

within the scope of today's proposed listing determination.

Additional information on polymeric colorants, perylenes, perinones, and quinacridones is presented in the "Background Document for Identification and Listing of Wastes from the Production of Organic Dyes and Pigments" (hereafter referred to as the Listing Background Document) and in the referenced comments which are available in the public docket for today's proposal.

2. Scope of Waste Classifications

Paragraph 1.h.(ii) of the consent decree describes the dyes and/or pigments production wastes that must be addressed by our listing determination:

Listing determinations under paragraph 1(h) of this Decree shall include the following wastes, where EPA finds such wastes are generated: spent catalysts, reactor still overhead, vacuum system condensate, process waters, spent adsorbent, equipment cleaning sludge, product mother liquor, product standardization filter cake, dust collector fines, recovery still bottoms, treated wastewater effluent, and wastewater treatment sludge.

In this proposal, we have grouped all of the wastes for these industries that are identified in the consent decree into two major categories of process wastes: Wastewaters and nonwastewaters. Some manufacturers may commingle nonprocess wastes (*i.e.*, cafeteria and office refuse, sanitary wastes) with wastewaters or nonwastewaters from dyes and/or pigment production. We consider these nonprocess wastes to be outside the scope of the consent decree and we have not evaluated them. However, if they are commingled with the process nonwastewaters that we propose to list, they will be regulated as K181 hazardous wastes under the RCRA mixture rule.

G. Description of the Dyes and/or Pigments Production Industries

Organic dye and/or pigment manufacturers are typically concentrated near large metropolitan areas, with the majority of facilities located on the East Coast and in the Midwest. We estimate that there are 37 dyes and/or pigments production facilities operating in the United States by about 29 different companies (a few larger companies operate several facilities).⁸ Of this universe, we estimate that about 15 of these companies meet

the Small Business Administration definition of a small business (total company employment of fewer than 750 people at the corporate level).

Kirk-Othmer defines dyes as intensely colored or fluorescent organic substances which impart color to a substrate by selective absorption of light.⁹ When applied, dyes penetrate the substrate in a soluble form, after which they may or may not become insoluble. The structure of dyes is temporarily altered during the application process and colors are imparted only by selective absorption.

Dyes are used to color fabrics, leather, paper, ink, lacquers, varnishes, plastics, cosmetics, and some food items. Several thousand individual dyes of various colors and types are manufactured. This large number is attributable to the many different types of materials to which dyes are applied and the different conditions of service for which dyes are required.¹⁰

Synthetic dyes are derived in whole or in part from cyclic intermediates. Approximately two-thirds of the dyes consumed in the United States are used by the textiles industry to dye fabrics, and about one-sixth are used for coloring paper, while the remainder are used primarily in the production of organic pigments and in the dyeing of leather and plastics.¹¹

Commercial dyes are sold in several physical forms including granular, powders, liquid solutions, and pastes. The dyes contain color at concentrations ranging from approximately 1 to more than 98 percent.¹²

Organic dyes are classified in several ways, including their chemical structure or class, general dye chemistry, and application process. Chemical structure classifications include azos, triarylmethanes, diphenylmethanes, anthraquinones, stilbenes, methines, polymethines, xanthenes, phthalocyanines, sulfurs and so on. Kirk-Othmer describes the common application process classes of dyestuffs to include acid dyes, mordant dyes, metal complex dyes, direct dyes, fiber-reactive dyes, basic dyes, vat dyes, sulfur dyes, disperse dyes, ingrain dyes/azoic dyes, and other dyes. Using general dye chemistry, textile dyes

typically are grouped into the following categories: acid dyes, direct (substantive dyes), azoic dyes, disperse dyes, sulfur dyes, fiber reactive dyes, basic dyes, oxidation dyes, mordant (chrome) dyes, developed dyes, vat dyes, pigments, optical/fluorescent brighteners, and solvent dyes.¹³ The trade association representing the dye industry is the Ecological and Toxicological Association of Dyes and Organic Pigments Manufacturers (ETAD).

The Color Pigment Manufacturers' Association (CPMA), which primarily represents the pigments industry, defines pigments as "colored, black, white, or fluorescent particulate organic or inorganic solids, which usually are insoluble in, and essentially physically and chemically unaffected by, the vehicle or substrate in which they are incorporated."¹⁴ According to the CPMA, the primary difference between pigments and dyes is that pigments are insoluble in the substrate during the application process, while dyes are soluble in the substrate. Pigments retain a crystalline or particulate structure and impart color by selective absorption or by scattering of light.

The approximate percentage of synthetic organic pigments by use during 1991–1995 was as follows: inks (60%), paints and coatings (25%), plastics (10%), and other (5%). Pigments are used primarily in printing inks. There are fewer pigments produced than dyes, however, pigment batches generally are larger in size. U.S. production of organic pigments increased by 5 percent during 1997–99, from 75,500 tons to 79,500 tons. Production is estimated to increase at an average annual rate of 2.7 percent through 2005.¹⁵

Organic pigments are derived in whole or in part from benzenoid chemicals and colors and are described as being toners or lakes. Toners and lakes essentially are the same in final form, but differ in their preparation method.

¹³ S. V. Kulkarni, C. D. Blackwell, A. L. Blackard, C. W. Stackhouse, and M. W. Alexander, U.S. Environmental Protection Agency, Air and Energy Engineering Research Laboratory, "Project Summary Textile Dyes and Dyeing Equipment: Classification, Properties, and Environmental Aspects," EPA/600/S2-85/010, April 1985.

¹⁴ See, for example, CPMA comments on the Testing of Certain High Production Volume Chemical; Data Collection and Development on High Production Volume ("HPV") Chemicals Proposed Rule and Notice 65 FR 81658, December 26, 2000, Docket Control No. OPPTS-42213A, http://www.thecre.com/watchlist/20010423_cpma.html#start.

¹⁵ Data and estimates taken from Will, Raymond and Akihiro Kishi. SRI International, *The Chemical Economics Handbook*, 2001. *CEH Marketing Research Report—Pigments* (pages 3 and 5).

⁸ "Economic Assessment for the Proposed Loadings-Based Listing of Non-Wastewaters from the Production of Selected Organic Dyes, Pigments, and Food, Drug, and Cosmetic Colorants," U.S. EPA, November, 2003.

⁹ "Dyes and Dye Intermediates." Kirk-Othmer Encyclopedia of Chemical Technology, Fourth Edition. Volume 8. New York: John Wiley & Sons, Inc, 1993.

¹⁰ "Chemical Economic Handbook Marketing Research Report—Dyes," SRI International, 2000.

¹¹ "Synthetic Organic Chemicals United States Production and Sales, 1991," USITC Publication 2607, February 1993.

¹² "Chemical Economic Handbook Marketing Research Report—Dyes," SRI International, 2000.