chlorous Acid, sodium salt CAS Registry #[7758-19-2] Molecular Formula $ClHO_2Na$	61,70 - 16	More than 500 lbs./yr.	Used for odor control.
Sodium Hypochlorite	Hypochlorous acid, sodium salt CAS Registry #[7681-52-9] Molecular Formula ClHO·Na	U - 19, 44	More than 500 lbs./yr.	(22) Also used in bleaching of broke.
Oakite 85	Sulfuric acid - 20% Phosphoric acid - 20% Kerosene - 30%	28 - 1,39	More than 500 lbs./yr. User #39 reports ca. 180 gals./yr.	(3)[4] Incompatible with alkaline materials oxidizing agents and materials containing chlorine. When heated to decomposition, may form oxides of sulfur.

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Oakite EXR	Sulfuric acid 35%	28 - 15	More than 500 lbs./yr.	(3) [4] Incompatible with alkaline materials, oxidizing agents and materials containing chlorine. When heated to decomposition, may form oxides of sulfur.
Nalco 496	Inorganic material with acidic properties. Contains sulfuric acid.	33 - 1,5	User #5 reports addition of 32 balls/month to cooling water.	Used as a water stabilizing chemical to adjust alkalinity of cooling water.
Nalpac 8242	Aqueous solution of tri-sodium salt of nitrilotriacetic acid, organophosphonate and hydrazine (1%).	33 - 1	Less than 500 lbs./yr.	(24) Contains hydrazine. Cannot be used in plants requiring USFDA regulation or USDA approval.
Nalco 7245	Aqueous solution of tri-sodium salt of nitrilotriacetic acid, organo phosphonate and amine. Contains 2% hydrazine.	33 - 1	More than 500 lbs./yr.	(24) Contains hydrazine

ACRYLIC ACID
(ESTERS AND SALTS)

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Moqul WS-164	A blend of sodium polyacrylate, sodium phosphonate, sodium chromate, and aryl triazole.	17 - 7	User #7 reports ca. 250 lbs./yr.	Used for treatment of incoming well water.
Polyquest	Sodium polymethacrylate, potassium hydroxide, sodium lignosulfonate, hydroxyethylidene-diphosphonate acid and nitrilotriacetic acid.	3 - 1	More than 500 lbs./yr.	[1] A synthetic sludge conditioner.
Dearborn 659 LPA	(See ORGANIC NITROGEN COMPOUNDS)			
Betz Polysperse	(Confidential)	14 - 16	More than 500 lbs./yr.	(7,9)
Hercofloc 834.5	Polymethacrylate	32 - 1,4	User #4 reports ca. 11 tons/yr.	(18, 12)
Nalco 8203	(see ACRYLAMIDE POLYMERS)			
Nalco 8184	(see ACRYLAMIDE POLYMERS)			
Nalchelate 762	(see ACID AND ACID DERIVATIVES)			
Nalco 625	(see ACRYLAIMDE POLYMERS)			
Nalco 7627	Methyl acrylate-acrylic acid copolymer; USFDA clearance for use in food-grade paper under 21 CFR 121.2526.	33 - 1	More than 500 lbs./yr.	[1] Pitch dispersant used in paper making. Will decompose to to unburned hydrocarbons and NO_2.
Moqul CL-652	(see PHOSPHATES)			
Hercules BL209	Polyacrylate with chelant	32 - 13	User #13 reports 13.33 gals./million gallons of boiler water makeup.	
Hercules BL206	10% Polyacrylate dispersant	32 - 13	User #13 reports 13.33 gals./million gallons of boiler water makeup.	

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
PVA	Ethenol homopolymer CAS Registry #[9002-89-5] Molecular Formula: $(C_2H_4O)x$	U - 6,15	User #6 reports ca. 237 tons/yr.	[2]
Alcohol	Ethanol CAS Registry #[64-17-5] Molecular Formula: C_2H_6O	U - 1	More than 500 lbs./yr.	(15) [9]
Alcohol - Methanol Ispropanol Mix		U - 34	User #34 reports ca. 4,500 gals./yr.	(15)
DuPont Elvanol Grade 71-30G	A polyvinyl alcohol.	50 - 39	User #39 reports ca. 10 tons/yr.	
Nalcon 243	(See HETEROCYCLIC COMPOUNDS - Carbothialdine)			
Igepal CO-710, CO-660 and CO-630	Poly (oxy-1, 2-ethanediyl),= alpha-(nonylphenyl)-omega-hydroxy CAS Registry #[9016-45-9] Molecular Formula: $(C_2H_4O)_nC_{15}H_{24}O$	62 - 1	More than 500 lbs./yr.	(8,9) [3] Incompatible with concentrated oxidizing agents.
Igepal DM-710	Poly(oxy-1, 2-ethanediyl),= alpha-(dinonylphenyl)-omega-hydroxy CAS Registry #[9014-93-1] Molecular Formula: $(C_2H_4O)_nC_{15}H_{24}O$	62 - 1	Unknown	(8,9) [1] Incompatible with concentrated oxidizing agents.

ALCOHOLS

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Pegosphere 200 ML	Poly (oxy-1, 2-ethanediyl),= (1-oxododecyl)-omega-hydroxy	68 - 1	More than 500 lbs./yr.	(9) [1]
DIHYDROXY ALCOHOLS				
Nalco 2303	Blend of polyglycols in oil.	33 - 1	More than 500 lbs./yr.	(15) [1] Used for foam control. Should avoid contact with strong oxidizing agents.
Nalco 8203	(See ACRYLAMIDE POLYMERS)			
Nalco 7313	Formula proprietary. Contains hexylene glycol (4%).	33 - 10	Unknown	Liquid cooling water dispersant; especially effective as a hydrocarbon dispersant.
Nalco 6PC907	(See PHOSPHATES)			
Nalco 8656	Contains polyglycol. USFDA clearance under FDA 121.2526 when used as directed.	33 - 1	More than 500 lbs./yr.	Starch modification chemical.
Nalco 71-D5	Fatty acid/polyglycol antifoam in a hydrocarbon carrier.	33 - 1	More than 500 lbs./yr.	(7) [1]
Nalco 7623	(See PHENOLIC COMPOUNDS)			
Betz Foam-trol 174	(Confidential) USDA approval under 21 CFR 176.210.	14 - 1	More than 500 lbs./yr.	(7) [1]
Betz Foam-trol 109	(Confidential) USDA approval under 21 CFR 176.210.	14 - 5	User #5 reports ca. 1,500 lbs./yr.	(7)
Metasol J-26	Ethyleneglycol - 54% N-[alpha-(1-nitroethyl)benzyl] ethylenediamine, as potassium salt - 25% Solvents and inert ingredients - 21%	55 - 1	Less than 500 lbs./yr.	(21) [1] Product can be used in manufacture of paper and board for food packaging.

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Dearborn 659LPA	(See ORGANIC NITROGEN COMPOUNDS)			
Nalco 750	Aqueous solution of polyoxyalkyleneglycol	33 - 1	More than 500 lbs./yr.	Boiler antifoaming agent. May decompose to carbon monoxide and carbon dioxide.
Glycol	1,2 Ethanediol CAS Registry #[107-21-1] Molecular Formula: $C_2H_6O_2$	U - 1	More than 500 lbs./yr.	Used as a plasticizer in the pulp and paper industry.
FC-829	Active ingredients: Ethylene glycol, ethylene acetate, fluorochemical polymer.	80 - 17	User #17 reports ca. 30 tons/yr.	
Nalco 7631	(See PHENOLS)			
Propylene Glycol	CAS Registry #[57-55-6] Molecular Formula: $C_3H_8O_2$	U - 46	User #46 reports ca. 8,690 gals./yr.	
TRIHYDRIC ALCOHOLS				
Nalco 445	Phosphated-ethoxylated glycerine	33 - 5	User #5 reports 4 quarts/month from May to October in cooling water.	Used to minimize deposition of calcium scales in cooling water systems.

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Spec Tac 1000	Sodium hydroxide Sodium gluconate Sodium carbonate	5 - 1, 17	More than 500 lbs./yr. User #17 reports ca. 17 tons/yr.	(3) [3]
Magnus AC-10	More than 10% Sodium hydroxide also chelates and surfactants* *Sufactant Patent #3,334,147	27 - 1	More than 500 lbs./yr.	(3) Also used for scale and deposit removal.
Magnus 145-NF	Sodium hydroxide Solvents (unknown)	27 - 1	More than 500 lbs./yr.	(23) [2]
Magnus 215-D	More than 10% sodium hydroxide.	27 - 1	More than 500 lbs./yr.	(3) [2] Alkaline detergent for cleaning oil and grease.
Oakite 45	Sodium hydroxide-45% Sodium meta-silicate-25% Sodium carbonate-10% Kerosene-10% Phosphate salts-2.1%	28 - 1	More than 500 lbs./yr.	(3) [4] Incompatible with hightly acidic materials and hot water.
Oakite LFL	Sodium hydroxide-15%	28 - 1	More than 500 lbs./yr.	(3) [1] Incompatible with highly acidic materials and hot water.
Hydrogen Peroxide	CAS Registry #[7722-84-1] Molecular Formula: H_2O_2	U - 1, 17	More than 500 lbs./yr. User #17 reports ca. 1,200 tons/yr.	[4]
Nalco 8600	Sodium hydroxide-5%	33 - 1, 17	More than 500 lbs./yr. User #17 reports ca. 60 tons/yr.	Fourdrinier wire life extender. Decomposition products include CO_2, SO_2 or oxides of nitrogen.

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
KC-Compound	Potassium hydroxide Sodium gluconate Cresylic acid Amphoteric surfactant Water	36 - 1	Less than 500 lbs./yr.	(3,4) [2]
Calcium Hydroxide	CAS Registry #[1305-62-0] Molecular Formula: CaH_2O_2	44 - 3, 4	More than 500 lbs./yr. 10-50 million pounds used and produced annually by user #44; user #4 reports ca. 33 lbs./day.	User #4 does not necessarily buy from manufacturer #44.
Sodium Hydroxide	CAS Registry #[1310-73-2] Molecular Formula: HNaO	45 - 2	Not Reported	
Potassium Hydroxide	CAS Registry #[1310-58-3] Molecular Formula: HKO	U - (Confidential)	User reports ca. 45 tons/yr.	
Alkasan 44	Caustic cleaner	76 - 17	User #17 reports ca. 9 tons/yr	
Sodium Hydroxide	CAS Registry #[1310-73-2] Molecular Formula: HNaO	48,63,- others 17,3,4,5, 8,37,14, 19,15,16, 34,38,20, 30,27,23, 22,43,11, 47,64,48, 49,55, (Confi- dential)	User # — Approximate Amount (tons/yr.) 17 — 1,500 3 — 200 4 — 1,250 5 — 5,750 8 — 200 37 — 50,000 gals. 14 — 100 19 — 150 15 — 2,750 16 — 15,750 34 — 5,200 gals. 38 — 3,000 gals. 20 — 175 30 — 25 27 — 1,650 gals. 23 — 100,000 gals. 22 — 140,000 gals. 43 — 2,500 11 — 86 lbs./million gals. of boiler water makeup 47 — 1 64 — Unknown 48 — 100 49 — 0.5 55 — 9 (Confidential) — 1,250	Used in alkaline pulping and bleaching. Users #9, 16 & 48 use 50% NaOH. User #27 uses 30% NaOH. User #49 uses 15% NaOH.

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Ammonium Hydroxide	CAS Registry #[1336-21-6] Molecular Formula: H_5NO	U - 1,23	User #23 reports 264 lbs./yr. Other four users report greater than 500 lbs./yr.	[5] May be used as a boiler water makeup chemical.
Avid L	Potassium Hydroxide with chlorine & wetting agents.	U - 44	User #44 reports ca. 400 gals./yr.	
Oakite Stripper Additive	Carboxylate type chelating agent.	28 - 39	Unknown	Used to boost the power of alkali paint stripping solutions.
Tex Strip 12	Proprietary (highly alkaline)	73 - 8,13, 15,17	User # / Approximate Amount (tons/yr.) 8 — 7.5 13 — greater than 0.25 15 — greater than 0.25 17 — 17.5	(4)
Texo-915	Proprietary (highly alkaline)	73 - 1, 8	User #8 reports ca. 26 tons/yr.	(3) [2]
Kopanex Powder RL	Sodium Hydroxide Alkaline sodium salts Complex phosphate salts Hydrocarbon solvent	52 - 15	More than 500 lbs./yr.	(3)
ND-150	(Confidential)	54 - 1	Less than 500 lbs./yr.	(8) [1]

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Polyacrylamide or Percol 720	2-Propenamide, homopolymer CAS Registry#[9003-05-8] Molecular Formula: $(C_3H_5NO)x$	U - 1	More than 500 lbs./yr.	(18,12) [3]
Separan CP7 Flocculant	Polyacrylamide -- acrylic acid-N= -dimethylaminomethyl acrylamide - 5% Water - 95%	31 - 1	More than 500 lbs./yr.	(15,18) [1] Oral toxicity: LD_{50} (rat) more than 5,000 mg/kg. Incompatible with acids, oxidizing materials, and some metals.
Nalco 623	2-Propenoic acid, polymer with 2-propenamide CAS Registry#[9003-06-9] Molecular Formula: $(C_3H_5NO \cdot C_3H_4O_2)x$	33 - 8	User #8 reports ca. 6000 lbs./yr.	Liquid retention and drainage aid in papermaking systems.
Nalco 7649	2,2-Dibromo-3-nitrolopropionamide 20%	33 - 17	User #17 reports ca. 7 tons/yr.	(21) [1]
Betz Polymer 1205	(Confidential) USDA Approval	14 - 1	More than 500 lbs./yr.	(18) [1]
Urea	CAS Registry #[57-13-6] Molecular Formula: CH_4N_2O	U - 4, 6	User # / Approximate Amount tons/yr. 4 / 27 6 / 1,700	(17) [2]
Foam Master TRBL	Oil based fatty amide non-ionic emulsifier	U - 4	User #4 reports ca. 1,200 lbs./day	

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Accurac 135	Polyacrylamide Polymer	19 - 17	User #17 reports ca. 122 tons/yr.	(18)
Betz Polymer 1260	(Confidential)	14 - 1, 6	User #6 reports 4 lbs./million gals. effluent.	(18) Organic copolymer used to increase the retention of fillers and pigments.
Hercofloc 847	Acrylamide-acrylic acid resins	32 - 39	User #39 reports ca. 1 lb./day	Used for sludge dewatering. Aquatic toxicity: very low.
Hercofloc 855	Acrylamide polymers and copolymers	32 - 39	User #39 reports ca. 4 lbs./day	(12)

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Tinofix QF	Amine formaldehyde resin	2 - 43	User #43 reports ca. 1,000 lbs./yr.	Used to increase fastness properties of certain dyes on cellulosic mat.
Turbine Defoulant	Active ingredient: Morpholine	3 - 1	More than 500 lbs./yr.	[1] Toxic or corrosive if swallowed. Used as an on-stream turbine cleaner.
Dearmeen	Diethylaminoethanol	3 - 16	More than 500 lbs./yr.	Used as a return line treatment chemical. Chemically it is a neutralizing amine corrosion inhibitor. It is toxic or corrosive if swallowed.
Wheelmate 205	Amines Nitrites Polyethelyne glycol 5%	12 - 1	More than 500 lbs./yr.	(6) [1] The USEPA considers sodium nitrite to be hazardous to aquatic life.
Betz-Chelant CL-2	(Confidential)	14 - 43	User #43 reports ca. 2,500 gals./yr.	(24)
Dimethyldiallyl Ammonium Chloride Polymer	2-Propen-1-aminium, N,N-dimethyl= -N-2-propenyl-,chloride, homopolymer CAS Registry #[26062-79-3] Molecular Formula: $(C_8H_{16}N{\cdot}Cl)x$	U - 1	Unknown	
Cat-Floc	2-Propen-1-aminium, N,N-dimethyl-= N-2-propenyl-,chloride, homopolymer CAS Registry #[26062-79-3] Molecular Formula: $(C_8H_{16}N{\cdot}Cl)x$	55 - 1	Unknown	(18)
Metasol J-26	(See DIHYDROXY ALCOHOLS)			

AMINES

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Nalco 7245	(See ACIDS)			
Nalco 7607	Aqueous solution of polyquaternary amine chloride.	33 - 1	More than 500 lbs./yr.	Used as a retention aid in papermaking systems.
Nalco 356	A blend of cyclohexylamine (25%) and morpholine (10%)	33 - 11, 5	User #5 reports 20 lb/month during heating season to boiler water; User #11 reports 10 lbs./million gals. of water.	(22) [3] Also used as a corrosion inhibitor.
Versene	(See CARBOXYLIC ACID ESTERS)			
Arosurf TA-100	1-Octadecanaminium, N, N-dimethyl= N-octadecyl-chloride CAS Registry #[107-64-2] Molecular Formula: $C_{38}H_{80}NCl$	71 - 1	More than 500 lbs./yr.	(22) [1]
NL-90	Active Ingredient: Cyclohexylamine diethylaminoethanol	55 - 2, 17, 4	8 lbs./million gals. of boiler water at plant 4 & 17; 5 lbs./day at plant 2.	Used as a condensate corrosion inhibitor.
NL-160	Active Ingredients: Octadecylamine and fatty amino acetates.	55 - 17	User #17 reports ca. 15 lbs./million gals. of boiler water	Used as a condensate corrosion inhibitor.
Parez 607	Active Ingredients: 1,3,5-Triazine-2,4,6-triamine polymer with formaldehyde CAS Registry # [9003-08-1] Molecular Formula: $(C_3H_6N_8CH_2O)x$	19 - 8	Use has been discontinued as of 1978.	Contains formaldehyde.

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Nalco 354	Aqueous solution of: cyclohexylamine-10% morpholine-10% ethoxylated amine	33 - 1, 5, 6	User #6 reports ca. 90 lbs./million gals. effluent; User #5 reports ca. 77 lbs./million gals. of water in steam condensate lines	[3] Corrosion inhibitor in condensate systems; should avoid contact with strong acids.
Hercules BL-285	Neutralizing amine-35%	32 - 13	User #13 reports 33.33 gals./million gals. of boiler water makeup	(24)
Super Filmeen 22	Primary haloqenated tallow and other amines (octadecylamine)-16.5% other amines-1.5% acetic acid less than-1%	3 - 13	User #13 reports ca. 0.5 lbs./day	
Hercules BL-294	Blend of volatile neutralizing amines. Contains: Morpholine-20% Cyclohexylamine-20% USFDA clearance under Section 121.1088.	32 - 1	Unknown	Will decompose to oxides of nitrogen.
Hercules BL-295	Blend of volatile organic amines. Contains: Morpholine-10% Cyclohexylamine-10% USFDA clearance under Section 121.1088.	32 - 39	User #39 reports ca. 8 gals./day	Will decompose to oxides of nitrogen.

AMMONIA COMPOUNDS

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Aqua Ammonia	Active Ingredient: Ammonium hydroxide CAS Registry #[1336-21-6] Molecular Formula: H_5NO	18 - 8	User #8 reports ca. 200 lbs./yr.	
Ammonia	CAS Registry #[7664-41-7] Molecular Formula: H_3N	Many - 4, 15, 16, 43	Total use more than 200 tons/yr.	More users than reported. Used as a pulping liquor chemical.
Nalco 7655	Aqueous solution of polyquaternary ammonium chloride.	33 - 17	User #17 reports ca. 9 tons/yr.	Used as a cationic liquid polymer. May release ammonia fumes or vapor.
Ammonium Hydroxide	(See ALKALIS)			
Ammonium Persulphate	Peroxydisulfuric acid, diammonium salt CAS Registry #[7727-54-0] Molecular Formula: $H_3N \cdot 1/2\ H_2O_8S_2$	74 - 1, 17	User #17 reports ca. 5 tons/yr.	(22) [2]
Render	N-alkyl dimethyl benzyl ammonium chloride-4.8% Tetrasodium ethylenediamine tetraacetate-0.05% Inert ingredients-94.7%	48 - 44	User #44 reports ca. 50 gals./yr.	
Betz-Slimetrol RX-36	(See ORGANO SULFUR COMPOUNDS)			

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Vinings AMA31	Sodium dimethyl dithiocarbamate - 16% Disodium ethylene bisdithiocarbamate - 15%	13 - 3	User #3 reports ca. 3.7 lbs./million gals. of water	(21)
Busan 52	Active Ingredients: Potassium N-hydroxymethyl-N= -methyldithiocarbamate - 32% Sodium 2-mercaptobenzothiazole - 8% Inert ingredients - 60% Above chemicals have use clearance under USFDA regulation 121.2505	15 - 1, 6	More than 500 lbs./yr. User #6 reports ca. 8.2 lbs./million gals. effluent.	(21) [2] This product is toxic to fish.
Busan 881	Active Ingredients: Potassium N-methyldithiocarbamate - 20.3% Disodium cyanodithiomidocarbonate - 14.7% Inert Ingredients - 65.0%	15 - 1	More than 500 lbs./yr.	(21) [2] This product is toxic to fish.
Betz-Slime-trol RX-34	(Confidential)	14 - 1	More than 500 lbs./yr.	(21) [1]

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Myiar	Poly(oxy-1,2-ethanediylcarbonyl= -1,4-phenylenecarbonyl) CAS Registry #[25038-59-9] Molecular Formula: $(C_{10}H_8O_4)_x$	U - 15	More than 500 lbs./yr.	
ALDEHYDES				
Formaldehyde Polymer	Formaldehyde, polymer with 5-amino-1,3,3, Trimethylcyclohexane,methanamine and phenol CAS Registry #[252675-17-2] Molecular Formula: $(C_{10}H_{22}N_2.C_6H_6O.CH_2O)_x$	42 - U	Up to 1,000 lbs. produced annually.	
Kymene 917	Cationic, urea-formaldehyde wet strength resin USFDA clearance under Sections 121.2526 and 121.2571.	32 - 8	User #8 reports ca. 18 tons/yr.	
Formaldehyde	CAS Registry #[50-00-0] Molecular Formula: CH_2O	U - 1,14,13	User # / Approximate Amount (lbs./yr.) 13 / More than 500 14 / 1,850	(19) [4]
Glyoxal	Ethanediol CAS Registry #[107-22-2] Molecular Formula: $C_2H_2O_2$	U - 1	More than 500 lbs./yr.	(19) [3]
Vineland V-10-X	(See HYDROCARBONS)			

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
KETONES				
Busan 90	Active Ingredients: 2-Bromo-4 Hydroxyacetophenone-30% Inert Ingredients-70% Above chemical composition has use clearance under USFDA Regulations 176.170 and 176.300.	15 - 1, 5	More than 500 lbs./yr.	(21) [2] This product is toxic to fish.
Methyl Ethyl Ketone	CAS Registry #[78-93-3] Molecular Formula: C_4H_8O	U - 1	More than 500 lbs./yr.	(15) [1]
Acetone	2-Propanone CAS Registry #[67-64-1] Molecular Formula: C_3H_6O	U - 1	Less than 500 lbs./yr.	(15) [1]

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Suryln	2-Propenic acid, 2-methyl-,polymer with ethene, sodium salt CAS Registry #[25608-26-8] Molecular Formula: $(C_4H_6O_2.C_2H_4)_x.nNa$	21 - 1, 5	More than 500 lbs./yr.	
Versene	Glysine, N, N-1, 2-ethanediylbis [N-(carbomethyl)] CAS Registry #[60-00-4] Molecular Formula: $C_{10}H_{16}N_2O_8$	31 - 6, 13	User #6 reports ca. 37 tons/yr.; User #13 reports more than 500 lbs./yr.	
CARBOXYLIC ACID ESTERS				
Ethylene Vinyl Acetate Copolymer	Acetic acid ethenyl ester, polymer with ethene CAS Registry #[24937-78-8] Molecular Formula: $(C_4H_6O_2C_2H_4)_x$	U - 1	More than 500 lbs./yr.	(1) [1]
Span 60	Sorbitan, monooctadecanoate CAS Registry #[1338-41-6] Molecular Formula: $C_{24}H_{46}O_6$	26 - 1	More than 500 lbs./yr.	(22) [1]
Tween-80	Sorbitan, mono-9-octadecanoate,= poly(oxy 1-2-ethandiyl) derivatives	26 - 1	More than 500 lbs./yr.	(22) [1]
Tamol 731	(See MISCELLANEOUS)			

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Kymene 557	Hexanedioic acid, polymer with N-(2-amino ethyl)-1, 2-ethanediamine and (chloromethyl) oxirane CAS Registry #[25212-19-5] Molecular Formula: $(C_6H_{10}O_4C_4H_{13}N_3C_3H_5ClO)_x$	32 - 8, 15	User #8 reports ca. 1,900 lbs./yr. User #15 Unknown	
Dioctyl Sodium Sulfosuccinate	Butanedioic acid, sulfo-1, 4-bis= (2-ethylhexyl) ester, sodium salt CAS Registry #[577-11-7] Molecular Formula: $C_{20}H_{38}O_7SNa$	U - 1	Unknown	

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
AZO DYES				
Monoazo Dyes				
Chrysoidine Y Extra Concentrate	1, 3-Benzenediamine, 4-(phenylazo),= -monohydrochloride CAS Registry #[532-82-1] Molecular Formula: $C_{12}H_{12}N_4ClH$ Color Index #11270	58 - 19	Unknown	
Crocein Scarlet LFL Extra Concentrate or Acid Red 137	2-Naphthalenesulfonic acid,= 7-(acetylamino)-3-[[4-(acetylamino)= phenyl]azo]-4-hydroxy-,monosodium salt CAS Registry #[6222-63-5] Molecular Formula: $C_{20}H_{18}N_4O_6S\cdot Na$ Color Index #17755	58 - 19	Unknown	
Paper Red APX	2-Naphthalenesulfonic acid,= 7-(acetylamino)-3-[[4-(acetylamino)= phenyl]azo]-4-hydroxy-monosodium salt CAS Registry #[6222-63-5] Molecular Formula: $C_{20}H_8N_4O_6S\cdot Na$	48 - 39	User #39 reports ca. 1,500 lbs./yr.	
Phenamine Yellow	Direct azo	62 - 17	User #17 reports ca. 16 tons/yr.	
Acid Orange R	2,7-Naphthalenedisulfonic acid,= 3-hydroxy-4-(phenylazo)-disodium salt CAS Registry #[5859-00-7] Molecular Formula: $C_{16}H_{12}N_2O_7S_2{}^2Na$	U - 15	More than 500 lbs./yr.	[1]
Acilan Croceine FL or C.I. Acid Red 137	Color Index #17755	59 - 19	Unknown	Contains less than 50 ppm phenol (65)

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Intracid Fast Orange 2R or C.I. Acid Orange 8	Color Index #15575	58 - 19	Unknown	
Acilan Orange RO		59 - 19	Unknown	Contains: Lead (122) - less than 30 ppm; Other heavy metals - less than 10 ppm
Erio Orange R (Peroacid Orange 5R) or C.I. Acid Orange 8	Color Index #15575	2 - 19	Unknown	Contains: Zinc (128) - 45 ppm Chromium (119) - 55 ppm Arsenic (115) - 8 ppm Mercury (123) - 0.5 ppm
Amacid Orange RP Extra or Acid Orange 8	Chemical family: Monoazo CAS Registry #[5850-86-2] Color Index #15575	77 - 19	Unknown	
Golden Yellow RB	Active Ingredients: Diethanolamine Formaldehyde Monoazo	U - 17	User #7 reports ca. 25 tons/yr.	
Diazo Dyes				
Paper Yellow 3GX-125 or C.I. Direct Yellow 4	CAS Registry #[3051-11-4] Color Index #24890	59 - 19, 39	User # / Approximate Amount (lbs./yr.): 39 — 4,000; 19 — Unknown	Contains less than 0.1% Phenol (65)
Pontamine Bond Blue B or C. I. Direct Blue 218	CAS Registry #[10401-50-0] Color Index #24401	50 - 1	More than 500 lbs./yr.	Contains Copper (120)

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Pontamine Fast Orange WS or C.I. Direct Orange 102	Benzoic acid, 4-[[1-hydroxy-6-= [[[5-hydroxy-6-(phenylazo)-7-= sulfo-2-naphthalenyl]amino]= carbonyl]amino]-3-sulfo-2-= naphthalenyl]azo]-,trisodium salt CAS Registry #[6598-63-6] Molecular Formula: $C_{34}H_{24}N_6O_{11}S_23Na$ Color Index #29156	50 - 1	More than 500 lbs./yr.	
Phenamine Fast Orange WS	Chemical composition same as above.	48 - 39	User #39 reports 100 lbs./yr.	
Tinolite Yellow G-96	Chemical family: Diazo	2 - 17	User #17 reports ca. 8 tons/yr.	
Pontamine Fast Scarlet 4 BS or C.I. Direct Red 123	2-Naphthalenesulfonic acid, 3-= [[4-(acetylamino)phenyl]azo]-4-= hydroxy-7-[[[[5-hydroxy-6-= (phenylazo)-7-sulfo-2-naphthalenyl]= amino]carbonyl]amino]-disodium salt CAS Registry #[3441-14-3] Molecular Formula: $C_{35}H_{27}N_7O_{10}S_22Na$ Color Index #29160	50 - 1	Unknown	
Pontamine Blue BB	2, 7-Naphthalenedisulfonic acid, 3,= 3'-[[1,1'-biphenyl]-4, 4'-diylbis= (azo)]bis[5-amino-4-hydroxy-, tetra= sodium salt CAS Registry #[2602-46-2] Molecular Formula: $C_{32}H_{24}N_6O_{14}S_44Na$	50 - 1	More than 500 lbs./yr.	[1]
Pontamine Sky Blue M or C.I. Direct Blue 15	1, 3-Naphthalenedisulfonic acid, 6,= 6'-[(3, 3' dimethoxy [1, 1'-biphenyl]= -4, 4'diyl) bis(azo)]bis[4-amino-5-= hydroxy-,tetrasodium salt CAS Registry #[2610-05-1] Molecular Formula: $C_{34}H_{28}N_6O_{16}S_44Na$ Color Index #24400	50 - 1	More than 500 lbs./yr.	[2]

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Pontamine Fast Red 8 BLX or C.I. Direct Red 81	2-Naphthalene sulfonic acid, 7-=(benzoylamino)-4-hydroxy-3-=[[4-[(4-sulfophenyl)azo] phenyl]=azo-, disodium salt CAS Registry # [2610-11-9] Molecular Formula: $C_{29}H_{21}N_5O_8S_22Na$ Color Index #28160	50 - 1, 17	User #17 reports ca. 1,500 lbs./yr.	[3]
Fastusol Red 8BL Liquid	2-Naphthalenesulfonic acid,=7,7'-(carbonyldiamino)bis[4-=hydroxy-3-[[2-sulfo-4-[(4-sulfophenyl)=azo]phenyl]azo]-, hexasodium salt CAS Registry #[2610-10-8] Molecular Formula: $C_{45}H_{32}N_{10}O_{21}S_66Na$	48 - 19	Unknown	
Phenamine Sky Blue A Liquid	2,7-Naphthalenedisulfonic acid,=3,3'-[(3,3'-dimethoxy[1,1'-biphenyl]=-4,4'diyl)bis(azo)]bis[5-amino-4-=hydroxy-tetrasodium salt CAS Registry #[2429-74-5] Molecular Formula: $C_{34}H_{28}N_6O_{16}S_44Na$	48 - 19	Unknown	
Niagra Blue 2B	2,7-Naphthalene=disulfonic acid,3,3'-[[1,1'-biphenyl]-4,4'-diylbis=(azo)]bis[5-amino-4-hydroxy-,=tetrasodium salt CAS Registry #[2602-46-2] Molecular Formula: $C_{32}H_{24}N_6O_{14}S_44Na$	U - 1	Less than 500 lbs./yr.	[1]
Pyrazol Fast Yellow 5GL or C.I. Direct Yellow 44	Color Index #29900	89 - 1	More than 500 lbs./yr.	[1]
Chloramine Blue 3B	2,7-Naphthalenedisulfonic acid,=3,3'-[3,3'-dimethyl]-[1,1'biphenyl]=-4,4'-diyl)bis(azo)bis[5-amino-4-=hydroxy-,tetrasodium salt CAS Registry #[72-57-1] Molecular Formula: $C_{34}H_{28}N_6O_{14}S_44Na$	U - 1	Less than 500 lbs./yr.	[1]

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Pontamine Fast Blue 7GLN or C.I. Direct Blue 218	Color Index #24401	50 - 1	More than 500 lbs./yr.	[1]
Direct Blue 2B or Direct Blue 6	2,7-Naphthalenedisulfonic acid= 3,3'-[[1,1'-biphenyl]-4,4'-= diylbis(azo)]bis[5-amino-4-hydroxy-,= tetrasodium salt Registry #[2602-46-2] Molecular Formula: $C_{32}H_{24}N_6O_{14}S_4{}^4Na$ Color Index #22610	58 - 39	Unknown	A suspected carcinogen (National Cancer Institute data).
Chloramine Fast Scarlet 4B	2-Napthalenesulfonic acid,-3-[[4-= (acetylamino)phenyl]azo]-4-hydroxy-= 7-[[[[5-hydroxy-6-(phenylazo)-7-= sulfo-2-naphthalenyl]amino]carbonyl]= amino]-,disodium salt CAS Registry #[3441-14-3] Molecular Formula: $C_{35}H_{27}N_7O_{10}S_2{}^2Na$	U - 17	User #17 reports ca. 5.5 tons/yr.	[1]
Cartosol Blue 2GF or Direct Blue 15	2,7-Naphthalenedisulfonic acid,= 3,3'-dimethoxy[1,1'-biphenyl]-4,4'= diyl)bis(azo)bis[5-amino-4-hydroxy-,= tetrasodium salt CAS Registry #[2429-74-5] Molecular Formula: $C_{34}H_{28}N_6O_{16}S_4{}^4Na$ Color Index #24400	89 - 1, 15	More than 500 lbs./yr.	[2]
Pontamine Fast Scarlet or C.I. Direct Red 72	Color Index #29200	50 - 1	More than 500 lbs./yr.	[1]
Intrabond Paper Red BLX or C.I. Direct Red 81	Color Index #28160	58 - 19	Unknown	
Brilliant Paper Yellow C or C.I. Direct Yellow 4	Color Index #24890	58 - 19	Unknown	[1] Contains less than 10 ppm phenol (65)

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Intralite Blue 8GLL or C.I. Direct Blue 218/224	Color Index #24400	58 - 19	Unknown	Contains several percentages copper (120)
Direct Fast Blue 3RLP	Proprietary	77 - 17	Unknown	
Fastusol Blue 9GS	O-diansidine is an intermediate in making this dye.	48 - 39	User #39 reports ca. 1 ton/yr.	A suspected carcinogen (National Cancer Institute data).
Amafast Bond Blue 10GLP Concentrate or C.I. Direct Blue 218	Chemical family: Copperized disazo dye Color Index #24400	77 - 19, 17	User #17 reports ca. 10 tons/yr.; User #19 unknown	
Amanil Bond Yellow CGP or Direct Yellow 84	Chemical family: Disazo ureylene dye CAS Registry #[12222-65-0] Chemical formula: Proprietary	77 - 19	Unknown	
Amafast Red 8BLP Concentrate or C.I. Direct Red 81	Chemical family: Disazo CAS Registry #[2610-11-9] Color Index #28160	77 - 19	Unknown	
Amanil Sky Blue M Liquid or C.I. Direct Blue 15	Chemical family: Disazo CAS Registry #[2429-74-5] Color Index #24400 Contains Lithium hydroxide (5%)	77 - 19	Unknown	
Amanil Red NAS Liquid	Chemical family: Ureylenebis disazo dye Chemical formula: Proprietary Contains Diethyl Phthalate (5%)	77 - 17, 19	User #17 reports ca. 13 tons/yr.; User #19 unknown	Diethyl Phthalate (70)

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Triazo Dyes				
Direct Black E Extra Concentrate or Direct Black 38	2,7-Naphthalenedisulfonic acid,= 4-amino-3-[[4'-[(2,4-diaminophenyl)= azo][1,1'-biphenyl]-4-yl]azo]-5= -hydroxy-6-(phenylazo)-,disodium salt CAS Registry #[1937-37-7] Molecular Formula: $C_{34}H_{27}N_9O_7S_2 \cdot 2Na$ Color Index #30235	58 - 19, 39	Unknown	Contains less than 10 ppm benzidine (5) - a suspected carcinogen (National Cancer Institute data).
Phenamine Green	2,7-Naphthalenesulfonic acid, 4= -amino-5-hydroxy-6-[[4'-[(4-hydroxy= phenyl)azo[1,1'biphenyl]-4-yl]azo]-3= -[(4-nitrophenyl)azo]-,disodium salt CAS Registry #[4335-09-5] Molecular Formula: $C_{34}H_{24}N_8O_{10}S_2 \cdot 2Na$	48 - 1	Less than 500 lbs./yr.	[1]
Direct Brilliant Green CBM	2,7-Naphthalenesulfonic acid,= 4-amino-5-hydroxy-6-[[4'-[(4= -hydroxyphenyl)azo[1,1'-biphenyl]= -4-yl]-azo]-3-[(4-nitrophenyl)-azo]-,= disodium salt CAS Registry #[4335-09-5] Molecular Formula: $C_{34}H_{24}N_8O_{10}S_2 \cdot 2Na$	U - 1	More than 500 lbs./yr.	[1] Contains a trace of benzidine (5)
Erie Green GPD	2,7-Naphthalenedisulfonic acid,= 4-amino-5-hydroxy-6-[[4'-[(4-hydroxy= phenyl)azo][1,1'biphenyl]-4-yl]azo]= -3-[(4-nitrophenyl)azo]-disodium salt CAS Registry #[4335-09-5] Molecular Formula: $C_{34}H_{24}N_8O_{10}S_2 \cdot 2Na$	U - 1	More than 500 lbs./yr.	[1] Contains a trace of benzidine (5)
Phenamine Black E200	2,7-Naphthalenedisulfonic acid,= 4-amino-3-[[4'-[(2,4-diaminophenyl)= azo][1,1'biphenyl]-4-yl]azo]-5= -hydroxy-6-(phenylazo)-,disodium salt CAS Registry #[1937-37-7] Molecular Formula: $C_{34}H_{27}N_9S_2 \cdot 2Na$	48 - 1	Less than 500 lbs./yr.	[1] Contains a trace of benzidine (5)

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Amanil Black P Dye	Chemical family: Triazo Chemical formula: Proprietary	77 - 19	Unknown	Amanil Black P Dye
Organometallic Dyes				
Solantine Brown BRL	Cuprate (2-),[5-[[4'-[[2,6-dihydroxy= -3-[(2-hydroxy-5-sulfophenyl)azo]= phenyl]azo][1,1'biphenyl]-4-yl]azo]= -2-hydroxybenzoato(4-)]-disodium salt CAS Registry #[16071-86-6] Molecular Formula: $C_{31}H_{18}CuN_6O_9S \cdot 2Na$	U - 1	More than 500 lbs./yr.	(10) [1]
Intralite Brown BRLL or C.I. Direct Brown 95	Chemical composition same as above. CAS Registry #[16071-86-6] Molecular Formula: $C_{31}H_{18}CuN_6O_9S \cdot 2Na$ Color Index #30145	58 - 39	Unknown	(10) - A suspected carcinogen (National Cancer Institute data). Contains a trace of benzidine (5).
DIMETHOXANE DYES				
Pontamine Black SP	Chemical family: Dimethoxane	50 - 1, 17	User #17 reports ca. 1.75 tons/yr.	[2]
Pontamine Yellow 303	Chemical family: Dimethoxane	50 - 17	User #17 reports ca. 23 tons/yr.	
DIPHENYLMETHANE DYES				
Auramine Base or C.I. Solvent Yellow 34	Color Index #41000:1	U - 15	More than 500 lbs./yr.	
METHINE DYES				
Basic Yellow B6	Chemical family: Methine	50 - 17	User #17 reports ca. 55 tons/yr.	
Brilliant Flavine 6G	Active Ingredients: N,N-Dimethylacetamide Sodium fluorosilicate Methine	50 - 17	User #17 reports ca. 4 tons/yr.	

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
PHTHALOCYANINE DYES				
Astra Blue 6GLL or C.I. Basic Blue 48	Proprietary	59 - 1	More than 500 lbs./yr.	
Pontamine Turquoise 8GLP or C.I. Direct Blue 86	Color Index #74180	50 - 1	Less than 500 lbs./yr.	[1]
Brilliant Bond Blue A	Active ingredients: Phthalocyanine Ethylene glycol	50 - 17	User #17 reports ca. 2 tons/yr.	
Amafast Turquoise 8GLP Concentrate or C.I. Direct Blue 86	Chemical family: Copper phthalocyanine dye CAS Registry #[1330-38-7] Color Index #74180	77 - 19	Unknown	
STILBENE DYES				
DuPont Stilbene Yellow GXS	Proprietary	50 - 17	User #17 reports ca. 50 tons/yr.	[1]
Phorwite P-Liquid-Paper White SP Solution	Chemical family: Stilbene disulfonic acid Chemical formula: Proprietary	59 - 19, 1	Unknown	[2] Flourescent whitening agent. May release CO, CO_2, oxides of nitrogen and sulfur if burned. Contains zinc (128).
Direct Yellow TGX or C.I. Direct Yellow 11	Color Index #40000	58 - 19	Unknown	
Stilbene Yellow 5G or C.I. Direct Yellow 6:1	CAS Registry #[1325-42-4]	48 - 39	User #39 reports ca. 1,000 lbs./yr.	
Direct Stilbene Yellow		U - 15	More than 500 lbs./yr.	

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Stilbene Yellow TP or C.I. Direct Yellow 11	CAS Registry #[1325-37-7] Color Index #40000	48 - 19, 39	User #39 reports ca. 3 tons/yr.; User #19 unknown	
Amanil Stilbene Yellow DP	Chemical family: Polymerized stilbene dye CAS Registry #[1325-27-7] Chemical formula: Proprietary	77 - 19	Unknown	Burning may produce oxides of nitrogen, SO_2, or carbon monoxide.
TRIARYLMETHANE DYES				
Methyl Violet FN	A mixture of the hydrochlorides of the more highly methylated pararsoanilines, containing principally the N-tetra, penta-, and hexa methyl derivatives. CAS Registry #[8004-87-3] Color Index #42535	48 - 19	Unknown	
Basic Methyl Violet 4BX Liquid	Chemical composition same as above	58 - 15, 19	More than 500 lbs./yr.	[2]
Paper Blue R	Methanaminium, N-[4-[bis[4-(dimethyl=amino)phenyl]methylene]-2,5-cyclo=hexadien-1-ylidene]-N-methyl-,chloride CAS Registry #[548-62-9] Molecular Formula:$C_{25}H_{30}N_3 \cdot Cl$ Color Index #42555	90 - 1, 17	More than 500 lbs./yr.	[2]
Victoria Green	Methanaminium N-[4-[[4-(dimethyl=amino)phenyl]phenylmethylene]-2,5=-cyclohexadien-1-ylidene]-N-methyl-,=chloride CAS Registry #[569-64-2] Molecular Formula: $C_{23}H_{25}N_2.Cl$	50 - 1	More than 500 lbs./yr.	
Solar Blue RMN or C.I. Pigment Blue 14	CAS Registry #[1325-88-8] Color Index #42600	48 - 1	Less than 500 lbs./yr.	[1]

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Basic Malachite Green Crystals or C.I. Basic Green 4	Diamino derivative of triphenylmethane Color Index #42000	58 - 19	More than 500 lbs./yr.	
XANTHENE DYES				
Rhodamine B	Ethanaminium, N-[9-(2-carboxyphenyl)=-6-(diethylamino)-3H-xanthen-3=-ylidene]-N-ethyl-,chloride CAS Registry #[81-88-9] Molecular Formula: $C_{28}H_{31}N_2O_3 \cdot Cl$ Color Index #45170	50 - 17	User #17 reports ca. 500 lbs./yr.	
Rhodamine BX	Chemical composition same as above CAS Registry #[81-88-9] Molecular Formula: $C_{28}H_{31}N_2O_3 \cdot Cl$ Color Index #45170	90 - 1	More than 500 lbs./yr.	
Eric Black GPNF	Unknown	U - 1	More than 500 lbs./yr.	Contains a trace of benzidine (5)
Pontamine Fast Blue B	Unknown	50 - 1	Unknown	[1]
Pyrazol Yellow 2GCD	Unknown	89 - 1	More than 500 lbs./yr.	[1]
Pyrazol Fast Brilliant Blue VP	Unknown	U - 1	More than 500 lbs./yr.	[1]
Pontamine Brilliant Yellow 5GA or C.I. Direct Yellow 119	Proprietary	50 - 1	Less than 500 lbs./yr.	[1]
DuPont Turquoise S	Unknown	50 - 15	More than 500 lbs./yr.	
Basic Safranine	Unknown	U - 15	More than 500 lbs./yr.	

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Direct Fast Orange SR	Unknown	U - 15	More than 500 lbs./yr.	
Phenamine Yellow BL	Unknown	48 - 1	More than 500 lbs./yr.	[1]
Direct Fast Red FTA	Unknown	U - 15	More than 500 lbs./yr.	
Acid Paper Magenta	Unknown	U - 15	More than 500 lbs./yr.	
Pontamine Yellow G	Unknown	50 - 1	More than 500 lbs./yr.	[1]
Direct Diphenyl Violet	Unknown	U - 15	More than 500 lbs./yr.	
Basic Red BG	Unknown	U - 15	Less than 500 lbs./yr.	
Bond Yellow TDC	Proprietary	58 - 19	Unknown	Toxic by inhalation (rat).
Intrabond Liquid Black SP or C.I. Direct Black	Unknown	58 - 19	Unknown	
Direct Yellow RB or C.I. Direct Yellow 127	Proprietary	58 - 19	Unknown	Contains zinc (128)
Verona Dyes	Unknown	U - 19	Unknown	
Cabolite 100	Unknown	U - 19	Unknown	

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Pontamine Bond Yellow or C.I. Direct Yellow 147	Proprietary	50 - 1	More than 500 lbs./yr.	[2]
Direct Pontamine Fast Red	Unknown	50 - 15	More than 500 lbs./yr.	
Acid Paper Red	Unknown	U - 15	Less than 500 lbs./yr.	
Direct Fast Blue 3RPL	Unknown	U - 15	More than 500 lbs./yr.	
Amanil Fast Red	Unknown	U - 1	More than 500 lbs./yr.	[1]
Basic Chrysoidine	Unknown	U - 15	More than 500 lbs./yr.	
Pontamine Yellow 711 or C.I. Direct Yellow 711	Proprietary	50 - 1	More than 500 lbs./yr.	[1]
Pontamine Fast Yellow 2R	Proprietary	50 - 1	More than 500 lbs./yr.	[1]
Brilliant Bond Blue G	Unknown	48 - 39	User #39 reports ca. 250 lbs./yr.	
Fastusol Yellow RP	Unknown	48 - 39	User #39 reports ca. 1000 lbs./yr.	
Phenamine Yellow GN	Unknown	48 - 39	User #39 reports ca. 1 ton/yr.	
Verona Astra Blue	Unknown	U - 1	More than 500 lbs./yr.	[1]

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Basic Methylene Blue	Unknown	U - 15	More than 500 lbs./yr.	
Basic Yellow BL or C.I. Basic Yellow 58	Proprietary	50 - 1	More than 500 lbs./yr.	[1]
Direct Paper Brown	Unknown	U - 15	More than 500 lbs./yr.	
Crystal Green Concentrate Liquid	Unknown	48 - 19	Unknown	
Pontamine Blue 3 RPR	Unknown	50 - 17	User #17 reports ca. 18 tons/yr.	
Direct Yellow G Concentrate or C.I. Direct Yellow 107	Proprietary	58 - 1	Unknown	[1] Toxic by inhalation (rat).
Intrabond Liquid Red 5BB or C.I. Direct Red 81	Proprietary	58 - 1	Unknown	
Direct Paper Yellow LGG	Unknown	U - 15	More than 500 lbs./yr.	
Sandofix SWE	Unknown	U - 1	More than 500 lbs./yr.	[2]
DuPont Paper White SP Solution	Proprietary	50 - 1, 39	More than 500 lbs./yr.	[3]
Acid APX	Unknown	U - 1	More than 500 lbs./yr.	[1]
Brilliant Flavine 6G	Unknown	U - 1	More than 500 lbs./yr.	[1]

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Amanil Bond Blue B6A	Proprietary	77 - 19	Unknown	Burning may produce oxides of nitrogen, SO_2, or carbon monoxide.
MISCELLANEOUS DYES				
Phenamine Fast Scarlet 4GBP & 4BA	2-Naphthalenesulfonic acid, 6-amino CAS Registry #[93-00-5] Molecular Formula: $C_{10}H_9NO_3S$	48 - 19, 39	User #39 reports ca. 1 ton/yr.; User #19 unknown	
Methylene Blue 2B Concentrate	(See HETEROCYCLIC COMPOUNDS -OXAZOLE)			

EPOXIDES

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Pluronic L61	Oxirane, methyl-,polymer with oxirane CAS Registry #[9003-11-6] Molecular Formula: $(C_3H_6O \cdot C_2H_4O)_x$	48 - 1	Unknown	(11)

ETHERS

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Irgasan DP 300 (Triclosan)	2,4,4'-trichloro-2'hydroxydiphenyl= ether	2 - 1	More than 500 lbs./yr.	(13) [1]
Limit 33 Defoamer	Blend of polyoxyethylene ethers and copolymers. Conforms to USFDA specifications under Title 21 Chapter I Part 121.2519.	25 - 39	User #39 reports ca. 90 gallons/yr.	(7)

FATTY ACIDS ESTERS

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Hercules Defoamer 491	Alcohol-fatty acid partial ester. USFDA clearance under Title 21, Section 176.200 and 176.210.	32 - 1	More than 500 lbs./yr.	(7) [2] For use in alkaline or acid papermaking systems.
Nalco 71-D5	(See DIHYDROXY ALCOHOLS)			
Tall Oil	Fatty acids, tall-oil, sodium salts CAS Registry #[67190-45-2]	39 - U	10-50 million lbs. are produced annually.	

FATTY AND RESIN ACIDS

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Monsize	Contains: Abietic acid Dehydroabietic acid Isoprimaric acid Pimaric acid Oleic acid Linoleic acid Linolenic acid	25 - 8	User #8 reports ca. 100 tons/yr.	(20)
Accostrength 410	Contains: Abietic acid	19 - 15	More than 500 lbs./yr.	(20)
Neuphor 100	Contains: Abietic acid USFDA clearance under Sections 176.170 and 176.180.	32 - U	More than 500 lbs./yr.	(20)
Rosin Size	Usually contains a mixture of resin acids.	32, - 1, 17, 5, 15 others 32, 6, 19, 31	User # / Approximate Amount (tons/yr.) 17 — 1,000 5 — 502 15 — 875 32 — 375 6 — 44 19 — 120 31 — 5,000 (gals./yr.)	(20) [8] Used as a bonding additive or as an internal sizing agent.

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Rubber Gloss Cleaner	Ingredients: Water - more than 85% CAS Registry #[7732-18-5] Molecular Formula: H_2O Potassium tallate - less than 5% CAS Registry #[61790-44-1] Fatty acids, tall oils, potassium salts Potassium dodecyl benzenesulfonate - less than 5% CAS Registry #[27177-77-1] Molecular Formula: $C_{18}H_{30}O_3S^{\cdot}K$ Sodium ethylene diaminetetra-acetate - less than 5% CAS Registry #[64-02-8] Molecular Formula: $C_{10}H_{16}N_2O_8{}^{\cdot}4Na$ Sodium sulfate - less than 2% CAS Registry #[7757-82-6] Molecular Formula: $H_2O_4S^{\cdot}2Na$ Pine oil - less than 1% CAS Registry #[8002-09-3] Composed primarily of isomeric tertiary and secondary cyclic terpene alcohols Benzene, ethenyl-homopolymer - trace CAS Registry #[9003-53-6] Molecular Formula: $(C_8H_8)_x$	34 - 1	More than 500 lbs./yr.	(4) Hazard Class (49(FR 172.101)) Nonhazardous.

GLYCERIDES

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Tallow	Trialkyl (glyceride) CAS Registry #[61789-97-7] An animal fat. Contains primarily glycerides of C_{16}-C_{18} fatty acids.	43 - U	10-50 million lbs. produced annually	
Tallow Soap	Hi-trite soap	91 - 70	User #70 reports ca. 400 lbs./yr.	

GUMS

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Gendriv 162	Guar gum CAS Registry #[9000-30-0]	20 - 1, 16	More than 500 lbs./yr.	(18) [2]
Hercules Cellulose Gum	(See CELLULOSE)			
Gum Arabic	CAS Registry #[9000-01-5]	U - 1	More than 500 lbs./yr.	(1) [1]
Lycoid OPM-CD	Guar gum	U - 8	User #8 reports ca. 3.5 tons/yr.	(18)
Guar Gum	CAS Registry #[9000-30-0]	U - 44	User #44 reports ca. 24 tons/yr.	

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
THIAZOLE				
Busan 30	Active ingredient: 2-(Thiocyanomethylthio)benzothiazole - 30% Inert ingredients - 70%	15 - 6, 1	More than 500 lbs./yr.	(13) [1] Used to control the growth of fungi that cause the degradation of wood chips and pulp. This product is toxic to fish.
Busan 72	Active ingredient: 2-(Thiocyanomethylthio)benzothiazole - 60% Inert ingredients - 40%	15 - 43	User #43 reports ca. 8 tons/yr.	(13) [2] Used for preservation of wood chips, wet pulp, and mulch paper and manufacture of mold resistance paper and paperboard. This product is toxic to fish.
Busan 25	(See SULFONATES)			
CARBOTHIALDINE				
AMA 3,5D	Tetrahydro-3,5-dimethyl-2H-1,3,5-thiadiazine-2-thione - ca. 99% CAS Registry #[533-74-4] Molecular Formula: $C_5H_{10}N_2S_2$	13 - 1	Less than 500 lbs./yr.	(21) [1] Toxic to fish. Waste disposal in an approved landfill.
Nalcon 246	3,5-dimethyl-1,3,5,2H tetrahydro-thiadiazine-2-thione - 24% CAS Registry #[533-74-4] Molecular Formula: $C_5H_{10}N_2S_2$	33 - 3, 1	More than 500 lbs./yr. User #3 reports 5.3 lbs./million lbs. of treated water.	(21) [2] Decomposition products include dimethyl amine, oxides of sulfur, H_2S, formaldehyde or CS_2.

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Nalcn 248	3,5-Dimethyl-1,3,5,2H tetrahydro-thiadiazine-2-thione - 24% CAS Registry #[533-74-4] Molecular Formula: $C_5H_{10}N_2S_2$	33 - 17	User #17 reports ca. 10 tons/yr.	(13) [1] Microorganism control chemical for preservative applications. Toxic to fish and bacteria, should not be discharged to fish bearing waters and sludge systems. May decompose to dimethylamine, oxides of sulfur, H_2S, formaldehyde or CS_2.
Nalcon 243	Active Ingredients: 3,5 Dimethyl=1,3,5,2H tetrahydrothiadiazine-2=thione - 24% Isopropanol - 9% CAS Registry #[533-74-4] Molecular Formula: $C_5H_{10}N_2S_2$	33 - 15	More than 500 lbs./yr.	(21) May decompose to dimethyl amine, oxides of sulfer, H_2S, formaldehyde or CS_2. Toxic to fish and bacteria. Keep out of fish bearing waters and sludge systems.
Tamol 731	2,5-Furandione, polymer with 2,4,4=trimethyl pentene, sodium salt	30 - 1	Unknown	(9)
Slimex 14	Ingredients: 3,5-Dimethyltetrahydro=1,3,5,2H-thiadiazine-2-thione - 19% Ethylene diamine - 5% Sodium hydroxide - 5% Water - 71%	8 - 16	More than 500 lbs./yr.	(21) Will decompose to oxides of nitrogen and sulfur.
Metasol D3T-H	Tetrahydro-3,5-dimethyl-2H-1,3,5=thiadiazine-2-thione, sodium salt - 21% 2-Mercaptobenzothiazole, sodium salt - 6% Inert ingredients - 73%	55 - 8	User #8 reports ca. 5 tons/yr.	(21) This product is toxic to fish. Treated effluent should not be discharged where it will drain into lakes, streams, ponds, or public water.

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
OXAZOLE				
Uvitex OB	bis-benzoxazolyl derivative	2 - 15	More than 500 lbs./yr.	Used as an optical brightener for polymers.
Methylene Blue 2B Concentrate	Phenothiazine-5-ium,3,7-bis-= (dimethylamino)-,chloride CAS Registry #[61-73-4] Molecular Formula: $C_{16}H_{18}N_3S \cdot Cl$	58 - 19	Unknown	(10)

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Stoddard Solvent	CAS Registry #[8052-41-3] A colorless, refined petroleum distillate that is free from rancid or objectionable odors and that boils in a range of approximately 300-400°F.	49 - 13, 43	User #43 reports 20,000 gals./yr.; User #13 unknown	(8)
Turpentine	CAS Registry #[9005-90-7] Extractives and their physically modified derivatives Pinus palutric, Pinaceae.	U - 1	More than 500 lbs./yr.	(15) [1]
Midwestern Coal		U - 15	More than 500 lbs./yr.	(2) [1]
Bitusize		U - 1	More than 500 lbs./yr.	(2) [1]
Perfect-8-Mod Coal		U - 1	More than 500 lbs./yr.	(2) [1]
Hercules Defoamer 831	Hydrocarbon oil-based defoamer USFDA clearance under Title 21, Sections 176.200 and 176.210.	32 - 1	More than 500 lbs./yr.	(7) [2] Used for defoaming paper coatings and size press applications.
Nalco 61G10	Petroleum Hydrocarbon - 92% USFDA clearance under 21 CFR 121.2519, 121.2557 and 121.2520.	33 - 1	More than 500 lbs./yr.	(4,7) [2]
Colloid 790	Surfactants in a hydrocarbon base. USFDA-approved (Section 121.2526). OSHA approval for carcinogens (Section 1910-93C)	35 - 1	More than 500 lbs./yr.	(7) Wet end application in paper mills.

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Turpentine, Oil	Turpentine, Oil CAS Registry #[8006-64-2] Any of the volatile predominately terpenic fractions or distillates resulting from the solvent extraction of, gum collection from, or pulping of softwoods. Composed primarily of the $C_{10}H_{16}$ terpene hydrocarbons: alpha-pinene, beta-pinene, limonene, 3-carene, camphene. May contain other acyclic, monocyclic, or bicyclic terpenes, oxygenated terpenes, and anethole.	39 - U	1-10 million lbs. produced annually	
Ligroine, Mineral Spirits or V.M.&P. Naptha	CAS Registry #[8032-32-4] A complex combination of hydrocarbons obtained by the fractional distillation of petroleum. This fraction boils in the range of approximately 20-135°C.	U - 1, 13	More than 500 lbs./yr.	(15) [3]
Naphtha	CAS Registry #[64741-84-0] A complex combination of hydrocarbons obtained as a raffinate from a solvent extraction process. It consists predominantly of aliphatic hydrocarbons having carbon numbers in the range C_5 to C_{11} and a boiling range of approximately 35-190°C.	U - 15	Unknown	(15)
Kerosene	CAS Registry #[8008-20-6] A complex combination of hydrocarbons produced by the distillation of crude oil. It consists of hydrocarbons having carbon numbers predominantly in the range C_9 through C_{16} and boiling in the approximate range of 150-290°C.	U - 1, 30	User #30 reports 2,300 gals./yr.	(8, 15) [3]

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Natural Gas	CAS Registry #[64741-48-6] A complex combination of hydrocarbons separated as a liquid from natural gas in a gas recycling plant by processes such as refrigeration or absorption. It consists mainly of saturated aliphatic hydrocarbons having carbon numbers in the range C_2 to C_8.	U - 1	Unknown	
Cerfak 515	Petroleum hydrocarbon - 35-40% Alkylaryl sulfonic acid - 20-25% Phosphoric acid - 20-25% Sulfuric acid - 5-10% Non-ionic surfactant - 5-12% Water - 5-10%	8 - 1	More than 500 lbs./yr.	(22) [1] Will decompose to oxides of sulfur and phosphorus after water is boiled off.
Mobilpar H	Mineral oils - 75% Additives - ca. 15% Cyclohexanol - ca. 10%	9 - 1	More than 500 lbs./yr.	(7) [1] Will decompose to CO and CO_2.
Sovasol No. 5	Aliphatic petroleum solvent	9 - 8, 19	User #8 reports ca. of 1,200 lbs./yr. User #19 unknown	(3,15) Will decompose to oxides of nitrogen, CO and CO_2. Contains naphthalene (55).
Aqua Pel	Petroleum hydrocarbon	11 - 1	More than 500 lbs./yr.	Thermal decomposition to CO.
Berchem CL	(See MISCELLANEOUS)			
Syl-Off 294 Paper Coating	(See SILOXANES)			

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Asphalt	CAS Registry #[8052-42-4] A very complex combination of high molecular weight organic compounds containing a relatively high proportion of hydrocarbons having carbon numbers predominantly greater than C_{25} with high carbon to hydrogen ratios.	Many - 1, 15	More than 500 lbs./yr.	[2] May contain small amounts of various metals, such as nickel, iron or vanadium.
#2 Fuel Oil	CAS Registry #[68476-30-2] A distillate oil having a minimum viscosity of 32.6 SUS at 100°F. to a maximum of 37.9 SUS at 100°F.	U - 33, 15, 34	User # / Approximate Amount (gals./yr.) 33 — 1,300,000 15 — 770,000 34 — 2,500,000	(2)
Piccovar AP 25	Aromatic hydrocarbon plasticizer USFDA clearance under Section 175.105 and Section 177.2600	32 - 15	More than 500 lbs./yr.	This alkylaryl resinous material is used as a plasticizer, softener, and tackifier for other resins.
Vineland V-10-X	1,4-Bis(bromoacetoxy)-2-butene - 48% 2,3-dibromopropionaldehyde - 32%	U - 1, 13	User #13 reports ca. 12-15 lbs./day	(21) [2] Chemical is not a routine addition at plant #13. Contains trichloroethylene (87).
Lubricating Oil and Greases		U - 31, 61, 45, 14, 16, 34 20, 29, 28 30, 70, 13, 35, 36, 64, 70	User # / Approximate Amounts 31 — 3,500 gals./yr. 61 — 100 gals./yr. 45 — 3,300 gals./yr. 14 — 4,500 gals./yr. 16 — 50,000 gals./yr. 34 — 104,000 gals./yr. 20 — 5,400 gals./yr. 29 — 100 gals./yr. 28 — 6,800 gals./yr. 30 — 300 gals./yr. 70 — 6,500 gals./yr. 13 — 13 tons/yr. 35 — more than 1 ton/yr. 16 — 1,400 tons/yr. 36 — 1.5 tons/yr. 28 — more than 1 ton/yr. 29 — more than 0.5 tons/yr. 64 — Unknown 70 — 6,500 gals./yr.	User #16 uses 1,400 tons/yr. as emulsion oil.

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
ALIPHATIC HYDROCARBONS Alkenes				
Polyethylene	Ethene homopolymer CAS Registry #[9002-88-4] Molecular Formula: $(C_2H_4)_x$	U - 5, 15, 41 50	More than 500 lbs./yr. User #50 reports ca. 929 tons/yr.	(18) [4]
Polypropylene	1-Propene, homopolymer CAS Registry #[9003-07-0] Molecular Formular: $(C_3H_6)_x$	U - 15, 62, 64	More than 500 lbs./yr.	(18)
Wax, Amorphous	CAS Registry #[8002-74-2] Paraffin waxes and hydrocarbon waxes - a complex combination of hydrocarbons obtained from petroleum fractions by solvent crystallization (solvent deoiling) or by the sweating process. It consists predominantly of straight chain hydrocarbons having carbon numbers predominantly greater than C_{20}.	U - 14, 19, 7 20, 15, 45	User # / Approximate Amount (tons/yr.) 14 — 75 19 — 2.5 7 — 1,150 20 — 4,650 15 — more than 0.25 45 — 4,500	Used as an internal and external sizing agent in papermaking. Also used by paper converting facilities.
Amorphous Polypropylene Adhesive		U - 15	More than 500 lbs./yr.	(1)
Wax, Crystalline		U - 15	More than 500 lbs./yr.	
Propylene Glycol	(See DIHYDROXY ALCOHOLS)			
Paracol	Wax emulsion	32 - 15	More than 500 lbs./yr.	Paracol is a general trade name product. The specific product used is not known.
Hi-T-Degreasol	Chemical family: Aliphatic petroleum hydrocarbon.	66 - 1	More than 500 lbs./yr.	(8) [1]

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Dienes				
Neoprene	Polychloroprene CAS Registry #[9010-98-4] Molecular Formula: $(C_4H_5Cl)_x$	U - 29	User reports ca. 18.5 tons/yr.	
MONOCYCLIC AROMATIC HYDROCARBONS				
Arenes				
Xylol	Benzene, dimethyl CAS Registry #[1330-20-7] Molecular Formula: C_8H_{10}	U - 1, 15	More than 500 lbs./yr.	(15) [1]
Toluol	Benzene, methyl CAS Registry #[108-88-3] Molecular Formula: C_7H_8	U - 1	Less than 500 lbs./yr.	(15) [2]
Syl-Off 292 Paper Coating	(See SILOXANES)			
Styrene-Butadiene Latex		U - 1, 15	More than 500 lbs./yr.	(5,14) [4]
Syl-Off 23 Paper Coating	(See SILOXANES)			
POLYCYCLIC AROMATIC HYDROCARBONS				
Piccotex	Benzene, ethenylmethyl-, polymer with (1-methylethenyl)benzene CAS Registry #[9017-27-0] Molecular Formula: $(C_9H_{10} \cdot C_9H_{10})_x$	U - 15	More than 500 lbs./yr.	
Dow 620	Benzene, ethenyl-, polymer with 1,3-butadiene CAS Registry #[9003-55-8] Molecular Formula: $(C_8H_8 \cdot C_4H_6)_x$	31 - 1	Unknown	(14)

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Lytron 2203	Polystyrene latex Covered under USFDA Title 21, CFR 176.170.	25 - 1	Unknown	Plastic pigment for paper and paperboard coatings.
Scripset 720	Styrene maleic anhydride copolymer	25 - 8, 39	User # / Approximate Amount (tons/yr.) 8 / 17.5 39 / 5	Used in surface sizing of paper.
Lytron 2501	Polystyrene latex Covered under USFDA Title 21, CFR 176.170.	25 - 1	More than 500 lbs./yr.	Plastic pigment for paper and paperboard coatings.
Blancol-N	(See ORGANO-SULFUR COMPOUNDS)			
Dow Latex 620 & 612	Benzene, ethenyl-, polymer with 1,3-butadiene CAS Registry #[9003-55-8] Molecular Formula: $(C_8H_8 \cdot C_4H_6)_x$	88 - U	More than 500 lbs./yr.	

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
CALCIUM BASED				
Lime	Calcium oxide CAS Registry #[1305-78-8] Molecular Formula: CaO	75, - others 1, 3, 4, 15, 16, 19, 12, 31, 6, 21	User # / Approximate Amount (tons/yr.) 3 — 5,750 4 — 3,500 12 — 1,000 15 — 13,000 16 — 9,000 19 — 10 21 — 400 31 — 18 6 — 53 lbs./million gals. effluent	Uses include pulp bleaching chemical and color removal in paper mill effluents.
Limestone	CAS Registry #[1317-65-3] A noncombustible solid characteristic of sedimentary rock. It consists primarily of calcium carbonate.	U - 3, 4, 1	User # / Approximate Amount (tons/yr.) 3 — 7,500 4 — 5,000	[3]
Lime-Hydrated or Pure-Cal	Unknown	U - 17, 4	User # / Approximate Amount 17 — 250 lbs./million gals. of boiler water 4 — 65 tons/yr.	
Calcium Carbonate	CAS Registry #[471-34-1] Molecular Formula: CH_2O_3Ca	U - 1, 17	More than 500 lbs./yr. User #17 reports ca. 790 tons/yr.	(11) [3]
Dolomitic Lime	Calcium oxide	U - 11	User # 11 reports 930 lbs./million gals. of boiler water.	

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
CHLORINES, CHLORIDES, CHLORITES & CHLORATES				
Chlorine	CAS Registry #[7782-50-5] Molecular Formula: Cl_2	82,31 - 2,3,17, 48,6, 4,5,8, 86,63, 18,11, others. 19,15, 16,20, 21,22, 23,24, 12,25, 26,40, 43,58, 60,6, 59,67	User # / Approximate Amount (tons/yr.) 2 Unknown 3 6,000 4 4,000 5 2,000 8 35 11 750 12 100 15 225 16 6,500 17 100 18 20 19 200 20 4.3 21 2 22 750 23 50 24 7.5 25 3 26 2.5 40 1.5 43 1,000 58 1.5 60 0.5 6 50 lbs./million gals. of effluent 59 1,875 gals./yr. 67 208 gals./yr.	Used as a pulp mill chemical for delignifying pulp. Also used as a disinfectant and oxidizing agent.
Chlorine Dioxide	CAS Registry #[10049-04-4] Molecular Formula: ClO_2	U - 1	More than 500 lbs./yr.	Used as an oxidizing agent.
Sodium Hypochlorite	(See ACID DERIVATIVES)			
Calcium Oxychloride or Solvox KS	(See ACID DERIVATIVES)			
Sodium Chlorite	(See ACID DERIVATIVES)			

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Calcium Chloride	CAS Registry #[10043-52-4] Molecular Formula: $CaCl_2$	U - 20	User #20 reports ca. 10,000 gals./yr.	
Sodium Chlorate	CAS Registry #[7775-09-9] Molecular Formula: $ClNaO_3$	U - 1	More than 500 lbs./yr.	[1]
Ferric Chloride	CAS Registry #[7705-08-0] Molecular Formula: Cl_3Fe	U - 12, 21, 22, 27	User # / Approximate Amount 12 — 225 tons/yr. 21 — 34,000 gals./yr. 22 — 90 tons/yr. 27 — 220 gals./yr.	Used for phosphorus removal in primarily clarifiers, and for sludge conditioning.
Iron Chloride	CAS Registry #[7758-94-3] Molecular Formula: Cl_2Fe	U - 27	User #27 reports ca. 575 gals./yr.	
Sodium Chloride	(See NATURAL PRODUCTS)			
Mercuric Chloride	CAS Registry #[7487-94-7]	U - 48	User #48 reports ca. 4 lbs./yr.	
Intrest	Potassium chloride & potassium hydroxide	U - 44	User #44 reports ca. 600 gals./yr.	
Kelochlor	Sodium and calcium chlorate	48 - 44	User #44 reports ca. 500 lbs./yr.	
FLOURIDES				
Calcium Flouride	CAS Registry #[7789-75-5] Molecular Formula: CaF_2	U - 52, 54	User # / Approximate Amount 52 — 412 tons/yr. 54 — 890 tons/yr.	
Best Sour	Sodium silicoflouride	91 - 70	User #70 reports ca. 1,200 lbs./yr.	

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
METALS, ALKALI METALS & METALLOIDS				
Magnesium Carbonate	CAS Registry #[546-93-0] Molecular Formula: CH_2O_3Mg	U - 27	350 lbs./yr.	
Magnesium Oxide	CAS Registry #[1309-48-4] Molecular Formula: MgO	U - 15	More than 500 lbs./yr.	
Chromium	CAS Registry #[7440-47-3] Molecular Formula: Cr	U - 51	User #51 reports ca. 10 tons/yr.	
Cyanide	CAS Registry #[57-12-5] Molecular Formula: CN	U - 51, 55	User # / Approximate Amount 51 — 350 lbs./yr. 55 — 10,000 lbs./yr.	
Nickel	CAS Registry #[7440-02-0] Molecular Formula: Ni	U - 51	User #51 reports ca. 3 tons/yr.	
Zinc	CAS Registry #[7440-66-6] Molecular Formula: Zn	U - 51, 55	User # / Approximate Amount 51 — 400 lbs./yr. 55 — 24,000 lbs./yr.	
Bronze		U - 38	User #38 reports ca. 200 tons/yr.	
Brass		U - 38, 27	User #38 reports ca. 135 tons/yr. User #27 reports ca. 1.5 tons/yr.	
Stainless Steel		U - 38	User #38 reports ca. 100 tons/yr.	
Copper	CAS Registry [7440-50-8] Molecular Formula: Cu	U - 27, 68	User # / Approximate Amount 27 — 9.5 tons/yr. 68 — 1 ton/yr.	

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Aluminum Foil	Aluminum CAS Registry #[7429-90-5] Molecular Formula: Al	U - 28, 36, 7, 15	User # / Approximate Amount (tons/yr.) 7 — 1,500 28 — 1,750 36 — 1 15 — greater than 0.25	
Manganese Sulfate A	CAS Registry #[7785-87-7] Molecular Formula: $H_2O_4S{\cdot}Mn$	U - 18	User reports ca. 1,500 lbs./yr.	
Zinc Oxide		U - 29	User reports ca. 30.5 tons/yr.	
Tin Tie Steel		U - 15	More than 500 lbs./yr.	
Iron	CAS Registry #[7439-89-6] Molelcular Formula: Fe	U - 53	User # 53 reports ca. 6,413 tons/yr.	
Magnesium	CAS Registry #[7439-95-4] Molecular Formula: Mg	U - 68	User #68 reports ca. 4.5 tons/yr.	
NITROGEN BASED				
Nalco 439-L	Blend of nitrates, nitrites, silicates and borates.	33 - 5	User reports 12 qts./month to cooling water from May to October.	Used for corrosion control in closed water systems.
Nitrate		U - 6	Use reported at 535 tons/yr.	
Sodium Nitrate	CAS Registry #[7631-99-4] Molecular Formula: $HNO_3{\cdot}Na$	U - 1, 16	More than 500 lbs./yr.	(17,22) [3]
Hercules BI-235	Contains 36% hydrazine	32 - 13	User #13 reports 2.5 gals./million gals. of boiler water makeup.	

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Hydrazine	CAS Registry #[302-01-2] Molecular Formula: H_4N_2	U - 23	User #23 reports ca. 380 gals./yr.	
PHOSPHATES				
Dearborn 241	(Confidential)	3 - 1	More than 500 lbs./yr.	[1] Used as an alkalinity builder.
Mogul W-139	Sodium polyphosphate	17 - 7	User #7 reports ca. 2,500 lbs./yr.	Used for control of scale and corrosion in water supply systems.
Nalco 18-S Ball and Nalco 18-S Pulv.	Blend of polyphosphate and starch.	33 - 6	User #6 reports ca. 54 lbs/million gals. of boiler feedwater.	Used to soften boiler feedwater.
Nalco 8203	(See ACRYLAMIDE POLYMERS)			
Nalco 918	Blend of polyphosphates.	33 - 8, 17	User #17 reports ca. 2,600 lbs./yr.; User #8 unknown	Water stabilizing chemical that provides scale and corrosion control.
Sodium Hexametaphosphate	CAS Registry #[10124-56-8] Molecular Formula: $H_6O_{18}P_6 \cdot 6Na$	U - 1	More than 500 lbs./yr.	(9,22) [2]
Betz P-83	Phosphates, acrylic polymers (Confidential)	14 - 17	User #17 reports ca. 9 tons/yr.	(9)
Hercules BL241	Sodium tripolyphosphate - 91% Lignusulfonate - 2%	32 - 13	User #13 reports ca. 53 lbs./million gals. of boiler water makeup.	
Dearborn 206	(Confidential)	3 - 16	More than 500 lbs./yr.	

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Sodium Tripoly Phosphate	CAS Registry #[7758-29-4] Molecular Formula: $H_5O_{10}P_3.5Na$	U - 1	More than 500 lbs./yr.	(9,22) [2]
Tripoly Phosphate		U - 1	More than 500 lbs./yr.	(9) [1]
Trisodium Phosphate	CAS Registry #[7601-54-9] Molecular Formula: $H_3O_4P \cdot 3Na$	U - 23	User #23 reports ca. 3,300 lbs./yr.	(24)
Sodium Phosphate	CAS Registry #[7601-54-9] Molecular Formula: $H_3O_4P \cdot 3Na$	U - 45	User #45 reports ca. 160 tons/yr.	
SILICATES				
Talc	CAS Registry #[14807-96-6] Molecular Formula: $H_2O_3Si \cdot 3/4\ Mg$	U - 1, 15	More than 500 lbs./yr.	(11) [7]
Silicate	Any of numerous compounds containing silicon, oxygen, and a metallic or organic radical.	U - 4	User #4 reports ca. 44 tons/yr.	
Hi-Sil 404	Silicon dioxide	69 - 1, 19, 8	User # / Approximate Amount 8 — 250 tons/yr. 19 — 250 tons/yr.	(11) [3]
Silica	CAS Registry #[7631-86-9] Molecular Formula: O_2Si	U - 1	More than 500 lbs./yr.	(16) [1]
Silicate Flattner Aerosil	Unknown	U - 15	More than 500 lbs./yr.	(16)
Sodium Silicate	Silicic acid, sodium salt CAS Registry #[1344-09-8]	50 - 15	User #15 reports ca. 625 tons/yr.	[2]

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Mistron Vapor	Active ingredient: Talc $(Mg_3H_2(SiO_3)_4)$ CAS Registry #[14807-96-6] Molecular Formula: $H_2O_3Si \cdot 3/4\ Mg$	U - 8	User # 8 reports ca. 13.5 tons/yr.	
Silica Sand		U - 52, 54	User # — Approximate Amount 52 — 52 tons/yr. 54 — 14,500 tons/yr.	
Linen Best	Ingredients: Sodium metasilicate Sodium hydroxide Sodium phosphates Sodium carbonate Dodecyl benzene sulfonate Optical brighteners Ethoxylated linear alcohols Volcanic silica	91 - 70	User #70 reports ca. 14 tons/yr.	
Formula S-2	Ingredients: Sodium metasilicate Sodium hydroxide Sodium tripolyphosphate Sodium carbonate Optical brighteners	91 - 70	User #70 reports ca. 12 tons/yr.	
SODIUM BASED				
Nalco 617	Sodium aluminate - 70% Sodium hydroxide - 4%	33 - 1, 31	User #31 reports ca. 2 gals./day	(24) [2] Used as a coagulant in water clarification systems.
Nalco 752	Blend of sodium humate and sulfite and monobutyl ethers of polyethylene polypropylene glycol.	33 - 6	61.5 lbs./million gals. of water at plant #6	(24)

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Nalco 75	Sodium humate Sodium hydroxide Sodium lignosulfonate Sodium hexametaphosphate Sodium carbonate Monobutyl ethers of polyethylene polypropylene glycol	33 - 5	10 lbs./million gals. of water at plant #5	(24)
Nalco 690 or Sodium Aluminate	Sodium aluminate CAS Registry #[1302-42-7] Molecular Formula: $AlO_2 \cdot Na$	33 - 19, 6, 15	User # 15 - more than 500 lbs./yr. User #19 - ca. 6,000 lbs./yr. User #6 - ca. 61.5 lbs./million gals. effluent	[7]
Soda-Ash or Sodium Carbonate	CAS Registry #[497-19-8] Molecular Formula: $CH_2O_2.2Na$	18, 87, - others 1, 4, 5, 13, 15, 17, 6	User # / Approximate Amount (tons/yr.) 4 — 20 5 — Unknown 13 — 2,750 15 — More than 0.25 17 — 60 6 — 490 lbs./million gals. effluent	(3,4) [12] Also used as a component in alkaline pulping mixtures.
Sodium Thiosulfate	(See INORGANIC COMPOUNDS - Sulfates)			
Sodium Citrate	CAS Registry #[68-04-2] Molecular Formula: $C_6H_8O_7.3Na$	U - 45	User #45 reports ca. 1,400 tons/yr.	
Hercules BL-323	(See INORGANIC COMPOUNDS - Sulfites)			
Sodium Hydrosulfite	CAS Registry #[7775-14-6] Molecular Formula: $H_2O_4S_2.2Na$	U - 1, 4, 8, 19	User # / Approximate Amount (tons/yr.) 4 — 3.75 8 — 0.75 19 — 16.5	[7]

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Lite Soda Ash	CAS Registry #[497-19-8] Molecular Formula: $CH_2O_3.2Na$	U - 4, 8, 19, 17	User # / Approximate Amount (tons/yr.) 4 — 21.5 8 — 5 19 — 40 17 — 167 lbs./million gals. of boiler water	
Calgon LS 32	Sodium sulfite	55 - 4	User #4 reports ca. 2 tons/yr.	
Salt	(See NATURAL PRODUCTS)			
Sodium Alginate	(See NATURAL PRODUCTS)			
SULFUR, SULFATES AND SULFITES				
Nalco 464	Sodium hydrosulfite Molecular Formula: $Na_2S_2O_4$	33 - 1	More than 500 lbs./yr.	Used to remove iron in ion exchange beds. Will decompose to sulfur dioxide.
Nalco 19 Pulv.	Catalyzed sodium sulfite	33 - 5, 6, 11	User # / Approximate Amount (lbs./million gals. water) 5 — 365 6 — 73 11 — 55	Used an an oxygen scavenger. Avoid contact with strong oxidizer or acids which could liberate sulfur dioxide gas.
K - 91	Active Ingredient: Sodium sulfite	55 - 17	User #17 reports ca. 17 lbs./million gals. of water.	(24)
Sulfur	CAS Registry #[7704-34-9] Molecular Formula: S	U - 15, 3, 4, 13, 16, 29,	User # / Approximate Amount (tons/yr.) 15 — More than 0.25 3 — 5,000 4 — 3,500 13 — More than 0.25 16 — 11,000 29 — 9	Used as a wood pulping chemical.

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Sulfur Dioxide	CAS Registry #[7446-09-5] Molecular Formula: O_2S	U - 1, 3, 16, 43	User # — Approximate Amount 3 — 200 tons/yr. 16 — 750 tons/yr. 43 — 53 tons/yr.	[4] Used in makeup of wood pulping liquor.
Sodium Sulfite	Sodium sulfite CAS Registry #[7757-83-7] Molecular Formula: $H_2O_3S \cdot 2Na$	72, - 1, 17, 8, others 13, 5, 57	User # — Approximate Amount (tons/yr.) 17 — 500 8 — 13.5 13 — 8,500 5 — Unknown 57 — 0.5	[9] Used as a pulping liquor component in alkaline pulping systems.
Sodium Bisulfite	Sodium bisulfite CAS Registry #[7631-90-5] Molecular Formula: $H_2O_3S \cdot Na$	U - 1, 20	User #20 reports ca. 18.5 tons/yr.	(3)
Copper Sulfate	CAS Registry #[7758-98-7] Molecular Formula: $Cu \cdot H_2O_4S$	U - 27	User #27 reports ca. 1,800 lbs./yr.	
Sodium Thiosulfate	CAS Registry #[7772-98-7] Molecular Formula: $H_2O_3S_2.2Na$	U - 1, 43	User #43 reports 210 gals./yr.	(22) [2]
Antichlor	Sodium thiosulfate	91 - 70	User #70 reports ca. 300 lbs./yr.	
Sodium Hydrosulfite	(See INORGANIC COMPOUNDS - Sodium Based)			
Calgon LS 32	(See INORGANIC COMPOUNDS - Sodium Based)			
Dearborn 66	(Confidential)	3 - 16	More than 500 lbs./yr.	(24) Oxygen scavenger
Hercules BL-233	Catalyzed sodium sulfite	32 - 39	User #39 reports ca. 8 gals./day	(24) Oxygen scavenger

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Kymene 557H	Cationic, wet strength resin USFDA clearance under Sections 176.170 and 176.180.	32 - 1, 8	User #8 reports ca. 1 ton/yr.	(20) [2] Contains epichlorohydrin and is treated by OSHA as a hazardous material.
Hercules Defoamer 5	This product has USFDA clearance as specified in the code of Federal Regulation, Title 21, Sections 176.210 and 176.200.	32 - 1	More than 500 lbs./yr.	(7) [1] Used in paper-making system using rosin size, alum, dyestuffs and various surfactants.
Slimes and Sludges, Activated, Dried, Papermaking	CAS Registry #[68188-15-8] The dried, mixed culture of micro-organisms from a waste treatment process of pulping and papermaking liquid wastes. Contains ammonia and phosphoric acid.	39, - N/A others	5,000 to 25,000 tons generated annually.	
Sulfite Liquor, Spent	CAS Registry #[66071-92-9] The aqueous solution resulting from the reaction of lignocellulosic substances with one or more pulping chemicals including those used in the kraft, sulfite, semichemical, or other pulping processes. Composition is highly variable and includes excess pulping chemicals, dissolved and degraded cellulose, hemicellulose and lignin.	44 - U	More than one billion pounds generated annually	A by-product of the pulping process.
Sulfite Liquor, Spent, Alkali-treated	CAS Registry #[68131-31-7]	44 - U	Unknown	A by-product of the pulping process.
Bentonite	CAS Registry #[1302-78-9] A colloidal clay. Consists primarily of montmorillonite.	U - 43, 52, 54	User # / Approximate Amount (tons/yr.) 43 — 1,400 52 — 4,372 54 — 1,869	(12)
Synthetic Size	Usually contains a mixture of resin acids.	U - 1, 15	More than 500 lbs./yr.	(20) [9]

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Pumice	An obsidian-type rock of vocanic origin	U - 27	Use #27 reports ca. 900 lbs./yr.	
Hycar Latex 2600X120 and 2600X138	Acrylic copolymer Ingredients meet requirements of USFDA regulations 175.300 and 175.105.	22 - 29, 19	User #29 reports ca. 16 tons/yr. of 2600X120; User #19 unknown	Size press additive. May contain trace levels of acrylonitrile (3). Contains no photo-chemically reactive solvents.
Berchem CL	High density polyethylene emulsion	23 - 8	More than 500 lbs./yr.	(20) Incompatible with mineral acid.
Cimplus	90-99% water-based when used as recommended.	24 - 15	Less than 500 lbs./yr.	Used for grinding ferrous metals. Acute oral toxicity: LD_{50} (rats) 14.8 g/kg @ [2%]. Acute inhalation toxicity: LC_{50} (rats) more than 58.6 mg/L @ [2%].
Cimcool	90-99% water-based when used as recommended.	24 - 15	Less than 500 lbs./yr.	Used for general purpose grinding. Acute oral toxicity: LD_{50} (rats) more than 5 g/kg (undiluted).
Busperse 49	Anionic dispersant and sequestering agent. Strongly alkaline.	15 - 5, 6, 1	User # 5 unknown; User #6 reports ca. 18 lbs./million gals. of effluent.	(9) [3] Used for control of organic and mineral scale in pulp and paper mills.
Busperse 47	Nonionic, organic penetrating and dispersing agent with defoaming properties. Components in Busperse 47 have use clearance through USFDA regulation 121.2519.	15 - 1	Less than 500 lbs./yr.	(9) [2] Used as a pulping aid in chemical and semi-chemical pulping processes and as a liquid burning aid in Kraft chemical recovery systems. Product is biodegradable.
Resins	May contain resin acids.	U - 1, 32, 11, 19, 15, 6	User # / Approximate Amount (tons/yr.) 32 — 75 11 — 1,500 19 — 20 15 — 500 6 — 700	(20) [15]

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Busperse 53	Colloidal suspension. Busperse 53 is composed of substances cleared for use through USFDA regulations 121.2519 and 121.2557.	15 - 6	User #6 reports ca. 2 lbs./million gals. of effluent	Chemical deaerator and drainage and for pulp and paper mills.
Titanium Dioxide	CAS Registry #[13463-67-7] Molecular Formula: TiO_2	U - 1, 5, 8, 6, 19, 15	User # / Approximate Amount (tons/yr.) 5 — 1,500 8 — 100 6 — 850 19 — 125 15 — more than 0.25	(11) [10]
Borax	CAS Registry #[1303-96-4] Molecular Formula: $B_4H_2O_7 \cdot 10H_2O \cdot 2Na$	U - 1	More than 500 lbs./yr.	(19) [1]
Latex	A milky viscous sap of certain trees and plants.	U - 11, 14, 35, 36	User # / Approximate Amount (tons/yr.) 11 — 6,350 14 — 8.5 35 — 9 36 — 7	
Dry Pigments		U - 30	User #30 reports ca. 400 tons/yr.	
Magnufoam 62927	Contains anionic wetting agents	27 - 1	More than 500 lbs./yr.	A foam additive stable in solvents, acids and alkalines.
Magnus Feltex 69815	Contains wetting agents. Phosphorus - ca. 5.2%	27 - 1	More than 500 lbs./yr.	(23) [1]
Stuart Threat Cut	Sulfochlorinated mineral oil sulfur - 3.25% chlorine - 0.5%	29 - 1	Less than 500 lbs./yr.	(6) [1]
Tamol 731	Sodium salt of polymeric carboxylic acid - 25% Formaldehyde - 0.3%	30 - 1	More than 500 lbs./yr.	(9) [1] Used as a pigment dispersant.

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Tamol 850	Acrylic polymer - 30.0% Residual monomer - 0.1% Formaldehyde - .05%	30 - 1	More than 500 lbs./yr.	(9) [1] Used for maintaining low viscosity in clay slurries.
Betz P-26	Polymeric organic oxides (Confidential)	14-17	User #17 reports ca. 6 tons/yr.	
Colloid 770	Surfactant	35 - 17	User reports ca. 9.5 tons/yr.	
Sucrose, diacetate hexisobutyrate	CAS Registry #[126-13-6] Molecular Formula: $C_{40}H_{62}O_{19}$	U - 1	More than 500 lbs./yr.	Approved for food packaging.
Waste Paper		U - 31, 5, 43 2, 19	User # / Approximate Amount (tons/yr.) 31 — 75,000 5 — 120,530 43 — 50 2 — Unknown 19 — 1,605	
Ashes (residues)	Ash residue from coal burning. CAS Registry #[68131-74-8] The residuum from the burning of a combination of carbonaceous materials. The following elements may be present as oxides: aluminum, calcium, iron, magnesium, nickel, phosphorus, potassium, silicon, sulfur, titanium, and vanadium.	39, 46 - N/A	10-50 million pounds are produced annually by manufacturer 39, and 50-100 million pounds are produced annually by manufacturer 46.	These residues are a result of coal burning to produce the power needed to run the plant.
Butrol 26	Composed of substances having clearance under USFDA regulations 176.210 and 176.300.	15 - 6, 43	User # / Approximate Amount 43 — 1,500 lbs./yr. 6 — 4 lbs./million gals. of effluent.	(6) Also used as a corrosion inhibitor.
Varnish	CAS Registry #[68855-90-3] Lecithins, polymers with dipentaerythritrol, formaldehyde, fumaric acid, isophthalic acid, linseed oil, nonylphenol, pentaerythritol, rosin, soybean oil and trimetholpropane.	U - 7, 28, 30, 45, 61	User # / Approximate Amount 61 — 221 gals./yr. 7 — 300 tons/yr. 28 — 45 tons/yr. 30 — 850 tons/yr. 45 — 200 tons/yr.	User #30 figure is high due to reporting of varnish and resins together.

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Calgon SL 500	Organic sequestering agent, contains EDTA and NTA	55 - 4	User #4 reports ca. 2.5 tons/yr.	(24)
Calgon BA-11	Polymeric sludge conditioner and anti-foamers	55 4	User #4 reports ca. 1.5 tons/yr.	(24)
Fire Clay	CAS Registry #[66402-68-4]	U - 52	User #52 reports ca. 633 tons/yr.	
Coke	CAS Registry #[65996-77-2]	U - 53	User #53 reports ca. 1,282 tons/yr.	
Veneer		U - 61	User #61 reports ca. 4,907,000 sq. ft.	
Particleboard		U - 61	User #61 reports ca. 1,635,000 sq. ft.	
Busperse 36	A combination of scale inhibiting compounds. An aqueous solution of nonvolatile materials.	15 - 43	User #43 reports ca. 150 tons/yr.	
Paperboard		U - 40	User #40 reports ca. 48,000 tons/yr.	This industry is a paper converting facility
Whey (Processed)	Cheese Whey	(Confidential)	700,000 tons/yr.	
Hercon 40	Cellulose-reactive sizing emulsion Contains: Epichlorohydrin - less than 0.5 ppm Dichloropropanols - less than 0.25% 3-Chloropropanediol - less than 3 ppm	32 - 8, 17, 39	User # / Approximate Amount 8 — 1,265 lbs./yr. 17 — 90 tons/yr. 39 — 175 gals./day	Used as a sizing emulsion agent.
Synthetic Fibers		U - 35, 64	User # / Approximate Amount 35 — 10 tons/yr. 65 — Unknown	

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Film		U - 7, 27, 28, 68	User # / Approximate Amount 7 — 6,135 tons/yr. 27 — 318,000 sq. ft. 28 — 6,700 tons/yr. 68 — 145,000 sq. ft.	
Fire Retardant	Specific fire retardant not known.	U - 6	User #6 reports 14 tons/yr.	
Broke	Internally generated waste paper from the manufacturing process that is recycled.	N/A - 5	User #5 reports ca. 1,200 tons/yr.	
Inks		U - 7, 27, 28, 68, 69	User # / Approximate Amount (tons/yr.) 7 — 480 27 — 1.5 28 — 385 68 — 1 69 — 171	
Organic Solvents	Solvent usage other than those specifically listed.	U - 7, 27, 28 30, 35, 69	User # / Approximate Amount (tons/yr.) 7 — 1,324 27 — 3,700 gals./yr. 28 — 732 , 150,000 gals./yr. 30 — 890 35 — 31 69 — 4,400 gal/yr.	
Glue		U - 69	User #69 reports ca. 127.5 tons/yr.	
Unknown	Ingredients: 1) Diethylene triamine 2) Dibutyl phthalate 3) Paratoluene sulphimate 4) Terephthalyol chloride 5) Epoxy resin 6) Soda ash 7) Geluatol 8) Caustic soda 9) Water	69 - 69	Ingredient # / Approximate Amount (tons/yr.) 1 — 40 2 — 795 3 — 30 4 — 86 5 — 52 6 — 31 7 — 52 8 — 3 9 — 1,930	This product is a coating that is used to make carbonless paper.

NATURAL PRODUCTS

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Sodium Alginate (Kelgin Products)	Sodium alginate CAS Registry #[9005-38-3]	51 - 6	User #6 reports ca. 71 tons/yr.	Used as a thickener. Derived from algae.
Clay		U - 1, 17, 5, 8 6, 19, 15	User # / Approximate Amount (tons/yr.): 17 — 10,500; 5 — 7,500; 8 — 375; 6 — 50; 19 — 2,000; 15 — Unknown	(11) [11]
Casein	CAS Registry #[9000-71-9] A complex combination produced in the mammary tissue from amino acids supplied by the blood. It contains several proteins, phosphorus and calcium.	U - 1	Less than 500 lbs./yr.	(1)
Sucrose	CAS Registry #[57-50-1] Molecular Formula: $C_{12}H_{22}O_{11}$	U - 48	User #48 reports ca. 9,387 tons/yr.	
Lumber		U - 61	User #61 reports ca. 1,793,776 BM.	
Salt	CAS Registry #[7647-14-5] Molecular Formula: ClNa	Many - 1, 17, 8, 18, 11, 15, 16, 20, 7, 28, 23, 5, 48, 45, 44, 57, 58	User # / Approximate Amount (tons/yr.): 17 — 145; 8 — 12.5; 18 — 6; 11 — 200; 15 — 400; 20 — 500; 7 — 1; 28 — 25; 23 — 50; 5 — 3,000 lbs./million gals. boiler water; 48 — 4.5; 45 — 320; 16 — 400; 44 — 57; 57 — 24; 58 — 43	(24) [20]

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
CARBOHYDRATES				
Starch	Starch, oxidized CAS Registry # [65996-62-5] Noncrystalline carbohydrate of the polysaccharose group found in cellulose and other plant material.	37 - 11	1-10 million lbs. produced annually	
Starch	Starch, oxidized CAS Registry #[65996-62-5]	40 - 11	More than 500 lbs./yr.	(1)
Starch	CAS Registry #[65996-62-5]	U - 17, 5, 8, 18, 13, 32, 33, 6, 19, 15, 20, 28 40	User # / Approximate Amount (tons/yrs.) 17 — 3,750 5 — 4,000 8 — 900 18 — 1,500 13 — 1,800 32 — 1,500 33 — 12,750 6 — 350 19 — 1,750 15 — 500 20 — 10 28 — 50 40 — 100	Used to increase fiber bonding, increase retention of fillers and improve dispersion of fillers in papermaking.
Sugar	CAS Registry #[57-50-1] Molecular Formula: $C_{12}H_{22}O_{11}$	U - 20	User #20 reports ca. 30 tons/yr.	
Hydroxyethyl Starch	CAS Registry #[9005-27-0]	U - 1	More than 500 lbs./yr.	(5) [1]
Corn Starch	CAS Registry #[9005-25-8]	U - 1	More than 500 lbs./yr.	(5) [1]
Corn Syrup	CAS Registry #[8029-43-4] Syrups, corn - a complex combination obtained by the hydrolysis of corn-starch by the action of acids or enzymes. It consists primarily of D-glucose, maltose and maltodextrins.	U - 48	User #48 reports ca. 252 tons/yr.	

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Sodium Alginate (Kelgin Products)	Sodium alginate CAS Registry #[9005-38-3]	51 - 6	User #6 reports ca. 71 tons/yr.	Used as a thickener. Derived from algae.
Clay		U - 1, 17, 5, 8 6, 19, 15	User # — Approximate Amount (tons/yr.) 17 — 10,500 5 — 7,500 8 — 375 6 — 50 19 — 2,000 15 — Unknown	(11) [11]
Casein	CAS Registry #[9000-71-9] A complex combination produced in the mammary tissue from amino acids supplied by the blood. It contains several proteins, phosphorus and calcium.	U - 1	Less than 500 lbs./yr.	(1)
Sucrose	CAS Registry #[57-50-1] Molecular Formula: $C_{12}H_{22}O_{11}$	U - 48	User #48 reports ca. 9,387 tons/yr.	
Lumber		U - 61	User #61 reports ca. 1,793,776 BM.	
Salt	CAS Registry #[7647-14-5] Molecular Formula: ClNa	Many - 1, 17, 8, 18, 11, 15, 16, 20, 7, 28, 23, 5, 48, 45, 44, 57, 58	User # — Approximate Amount (tons/yr.) 17 — 145 8 — 12.5 18 — 6 11 — 200 15 — 400 20 — 500 7 — 1 28 — 25 23 — 50 5 — 3,000 lbs./million gals. boiler water 48 — 4.5 45 — 320 16 — 400 44 — 57 57 — 24 58 — 43	(24) [20]

Product Trade Name	Chemical Composition and CAS Registry Number (If known)	Manufacturer-User (see code)	Usage	General Comments (see code)
CARBOHYDRATES				
Starch	Starch, oxidized CAS Registry # [65996-62-5] Noncrystalline carbohydrate of the polysaccharose group found in cellulose and other plant material.	37 - 11	1-10 million lbs. produced annually	
Starch	Starch, oxidized CAS Registry #[65996-62-5]	40 - 11	More than 500 lbs./yr.	(1)
Starch	CAS Registry #[65996-62-5]	U - 17, 5, 8, 18, 13, 32, 33, 6, 19, 15, 20, 28 40	User # / Approximate Amount (tons/yrs.) 17 — 3,750 5 — 4,000 8 — 900 18 — 1,500 13 — 1,800 32 — 1,500 33 — 12,750 6 — 350 19 — 1,750 15 — 500 20 — 10 28 — 50 40 — 100	Used to increase fiber bonding, increase retention of fillers and improve dispersion of fillers in papermaking.
Sugar	CAS Registry #[57-50-1] Molecular Formula: $C_{12}H_{22}O_{11}$	U - 20	User #20 reports ca. 30 tons/yr.	
Hydroxyethyl Starch	CAS Registry #[9005-27-0]	U - 1	More than 500 lbs./yr.	(5) [1]
Corn Starch	CAS Registry #[9005-25-8]	U - 1	More than 500 lbs./yr.	(5) [1]
Corn Syrup	CAS Registry #[8029-43-4] Syrups, corn - a complex combination obtained by the hydrolysis of corn-starch by the action of acids or enzymes. It consists primarily of D-glucose, maltose and maltodextrins.	U - 48	User #48 reports ca. 252 tons/yr.	

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Cellulose				
Nitrocellulose	Cellulose, nitrate CAS Registry # [9004-70-0]	U - 15	More than 500 lbs./yr.	(19) [1]
Hydroxyethyl Cellulose	Cellulose, 2-hydroxyethyl ether CAS Registry #[9004-62-0]	U - 1	More than 500 lbs./yr.	(18) [1]
Hercules Cellulose Gum	Sodium salt of carboxymethylcellulose.	32 - U	Unknown	
Pulp	Cellulose, pulp CAS Registry #[65996-61-4] Composed of cellulose, hemicellulose, lignin and other minor components.	37 - 17	100-500 million lbs. produced annually, 1-10 million lbs. imported annually.	
Pulp	Cellulose, pulp CAS Registry #[65996-61-4]	38 - 6	10-50 million lbs. used annually.	
Pulp	Cellulose, pulp CAS Registry #[65996-61-4]	39 - 15	100-500 million lbs. produced and used annually.	
Pulp	Cellulose, pulp CAS Registry #[65966-61-4]	40 - 11	User #11 reports ca. 100-500 million lbs. used annually.	
Pulp	Cellulose, pulp CAS Registry #[65966-61-4]	41 - 13	100-500 million lbs. produced and used annually.	
Pulp	Cellulose, pulp CAS Registry #[65966-61-4]	44 - 3	100-500 million lbs. produced and used annually.	
Pulp	Cellulose, pulp CAS Registry #[65966-61-4]	47 - 16	286,000 tons used annually.	

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
CMC	Cellulose, carboxymethyl ether CAS Registry #[9000-11-7]	U - 1	More than 500 lbs./yr.	(1) [2]
CMC-T	Cellulose, carboxymethyl ether, sodium salt CAS Registry #[9004-32-4]	32 - 1	More than 500 lbs./yr.	(1) [1]
Cellulose	CAS Registry #[9004-34-6] Molecular Formula: $(C_6H_{10}O_5)_x$	U - 35, 52, 54	User # / Approximate Amount (tons/yr.) 35 — 370 52 — 630 54 — 280	
Pulp	Cellulose, pulp CAS Registry #[65966-61-4]	U - 43, 50, 19, 35, 64	User # / Approximate Amount (tons/yr.) 19 — 3,750 43 — 7,000 50 — 11,200 35 — 60 64 — Unknown	

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Slime-Trol RX41	B-bromo, B-nitrostyrene - 9.2% Methylene bisthiocyanate - 4.9% Inert ingredients - 85%	14 - 3, 8, 17, 39	User # / Approximate Amount 3 — 320 lbs./million gals. of treated water 8 — 1.5 tons/yr. 17 — 4.5 tons/yr. 39 — Unknown	(13, 21) Highly toxic if inhaled. LC_{50} - 11.5 mg/L. Thermal decomposition would yield CO_2, water, sulfur, nitrous oxide and bromonitro-alkanes. Aquatic toxicity (rainbow trout) 0.76 mg/L - 96 Hr. TL_{50}. Manufacturer warns that treated effluent should not be discharged to waterways.
Magnus: Magnicide 18	Active Ingredient: Methylene bisthiocyanate - 10% Inert ingredients - 90%	27 - 1	More than 500 lbs./yr.	(21) [1] Liquid slimicide for control of bacteria, yeasts and mold in pulping systems.
Nalcon 271	Active Ingredient: Methylene bisthiocyanate - 5%	33 - 1, 7, 3	More than 500 lbs./yr. User #3 reports 6.6 lbs./million gals. of treated water.	(21) [3] Do not dispose in fish bearing waters. May affect sludge bacteria.
Nalco 7623	(See PHENOLIC COMPOUNDS)			
Nalcon 7620-WB	Methylene-bisthiocyanate - 10% CAS Registry #[6317-18-6] Molecular Formula: $C_3H_2N_2S_2$	33 - 3, 17	User #3 reports 13.9 lbs./million gals. of treated water. User #17 reports ca. 34 tons/yr.	(21) May affect biological waste water treatment systems.
Antibac B	Sodiumdichloro-(a)-triazinetrione - 25.8% Inert ingredients - 74.2%	U - 44	User #44 reports ca. 600 lbs./yr.	

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Fluorocarbon Solution	Unknown	U - 6	User #6 reports use @ 62 tons/yr.	(18) [1]
SS-25	(Confidential)	54 - 1	Less than 500 lbs./yr.	(8) [1] Contains methylene chloride (44).
NC-123	(Confidential)	54 - 1	More than 500 lbs./yr.	(8) [1] Contains methylene chloride (44) and tetrachloroethylene (85).
ALKYL CHLORIDES				
Trichloroethylene	Trichloroethylene CAS Registry #[79-01-6] Molecular Formula: C_2HCl_3	U - 8, 27	User # / Approximate Amount 8 — 13,000 lbs./yr. 27 — 275 gals./yr.	Priority pollutant (87). Used as a solvent or as an aid in deinking wastepapers.
Perchloroethylene	Perchloroethylene CAS Registry #[127-18-4] Molecular Formula: C_2Cl_4	U - 19	User #19 reports ca. 32 tons/yr. Largely discontinued in 1979.	
Chlorothene	Ethane,1,1,1,trichloro CAS Registry #[71-55-6] Molecular Formula: $C_2H_3Cl_3$	U - 1	More than 500 lbs./yr.	(6, 8, 15) [3] Priority pollutant (11)
1,1,1-Trichloroethane	CAS Registry #[71-55-6] Molecular Formula: $C_2H_3Cl_3$	U - 1	More than 500 lbs./yr.	(15) [1] Priority pollutant (11)
Mildewcide	Ingredients: Dimethyl dichlorobenzyl ammonium chloride Isopropenol	91 - 70	User #70 reports ca. 130 lbs./yr.	

ORGANIC NITROGEN COMPOUNDS

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Dearborn 63	(Confidential)	3 - 16	More than 500 lbs./yr.	(24) Oxygen scavenger. Used for feedwater desludging.
Dearborn 659 LPA	(Confidential)	3 - 16	More than 500 lbs./yr.	
Tinopal PT Liquid	Triazinyl Stilbene	2 - 15	More than 500 lbs./yr.	Optical brightner
FB-20 Bleach	Ingredients: Sodium dichloroisocyanurate dihydrate Sodium phosphates Sodium chloride	91 - 70	User #70 reports ca. 1,500 lbs./yr.	

ORGANIC PHOSPHORUS COMPOUNDS

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Mogul CL-652	Organo phosphonate Acrylamide-sodium acrylate copolymer	17 - 7	Less than 500 lbs./yr.	Used for conditioning of incoming well water.
Nalco 6PC907	An aqueous solution of an organic phosphate and meta acrylate/acrylic acid polymer. Ethylene glycol - 4%	33 - 4, 17	User #4 reports ca. 150 lbs./day User #17 reports ca. 10 tons/yr.	(9) Will decompose to unburned hydrocarbons. Avoid contact with strong oxidizers.
Kopanex-Dis-20	Organic phosphate ester surfactant alkyl phenol ethoxylate sodium lignin sulfonate	52 - 15	More than 500 lbs./yr.	(9)
Hercules BL-306	Phosphonate and organic polymers	32 - 39	User #39 reports ca. 8 gals./day	(24)

ORGANOSILICON COMPOUNDS

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Zeolex 23 P	Aluminosilicic acid, sodium salt	U - 1	More than 500 lbs./yr.	(16) [1]

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Betz-Slimetrol RX-36	(Confidential)	14 - 1	More than 500 lbs./yr.	(21) [1]
Betz-Slimetrol RX-34	(See CARBAMATES)			
Blancol-N	Sulfonated naphthalene formaldehyde condensate.	62 - 1	Less than 500 lbs./yr.	(9) [1] Keep out of municipal sewers and open bodies of water if spilled. Landfill in in closed containers.
Vinings AMA 31	(See CARBAMATES)			
Busan 52	(See CARBAMATES)			
Busan 881	(See CARBAMATES)			
ORGANO-SULFUR ACIDS				
Dioctyl Sodium Sulfosuccinate	Butanedioic acid, sulfo-1,4-bis= (2-ethylhexyl)ester, sodium salt CAS Registry #[577-11-7] Molecular Formula: $C_{28}H_{38}O_7S \cdot Na$	U - 1	Less than 500 lbs./yr.	(22) [1]
Unknown	Benezenesulfonic acid, 2,2-(1,2-= ethenediyl)bis[5-[[4-[bis(2-hydroxyet= hyl)amino]-6-(henylamino)-1,3,5-tri= azin-2-yl]amino]-disodium salt CAS Registry #[4193-55-9] Molecular Formula: $C_{40}H_{44}N_{12}O_{10}S_2 \cdot 2Na$	47 - 16	Unknown	
Sulfonate AA-10	Benzenesulfonic acid, dodecyl-, sodium salt	4 - 15	More than 500 lbs./yr.	(13) Also used as a surface active agent. Aquatic toxicity: LC_{50} greater than 10 less than 100 mg/L.

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Nalco 7623	Active Ingredients: 2,4,5 Trichlorophenol - 10.0% Methylenebisthiocyanate - 5.0% Base is a polyglycol ether solvent. When used as directed, this compound is in compliance with USFDA regulation 21 CFR 176.300.	33 - 1	Unknown	(21) May decompose to toxic fumes of chlorine. Manufacturer #33 has discontinued making this product.
Nalco 7633-S	Active ingredients: Sodium pentachlorophenate - 21% Sodium 2,4,5 trichlorophenate - 12% Sodium salts of other chlorophenols - 3%	33 - 1	More than 500 lbs./yr.	(21) [1] May effect bacterial sludge. This product is toxic to fish and wildlife. Do not discharge where it will drain into lakes, streams ponds or waterways. Contains pentachlorophenol (64).
Nalco 7631	Potassium pentachlorophenate 15.7% Potassium 2,4,5 trichlorophenate -9% Mono, Di and Tri Propylene Glycol Methyl Ether - 25%	33 - 1, 13	More than 500 lbs./yr.	(21) [2] May decompose to toxic chlorine fumes. This product is toxic to fish. Keep out of fish-bearing waters. May affect biological wastewater systems. Contains pentachlorophenol (64).
Phenol	CAS Registry #[108-95-2] Molecular Formula: C_6H_6O	U - 4	User #4 reports ca. 2 tons/yr.	
Irgasan DP-300	Phenol, 5-chloro-2-(2,4-dichlorophenoxy) CAS Registry #[3380-34-5] Molecular Formula: $C_{12}H_7Cl_3O_2$	2 - 1	Unknown	(13) [1]
Dowacide G	Phenol, pentachloro-sodium salt	31 - 1	Less than 500 lbs./yr.	(21) [1] Contains pentachlorophenol (64).

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Phenolic Cleaner		U - 67	User #67 reports ca. 72 gals./yr.	(4)
Surfonic N-95	CAS Registry #[9016-45-9] Poly(oxy-1,2-ethanediyl),= alpha-(nonylphenyl)-omega-hydroxy Molecular Formula: $(C_2H_4O)_nC_{15}H_{24}O$	49 - U	More than 500 lbs./yr.	(4) [1]
Kopanex DIS-20	(See INORGANIC COMPOUNDS - Phosphates)			
Dextrol Felt Scour Amp-200	Ethyl dimethyl alkyl quaternary, an alkyl phenol ethoxylate, and phosphonic acid.	52 - 1	More than 500 lbs./yr.	(4) [1]
Betz Slimetrol RX-17	(Confidential)	14 - 15	More than 500 lbs./yr.	(21)
Harol PG 71	Sulfamic acid condensed alkyd phenol	16 - 6	User #6 reports 220 lbs./million gals. of effluent.	Used as a pitch dispersant.
Sterox DJ	Poly(oxy-1,2-ethanediyl),= alpha-(4-dodecylphenyl-omega-hydroxy CAS Registry #[26401-47-8] Molecular Formula: $(C_2H_4O)_nC_{18}H_{30}O$	25 - 1	More than 500 lbs./yr.	(9) [2] Specialty surfactant. Used in felt washing, pitch removal and as a rewetting agent in paper processing.
Sterox DF	Poly(oxy-1,2-ethanediyl,= alpha-(dodecylphenyl)-omega-hydroxy CAS Registry #[9014-92-0] Molecular Formula: $(C_2H_4O)_nC_{18}H_{30}O$	25 - 1	More than 500 lbs./yr.	(9) [1] Speciality surfactant. Used for felt washing, pitch removal and as a rewetting agent in paper processing

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Dimethyldiallyl Ammonium Chloride Polymer	(See AMINES)			
Cat-Floc	(See AMINES)			
Parez 607	(See AMINES)			
Ethylene Vinyl Acetate Copolymer	(See CARBOXYLIC ACID ESTERS)			
Surlyn	(See CARBOXYLIC ACIDS)			
Formaldehyde Polymer	(See CARBONYL COMPOUNDS - Aldehydes)			
Kymene 557	(See DICARBOXYLIC ACIDS)			
Polyethylene	(See ALIPHATIC HYDROCARBONS - Alkenes)			
Polypropylene	(See ALIPHATIC HYDROCARBONS - Alkenes)			
Neoprene	(See ALIPHATIC HYDROCARBONS - Dienes)			
Dow 620	(See POLYCYCLIC AROMATIC HYDROCARBONS)			
Piccotex	(See POLYCYCLIC AROMATIC HYDROCARBONS)			
Cellulose	(See NATURAL PRODUCTS - Carbohydrates)			
Pluronic L 61	(See EPOXIDES)			

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Elvax 420	(See ACID & ACID DERIVATIVES)			
Polyvinyl Acetate	(See ACID & ACID DERIVATIVES)			
PVA	(See ALCOHOLS)			
Polyacrylamide or Percol 720	(See AMIDES)			
Nalco 623	(See AMIDES)			
Accurac 135	(See AMIDES)			
ACRYLAMIDE BASED				
Hercofloc 815, 821 & 849	Hercofloc 815, 821 and 849 are synthetic, high molecular weight acrylamide-based copolymers. Molecular weights are 3,000,000 or higher.	32 - 1, 43	User #43 reports 60 tons/yr. of Hercofloc 815. Other users report more than 500 lbs./yr.	(18) [4] Hercofloc 815, 821 and 849 are polymers used in papermill industrial water streams.
Nalco 8203	Ingredients: Acrylamide-sodium acrylate resin Monobutyl ethers of polyethylene= polypropylene glycol Sodium humate Sodium lignosulfonate Sodium tripolyphosphate Trisodium nitrilotriacetate	33 - 5	User #5 reports 125 lbs./million gals. of boiler feedwater	(24)
Nalco 8184	Copolymer of acrylamide and sodium acrylate	33 - 1	More than 500 lbs./yr.	Potable liquid flocculant and sludge conditioner.
Nalco 7627	(See ACRYLATES)			
Nalcolyte 7763	Copolymer of acrylamide and sodium acrylate	33 - 1	Unknown	Anionic flocculant used to reduce suspended solids in waste water streams.

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Nalchelate 762	(See ACID & ACID DERIVATIVES)			
Nalcolyte 7121	High molecular weight cationic water soluble acrylamide based polymer.	33 - 12	User #12 reports ca. 10,000 gals./yr.	Cationic pollution control flocculant. Decomposition may result in formaldehyde fumes, ammonia and dimethyl amine.
Nalco 625	Copolymer of acrylamide and sodium acrylate.	33 - 17	User #17 reports ca. 18 tons/yr.	A liquid retention and drainage aid for papermaking.
SYNTHETIC				
Rubber (All types listed)	Rubber butyl CAS Registry #[9010-85-9] Molecular Formula: $(C_5H_8.C_4H_8)_x$ Rubber, chlorinated CAS Registry #[9006-03-5] Rubber, natural, depolymd CAS Registry #[68425-13-8]	U - 27, 28, 29 15, 56	User # / Approximate Amount (tons/yr.) 27 — 75 28 — 425 29 — 22.5 15 — more than 0.25 56 — 257	May be used as a a bonding additive.
Neoprene	(See ALIPHATIC HYDROCARBONS - Dienes)			
Hercules BL-278	Synthetic polymer with a complexing agent.	32 - 1	Unknown	(24)

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
SS4164	Dimethyl polysiloxane gum solution Hazardous ingredients: Toluene - 70% Hi Viscosity Polymer - 30%	6 - 15	More than 500 lbs./yr.	Used as a paper release coating. Will thermally decompose at high temperatures and release CO_2 and SiO_2. Contains toluene (86).
Bersil P	Proprietary	23 - 1	More than 500 lbs./yr.	(20) [1] Incompatible with alkalies of any kind. Hazardous decomposition includes CO, CO_2 and H_2 gas.
Syl-Off 23 Paper Coating	Polysiloxane - 30% Xylene - 70%	31 - 15	More than 500 lbs./yr.	Incompatible with oxidizing materials. Will decompose to silicon dioxide, carbon dioxide and other carbon products.
Dow Corning Antifoam Y-30 Emulsion	Polysiloxane - 30% Organic oil - 10% Emulsifiers - 5% Water - 55%	31 - 1	Less than 500 lbs./yr.	(7) [1] Incompatible with oxidizing materials. Will decompose to silicon dioxide, carbon dioxide and other carbon products.
Syl-Off 292 Paper Coating	Polysiloxane - 30% Xylene - 70%	31 - 15	More than 500 lbs./yr.	Incompatible with oxidizing materials. Will decompose to silicon dioxide, CO_2 and other carbon products.
Syl-Off 294 Paper Coating	Polysiloxane - 40% VM & P Naphtha - 60%	31 - 15	More than 500 lbs./yr.	Incompatible with oxidizing materials. Will decompose to silicon io i e

SULFONATES

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Dispersant 573	Sodium ligno sulfonate - 50% Water - 50% CAS Registry #[25155-30-0]	8 - 2	User #2 reports ca. 143 lbs./day	(9) [1]
Busan 25	Active Ingredients: 2-Hydroxypropylmethane thio= sulfonate - 11.7% 2-Thiocyanomethylthio= benzothiazole - 13.3% Inert ingredients - 75% Above chemicals have use clearance under USFDA regulation 121.2505.	15 - 5	User #5 reports ca. 9 qts./day to wastewater stream.	(21) [1] This product is toxic to fish.
Nalco 8203	(See ACRYLAMIDE POLYMERS)			
Kopanex Dis-20	(See INORGANIC COMPOUNDS - Phosphates)			
Atlox	A blend of alkyl aryl sulfonate, aromatic hydrocarbons, and polyoxy-ethylene alkyl aryl ether.	26 - 1	More than 500 lbs./yr.	High flashpoint emulsifier.
Alkanol DW Solution	Sodium alkyl aryl sulfonate	50 - 1	More than 500 lbs./yr.	(22) [1]
Dearborn 659LPA	(See ORGANIC NITROGEN COMPOUNDS)			

TRADE NAME PRODUCTS SECTION
(CHEMICAL IDENTITY UNKNOWN, CONFIDENTIAL OR PROPRIETARY)

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Ferro-Terj-PM	Proprietary (Now discontinued)	53 - 1	Unknown	[1]
Hi-T-3500	(Confidential)	1 - 1	Unknown	
SNAP	(Confidential)	54 - 1	Less than 500 lbs./yr.	(8) [1]
Lexite	Unknown	U - 1	More than 500 lbs./yr.	(8) [1]
Thiadiazine-2-Thione	Unknown	U - 1	Less than 500 lbs./yr.	(21) [1]
Aqua 3SP	Unknown	U - 1	More than 500 lbs./yr.	(10) [1]
Dithonite	Unknown	U - 1	More than 500 lbs./yr.	Used for bleaching of broke material.
Zeprestize	Unknown	U - 1	Less than 500 lbs./yr.	(8) [1]
Percol 725	Unknown	85 - 16	More than 500 lbs./yr.	Flotation aid.
PDD-114-X-58	Unknown	56 - 13	More than 500 lbs./yr.	(7)
Paint Thinner	Unknown	U - 13	Less than 500 lbs./yr.	
Lacquer Thinner	Unknown	U - 13	Less than 500 lbs./yr.	
Unichrome	Unknown	U - 27	User #27 reports ca. 3,600 lbs./yr.	
Anokleen	Unknown	U - 27	User #27 reports ca. 1,000 lbs./yr.	
Kymene 2064	Unknown	U - 37	User #37 reports ca. 275 tons/yr.	
Natron 1260	Cationic polymer	78 - 6	User #6 reports ca. 61 lbs./million gals. of effluent	

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Felt Cleaner 825A	Unknown	U - 43	User reports ca. 12 tons/yr.	(23)
Paper Machine Cleaner 824	Unknown	U - 43	User reports ca. 9 tons/yr.	(4)
Ampitol	Unknown	U - 43	User reports ca. 60 tons/yr.	Used as a dryer release chemical.
Solvoc 699	Unknown	79 - 17	User #17 reports ca. 23.5 tons/yr.	(7)
Corrogen	Unknown	U - 43	User #43 reports ca. 1,000 lbs./yr.	(24)
Neutrafilm 463	Unknown	U - 43	User #43 reports ca. 200 gals./yr.	(24)
Ferrosperse	Unknown	U - 43	User #43 reports ca. 1,000 gals./yr.	(24)
DuMar 107	Unknown	U - 43	User #43 reports ca. 15,000 gals./yr.	Used as a paper deinking aid.
Dubond 65	Unknown	U - 43	User #43 reports ca. 70 tons/yr.	(18)
Swift Colloid	Unknown	U - 43	User #43 reports ca. 105 tons/yr.	Used as a dryer coating.
Arco-SOA	Unknown	U - 1	Less than 500 lbs./yr.	(4) [1]
Diaprene	Unknown	U - 1	More than 500 lbs./yr.	(4) [1]
Rid-Lime	Unknown	U - 1	Less than 500 lbs./yr.	(4) [1]
Magnusol 728	Unknown	U - 1	More than 500 lbs./yr.	(4) [1]
Tide	Unknown	60 - 1	More than 500 lbs./yr.	(4) [1]
4010 Coral	Unknown	U - 1	Less than 500 lbs./yr.	(4) [1]
Bougell	Unknown	U - 1	More than 500 lbs./yr.	(4) [1]

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Calgon Pax Lano-Save	Unknown	55 - 1	More than 500 lbs./yr.	(4) [2]
Poly-Tergent B-300	Unknown	U - 1	More than 500 lbs./yr.	(4) [1]
Savasol	Unknown	U - 1	More than 500 lbs./yr.	(4,8) [4]
Westsolv	Unknown	U - 1	More than 500 lbs./yr.	(4) [1]
SBR-Latex	Unknown	U - 1	More than 500 lbs./yr.	(5) [1]
Tap Magic	Unknown	U - 1	More than 500 lbs./yr.	(6) [3]
Rapid Tap	Unknown	U - 1	More than 500 lbs./yr.	(6) [2]
Coil-Trate	(Confidential)	54 - 1	More than 500 lbs./yr.	(8) [2]
Pioneer PD 63X11	Unknown	56 - 4	User #4 reports ca. 1,100 lbs./day	(7)
Hayssen Pemco Adhesive	Unknown	U - 1	More than 500 lbs./yr.	(1) [1]
Resyn 33-1322 Sheet Lamination	Unknown	U - 1	More than 500 lbs./yr.	(1) [1]
Adhesive 0171	Unknown	U - 1	More than 500 lbs./yr.	(1) [1]
Back Gum 32-7603	Unknown	U - 1	More than 500 lbs./yr.	(1) [1]
Case Seal Adhesive	Unknown	U - 1	More than 500 lbs./yr.	(1) [1]
Fuller #601/Neoprene Caseina	Unknown	U - 15	More than 500 lbs./yr.	(1)
Ace-M-All	Unknown	U - 1, 15	More than 500 lbs./yr.	(3, 4) [5]
Filmcol	Unknown	U - 27	990 gals./yr.	

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Film Kleen	Unknown	U - 27	155 gals./yr.	
Humicote	Unknown	U - 27	1,155 gals./yr.	
Lithoteen	Unknown	U - 27	100 gals./yr.	
Petro Gum	Unknown	U - 27	990 gals./yr.	
Animal Glue	Unknown	U - 1, 15	Less than 500 lbs./yr.	(1)(9)
Fuller Adhesive 3700	Unknown	U - 1	Less than 500 lbs./yr.	(1) Contains trichloroethane (11).
Benlo Paper Machine Cleaner	Unknown	U - 1	More than 500 lbs./yr.	(3) [1]
Chela-Santek Chem	Unknown	U - 1	More than 500 lbs./yr.	(3) [1]
Kemtron 52	Unknown	U - 13	Less than 500 lbs./yr.	(3)
Liqua Britex	Unknown	U - 1	More than 500 lbs./yr.	(3) [1]
Veratan 600	Unknown	U - 1	More than 500 lbs./yr.	(3) [1]
Benlo Felt Cleaner	Unknown	U - 1	More than 500 lbs./yr.	(23) [1]
Idtec Concentrate	Unknown	U - 1	More than 500 lbs./yr.	(3) [1]
Kemtron 262-6	Unknown	U - 13	More than 500 lbs./yr.	(3)
Kemtron 293	Unknown	U - 15	More than 500 lbs./yr.	(3)
Oakite 245	Unknown	28 - 1, 39	More than 500 lbs./yr. User #39 reports ca. 500 gals./yr.	(3) [4]
Octinol	Unknown	U - 1	Less than 500 lbs./yr.	(7) [1]

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
PPD-114-X-58	Unknown	56 - 1	More than 500 lbs./yr.	(7) [1]
Solvox 653	Unknown	79 - 1	More than 500 lbs./yr.	(7) [1]
Xalco 131	Unknown	U - 1	More than 500 lbs./yr.	(7) [1]
Diamond Foamaster LDC	Unknown	U - 1	More than 500 lbs./yr.	(7) [1]
Foamaster VF	Unknown	U - 1	Less than 500 lbs./yr.	(7) [1]
Foamaster TRB-LM	Unknown	U - 1	Less than 500 lbs./yr.	(7) [1]
Nopco DF-122	Unknown	64 - 1	More than 500 lbs./yr.	(7) [2]
Nopco Foamaster 187DE	Unknown	64 - 1	More than 500 lbs./yr.	(7) [1]
Xopco DF-187	Unknown	U - 1	More than 500 lbs./yr.	(7) [1]
Betz Defoamer 622	Unknown	14 - 1	Less than 500 lbs./yr.	(7) [1]
DuPont FG #10	Unknown	50 - 15	Less than 500 lbs./yr.	(7) [1]
Dalco Kleen DK-70	Unknown	U - 1	Less than 500 lbs./yr.	(8) [1]
Kemthane	Unknown	U - 1	More than 500 lbs./yr.	(8) [3]
McKessen Robins Nutri	Unknown	U - 15	More than 500 lbs./yr.	(8) [1]
Delco DS-50	Unknown	U - 1	More than 500 lbs./yr.	(8) [1]
Gunk-Neomet	Unknown	U - 1	Less than 500 lbs./yr.	(8) [1]
Agiteen (Gray Mills)	Unknown	U - 13	More than 500 lbs./yr.	(8)
Kemsolv TE	Unknown	65 - 1	Less than 500 lbs./yr.	(8) [1]

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Tantodrill	Unknown	U - 15	More than 500 lbs./yr.	(6) [1]
Anchor-Lube	Unknown	U - 1	More than 500 lbs./yr.	(6) [1]
Johnson TL-131	Unknown	U - 1	More than 500 lbs./yr.	(6) [1]
DF-198	Unknown	U - 1	More than 500 lbs./yr.	(7) [1]
Foamaster TBR	Unknown	U - 1	More than 500 lbs./yr.	(7) [1]
Nopco DF-160L	Unknown	64 - 1	Less than 500 lbs./yr.	(7) [1]
Houghton DF-187	Unknown	U - 1	More than 500 lbs./yr.	(7) [1]
Pioneer POD-XLN	Unknown	56 - 13	More than 500 lbs./yr.	(7)
Pioneer PD 114-X35	Unknown	56 - 15	More than 500 lbs./yr.	(7) [1]
Pioneer PDD-XRG	Unknown	56 - 1	More than 500 lbs./yr.	(7) [1]
PR114-X-10 Pioneer Salt	Unknown	56 - 15	More than 500 lbs./yr.	(7) [1]
Ryco X-76-14	Unknown	U - 1	More than 500 lbs./yr.	(7) [1]
Texo 622	Unknown	73 - 8	Less than 500 lbs./yr.	(7) [1]
Xopco UBN	Unknown	U - 1	More than 500 lbs./yr.	(7) [1]
DM-RW-2W	Unknown	U - 1	More than 500 lbs./yr.	(7) [1]
Hedai FDLX	Unknown	U - 1	More than 500 lbs./yr.	(7) [1]
Maser 1002	Unknown	U - 1	More than 500 lbs./yr.	(7) [1]

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Nopco DF #103 & 112	Unknown	64 - 15	Less than 500 lbs./yr.	(7) [1]
Nopco Foamaster UAS	Unknown	64 - 1	More than 500 lbs./yr.	(7) [1]
Dow Fade Resistant "O" Series	Unknown	31 - 1	More than 500 lbs./yr.	(20) [1] This is a general product catetory, the specific product used is not known.
Hyamine	Unknown	U - 15	More than 500 lbs./yr.	(21)
Oakite (Biocides)	Unknown	28 - 1	More than 500 lbs./yr.	(21) [1] This is a general product catetory, the specific product used is not known.
Nopco 130	Unknown	64 - 13	More than 500 lbs./yr.	(21)
Kem-Chlor-Form 40	Unknown	U - 1	More than 500 lbs./yr.	(21) [1]
TSPP	Unknown	U - 1, 15	More than 500 lbs./yr.	[3]
Premium Sunnyside	Unknown	U - 15	Less than 500 lbs./yr.	Used as a varnish remover.
Zip Strip	Unknown	U - 1	Less than 500 lbs./yr.	Used as a varnish remover.
Feltex	Unknown	U - 1	More than 500 lbs./yr.	(22) [1]
Pioneer POD-XWC	Unknown	56 - 15	More than 500 lbs./yr.	(22)
Quaker 1512	Unknown	U - 15	More than 500 lbs./yr.	(22)
XADH	Unknown	U - 1	More than 500 lbs./yr.	(22) [1]
Red Ball Felt Cleaner	Unknown	U - 1	More than 500 lbs./yr.	(23) [1]

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Dumusol AI	Unknown	U - 43	User #43 reports 1,000 gals./yr.	Deink solvent
Sandopan KDU	Unknown	U - 1	More than 500 lbs./yr.	(22) [1]
Screen Wash	Unknown	U - 1	More than 500 lbs./yr.	(22) [1]
Desoink #4	Unknown	U - 1	More than 500 lbs./yr.	(22) [1]
Diopreen #2	Unknown	U - 1	More than 500 lbs./yr.	(22) [1]
Solvox WG	Unknown	79 - 8, 39	User #8 reports ca. 8 tons/yr. User #39 reports ca. 500 lbs./yr.	(22)
Aerosol 07	Unknown	U - 1	More than 500 lbs./yr.	(22) [1]
Ansilex	Unknown	U - 1	More than 500 lbs./yr.	(11) [1]
Solvox 24	Unknown	79 - 1	Less than 500 lbs./yr.	Bleaching agent.
Zellex	Unknown	U - 1	More than 500 lbs./yr.	(11) [1]
Ansilex	Unknown	U - 1	More than 500 lbs./yr.	(11) [1]
Deairex 516	Unknown	U - 1	More than 500 lbs./yr.	(11) [1]
Loam Trol 575	Unknown	U - 1	More than 500 lbs./yr.	(11) [1]
Pioneer #114-XI	Unknown	56 - 1	Less than 500 lbs./yr.	(11) [1]
Metasol TK-100	Unknown	14 - 15	More than 500 lbs./yr.	(13)
Hylex-LXB 1165	Unknown	U - 1	More than 500 lbs./yr.	(14) [1]
Gen-Flow 5057	Unknown	U - 1	More than 500 lbs./yr.	(14) [1]
Westol 20	Unknown	U - 1	More than 500 lbs./yr.	(4) [1]

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Xytol	Unknown	U - 1	More than 500 lbs./yr.	(15) [1]
Solvox 20	Unknown	79 - 1	More than 500 lbs./yr.	(15) [1]
Stanisol	Unknown	U - 1	Less than 500 lbs./yr.	(15) [1]
Lacquer Thinner	Unknown	U - 1	Less than 500 lbs./yr.	(15) [1]
Paper AD	Unknown	U - 1	More than 500 lbs./yr.	(16) [1]
Tinolite	Unknown	2 - 1	More than 500 lbs./yr.	(16) [1] Tinolite is a general product category and the exact Tinolite product used is not known.
Aqua Pel-364	Unknown	U - 1	More than 500 lbs./yr.	(22) [1]
Aqua Pel-421	Unknown	U - 1	More than 500 lbs./yr.	(22) [1]
Marosphere	Unknown	U - 1	Less than 500 lbs./yr.	(22) [1]
Dis-AL 20	Unknown	U - 1	Less than 500 lbs./yr.	(3) [1]
Ampitol 7245	Unknown	U - 1	More than 500 lbs./yr.	(22) [1]
Front Seal-32	Unknown	U - 1	More than 500 lbs./yr.	(1) [1]
HB Fuller 566	Unknown	U - 1	More than 500 lbs./yr.	(1) [1]
Kemthane	Unknown	U - 1	More than 500 lbs./yr.	
Plastol Cool-Tool	Unknown	U - 1	Less than 500 lbs./yr.	(6) [1]
FWC-24	Unknown	U - 1	More than 500 lbs./yr.	(3) [1]
HB Fuller 153-2	Unknown	U - 1	More than 500 lbs./yr.	(1) [1]

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Johnson's 122 Chlorinated Wax Cutting Fluid	Unknown	U - 1	Less than 500 lbs./yr.	(6) [1]
Natron 88	Unknown	U - 1	More than 500 lbs./yr.	(22) [1]
Trycite Window Gum 33-4010	Unknown	U - 1	More than 500 lbs./yr.	(1) [1]
Xeo-Fat 90-13	Unknown	U - 1	More than 500 lbs./yr.	(22) [1]
Liquid Wrenzel	Unknown	U - 1	Less than 500 lbs./yr.	(6) [1]
Solvox A-175	Unknown	79 - 1	More than 500 lbs./yr.	(3) [1]
Ace-M-All-FWC #24	Unknown	U - 15	More than 500 lbs./yr.	(4)
HB Fuller 3133	Unknown	U - 1	More than 500 lbs./yr.	(1) [1]
Magic Cutting Fluid	Unknown	U - 1	Less than 500 lbs./yr.	(6) [1]
JE 538 Rhoads Waterproof Cement	Unknown	U - 1	More than 500 lbs./yr.	(1) [1]
Swish Degreaser	Unknown	U - 1	Less than 500 lbs./yr.	(8) [1]
Tetrahydro 3 & 5	Unknown	U - 1	Less than 500 lbs./yr.	(21) [1]
Dicoloid	Unknown	U - 1	Less than 500 lbs./yr.	(4) [1]
Dimethyl 2H-1 & 3 & 5	Unknown	U - 1	Less than 500 lbs./yr.	(21) [1]
Solvox-LS1	Unknown	79 - 1	More than 500 lbs./yr.	(3) [1]
XAOH	Unknown	U - 1	Less than 500 lbs./yr.	(3) [1]
Alcasan	Unknown	U - 1	More than 500 lbs./yr.	(3) [1]

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Coral Clean-50	Unknown	U - 1	More than 500 lbs./yr.	(3) [1]
Bronze Powders	Unknown	U - 1	More than 500 lbs./yr.	[1]
CA-Concentrate	Unknown	U - 1	Less than 500 lbs./yr.	(4) [1]
Charmin 83 B & H	Unknown	60 - 1	More than 500 lbs./yr.	(4) [1]
Midtec-Cleaner	Unknown	U - 1	More than 500 lbs./yr.	(4) [1]
Napco C-104	Unknown	U - 1	More than 500 lbs./yr.	(17) [1]
Cyclized Rubber	Unknown	U - 1	More than 500 lbs./yr.	(18) [1]
Coagulant 2254	Unknown	55 - 1	More than 500 lbs./yr.	(18) [1]
Hercules IAD	Unknown	32 - 1	More than 500 lbs./yr.	(18) [2]
Retention Agent A	Unknown	U - 1	More than 500 lbs./yr.	(18) [1]
Magnifloc 573 C	Unknown	U - 1	More than 500 lbs./yr.	(18) [1]
Alkyd	Unknown	U - 1	More than 500 lbs./yr.	(20) [1]
Zonyl	Unknown	U - 1	More than 500 lbs./yr.	(20) [1]
Parez 631NC	Unknown	19 - 15	More than 500 lbs./yr.	(20)
Parez 608	Unknown	19 - 1	More than 500 lbs./yr.	(20) [1]
Parez 613	Unknown	19 - 8	User reports ca. 1 ton/yr.	
Oakite FLT 333	Unknown	28 - 39	Unknown	Acid-type cleaner.
Oakite POL	Unknown	28 - 39	User reports ca. 3 gals./wk.	(4) Also a pitch dispersant.

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Nalco 623-SC	Unknown	33 - 39	Unknown	Used as a paper retention aid.
BL-303	Unknown	32-39	User #39 reports ca. 8 gals./day.	(24)
SP-701 Cleaner	Unknown	U - 15	Unknown	(4)
Saran	Latex product	U - 15	More than 500 lbs./yr.	(14)
Acrylic	Latex product	U - 15	More than 500 lbs./yr.	(14)
Poly-Film	Unknown	U - 15	More than 500 lbs./yr.	
Ace-M-All EX110	Unknown	U - 15	More than 500 lbs./yr.	
Saib 90%	Unknown	U - 8	User #8 reports ca. 13 tons/yr.	
HTH	Unknown	U - 8	User #8 reports ca. 6 tons/yr.	
Liquitex	Unknown	U - 8	User #8 reports ca. 23 tons/yr.	
Paramel	Unknown	19 - 8	User #8 reports ca. 27 tons/yr.	
Oakite 32	Unknown	28 - 39	User #39 reports ca. 250 gals./yr.	(4)
Oakite Felt Life	Unknown	28 - 39	User #38 reports ca. 10 gals./wk.	(4)
WE-833	Active Ingredients: Surfactants	48 - 7	Unknown	(7)
Ryco X7614	Unknown	U - 17	User reports ca. 32.5 tons/yr.	(7)
Zeolex Clay	Unknown	U - 17	User reports ca. 2,000 tons/yr.	(11)
Hi-Brite Clay	Unknown	U - 17	User reports ca. 12,500 tons/yr.	(11)
No. 63A Dewaxed Shellac	Unknown	U - 15	Unknown	Primer

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Stoner Mudge S-1299	Unknown	U - 15	Unknown	Primer
No. 251 Mica	Unknown	U - 15	Unknown	Primer
Tydex 12 PEI	Unknown	U - 15	Unknown	Primer
Eastman 343-1	Unknown	U - 15	Unknown	Primer
Glass Yarn	Unknown	U - 15	More than 500 lbs./yr.	Special coating
Oil Base Ink	Unknown	U - 1	More than 500 lbs./yr.	[4]
Water Base Ink	Unknown	U - 1	More than 500 lbs./yr.	[4]
Cadium Type Pigments	Unknown	U - 1	More than 500 lbs./yr.	(16) [1]
Chromium Type Pigments	Unknown	U - 1	More than 500 lbs./yr.	(16) [1]
Copper Type Pigments	Unknown	U - 1	More than 500 lbs./yr.	(16) [1]
Lead Type Pigments	Unknown	U - 1	More than 500 lbs./yr.	(16) [1]
Luminescent Type Pigments	Unknown	U - 1	More than 500 lbs./yr.	(16) [3]
Organic Type Pigments	Unknown	U - 1	More than 500 lbs./yr.	(16) [7]
Zinc Type Pigments	Unknown	U - 1	More than 500 lbs./yr.	(16) [1]
Leucophor P306	Unknown	U - 1	More than 500 lbs./yr.	(16) [1]
Ochre (Iron Type)	Unknown	U - 1	More than 500 lbs./yr.	(16) [1]
Mercite	Unknown	U - 1	More than 500 lbs./yr.	(20) [1]
Alco 809	Unknown	U - 1	More than 500 lbs./yr.	(9) [1]
Nycol Blancol Lomar PW	Unknown	U - 15	Less than 500 lbs./yr.	(9) [1]

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Lomar Harol	Unknown	U - 1	More than 500 lbs./yr.	(9) [1]
Solvox 135	Unknown	79 - 1	More than 500 lbs./yr.	(9) [1]
Nopcowet #160	Unknown	U - 15	Less than 500 lbs./yr.	(9) [1]
Vinyl Latex	Unknown	U - 19	User #19 reports ca. 39.5 tons/yr.	
Tinopal	Unknown	2 - 43	User #43 reports ca. 78 tons/yr.	Tinopal is a general name product, the specific product used is not known. Tinopal products are fluorescent whitening agents.
Lacquer Thinner #44	Proprietary	7 - 1	Unknown	
Lacquer Thinner #45	Proprietary	7 - 1	Unknown	
Glue	Unknown	U - 14, 45, 61	User # / Approximate Amount 14 — 75 tons/yr. 45 — 150 tons/yr. 61 — 185 tons/yr.	(1) Also used in making the final product at paper converting facilities.
Kleenkast	Unknown	U - 52	User #52 reports ca. 530 tons/yr.	
Seacoal	Unknown	U - 52, 54	User # / Approximate Amount 52 — 180 tons/yr. 54 — 1,087 tons/yr.	
Fyberfluff Softner	Unknown	U - 58, 59	User # / Approximate Amount 58 — 1.5 tons/yr. 59 — 3 tons/yr.	Used in cleaning of clothes.
Enhance	Unknown	54 - 58, 59	User # / Approximate Amount 58 — 21 tons/yr. 59 — 4.5 tons/yr.	Used in cleaning of clothes.
Neulin, Sour	Unknown	U - 58, 59, 49	User # / Approximate Amount 58 — 1 tons/yr. 59 — 2 tons/yr. 49 — 1.5 tons/yr.	

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Orvus	Unknown	60 - 60	User #60 reports ca. 100 lbs./yr.	A detergent
Pierce II	Unknown	60 - 60	User #60 reports ca. 5 tons/yr.	A detergent
Raylene	Unknown	48 - 60	User #60 reports ca. 1,1200 lbs./yr.	A detergent
Bio-Magic Rinse	Unknown	U - 60	User #60 reports ca. 900 lbs./yr.	A detergent
Crezon	Unknown	U - 61	User #61 reports ca. 60,440 sq.ft./yr.	
Luxcell	Unknown	U - 61	User #61 reports ca. 83,000 sq.ft./yr.	
Delvak	Unknown	48 - 44	User #44 reports ca. 400 lbs./yr.	A caustic-type cleaner.
Sepko	Unknown	U - 66	User #66 reports ca. 1,000 lbs./yr.	(4)
Super Ream	Unknown	U - 66	User #66 reports ca. 365 lbs./yr.	(4)
Calgon F-95	Filming corrosion inhibitor	55 - 2	User #2 reports ca. 10 lbs./day.	
Trichelok 5	Unknown	55 - 2	User #2 reports ca. 10 lbs./day.	
SBR	Unknown	U - 29	User #29 reports ca. 17.5 tons/yr.	
Onion Powder	Unknown	U - 20	User reports ca. 25 tons/yr.	
Ex-Rust	Unknown	U - 1	Less than 500 lbs./yr.	(8) [1]
Solvox KS	Unknown	79 - 8, 39	Plant #8 reports ca. 10 tons/yr. Plant #39 reports ca. .5 tons/yr.	Used for broke bleaching.
Foamcote #10	Unknown	U - 15	More than 500 lbs./yr.	
Nirez	A polyterpene or terpene phenol resin.	72 - 15	More than 500 lbs./yr.	(20) [1] General trade name product; specific Nirez product used is unknown.

Product Trade Name	Chemical Composition and CAS Registry Number (if known)	Manufacturer-User (see code)	Usage	General Comments (see code)
Everite	Unknown	U - 1	More than 500 lbs./yr.	[1]
Texo 284	Unknown	73 - 15, 8	User #8 reports ca. 3 tons/yr.	(3)
Formula 659 LPA	Unknown	U - 1	More than 500 lbs./yr.	[1]
IPI Coating 7389A	Unknown	U - 15	More than 500 lbs./yr.	
Dupont RK 6076	Unknown	50 - 15	More than 500 lbs./yr.	
TPP 1A Polyester Varnish	Unknown	U - 15	More than 500 lbs./yr.	
TPP 2 Polyester Varnish	Unknown	U - 15	More than 500 lbs./yr.	
Red Bond Copper	Unknown	U - 27	User reports ca. 300 gals./yr.	
Cello	Unknown	U - 28	User reports ca. 1,300 tons/yr.	
Topguard Type C	Unknown	U - 1	Less than 500 lbs./yr.	(2) [1]
Amizyme-Premier Malt	Unknown	U - 1	More than 500 lbs./yr.	[1]
Retention Agent A	Unknown	U - 1	More than 500 lbs./yr.	[1]
Selframin 40 Granular	Unknown	U - 1	More than 500 lbs./yr.	[1]
Filmeen 32	Unknown	U - 1	More than 500 lbs./yr.	[1]
Gunk Rust Retardant	Unknown	U - 1	More than 500 lbs./yr.	[1]
Therm Plastic Resins & Wax	Unknown	U - 1	More than 500 lbs./yr.	(1) [1]
Front Seal 33-2046	Unknown	U - 1	More than 500 lbs./yr.	(1) [1]
Fuller Adhesive	Unknown	U - 1	More than 500 lbs./yr.	(1) [1]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