

approximately 25 percent of the total U.S. dye market, while European-owned manufacturers hold the remaining 75 percent. Pigment production ownership is similarly structured.

#### c. Analytical Methodology

Our first step in the development of the cost and economic impacts analysis was the preparation of an industry profile (briefly discussed above). This profile established the potentially regulated universe, market structure, gross revenues, and estimated value of affected production. We then established baseline conditions for the producers of concern. This included an assessment of waste quantities generated, management practices, and unit costs. Compliance management practices and unit costs were developed next. Compliance costs include implementation costs (waste sampling, and analysis, plus recordkeeping and reporting, if any), transport costs, and compliant treatment and/or disposal costs, as appropriate. Baseline costs less total costs of rule compliance were calculated to determine incremental costs of compliance and economic impacts. All data were derived from publically available government and industry sources. No confidential business information (CBI) was used in the preparation of this analysis.

#### d. Affected Waste Quantities

This rule proposes a mass loadings-based listing for selected organic dye, pigment, and FD&C production nonwastewaters, to be identified as K181, if they meet or exceed either of two mass-based constituent thresholds. Non-wastewater quantities were estimated for the 37 facilities potentially subject to the rule requirements. Wastewater quantities were first estimated in order to derive wastewater treatment sludge quantities. Annual wastewater generation was estimated for the 37 facilities based on several sources. Facility specific information was available for eight direct dischargers and five indirect dischargers. Wastewater flow rates were estimated for the remaining 24 indirect dischargers based on estimated dyes and/or pigments production and wastewater flow data derived from a 1987 U.S. EPA Office of Water guidance document.<sup>62</sup>

We developed a log normal distribution of wastewater quantities from the statistics available in the above referenced document. A log-normal distribution is widely used under the following conditions: values are positively skewed with most of the values near the lower limit, the variable can increase without limits, but cannot fall below zero; and where the coefficient of variability (the ratio of the standard deviation to the mean) is greater than 30 percent. The wastewater flow statistics met these criteria. The coefficient of variability for the wastewater flow data was 453 percent. We used a commercially available software program to develop a distribution curve for the wastewater data. This program used a Monte Carlo technique to create a distribution of outcomes over thousands of iterations (50,000 in this case). From the distribution created by this program, the wastewater quantities were determined for every fifth percentile. Based on the production revenue data obtained for each facility, a corresponding production revenue percentile was assigned to each of the indirect dischargers. It was assumed that the production revenue directly correlated with the quantity of wastewater generated. For example, if a facility's product production revenue was at the 90th percentile level, it will generate wastewater at the 90th percentile level as well.

Annual wastewater treatment sludge generation rates were estimated for the 37 facilities based on two sources. Facility specific information was available for one facility who reported using a reverse osmosis wastewater treatment system. The wastewater treatment sludge generation rate for one other facility who reported using reverse osmosis, was estimated based on the calculated generation ratio. Wastewater treatment sludge generation rates for the remaining 35 facilities were based on total suspended solids (TSS) data from the 1987 Effluent Guidelines report. The total quantity of potentially impacted solid waste generated annually from the 37 facilities is estimated to range from 44,000 to 69,000 metric tons.

Other non-liquid wastes, in addition to wastewater treatment sludges, are expected to be impacted by this rule. These include: spent catalysts, spent adsorbent, equipment cleaning sludge, product standardization filter cake, and dust collector filter fines. The quantity of solids generated by these waste streams are assumed to be very minor. Furthermore, some of these wastes may be included in the wastewater treatment sludge estimates. No publicly available

information regarding the actual generation rates of these wastes within the dyes and/or pigments industry was found.

#### e. Baseline Waste Management Procedures and Unit Costs

Baseline waste management methods were derived through a review of industry and trade group comments, the 1999 TRI Report, and general public sources (including internet sources).

Baseline management practices for the wastes of concern include sludge dewatering for handling and disposal purposes (based on economic feasibility), then disposal in an unregulated clay-lined or unlined landfill, Subtitle D landfill, or a Subtitle C landfill (bulk or super sack). Three facilities with available site-specific information pertaining to sludge management methods have been identified. Two of these facilities report offsite Subtitle D landfill, while one reported onsite Subtitle C incineration followed by onsite Subtitle C landfill. The remaining facilities are assumed to manage sludge offsite in unregulated clay-lined landfills. This assumption will result in an overestimation of compliance costs if facilities are currently disposing of their wastes in composite lined landfills meeting Part 258 requirements.

Costs for landfill disposal were developed from the Remedial Action Cost Engineering and Requirements (RACER) cost estimating software, and the March 2000 Remediation Market Report Published by Chartwell. Costs in RACER are based on the 2002 Environmental Cost Handling Options and Solutions (ECHOS) cost database. The RACER disposal cost for hazardous and nonhazardous wastes is presented as a 30 city average of major cities across the United States. Chartwell reports the average costs of Subtitle D commercial landfill by state. For the purposes of this analysis, the state averages were averaged for a national average cost of disposal. All costs were inflated to 2003 dollars for this estimate using the Consumer Price Index. Disposal of solid waste in unregulated unlined landfills was estimated using the Subtitle D landfill disposal unit cost. Fifty percent of the Subtitle D landfill cost was used as a proxy for unregulated clay-lined landfill disposal costs. Unit costs are as follows: Subtitle D Landfill—\$42.60/ton, Unregulated clay-lined landfill—\$21.30/ton.

Costs for commercial incineration were developed from RACER and the Hazardous Waste Resource Center's "January 2002 Incinerator and Landfill

<sup>62</sup> U.S. EPA. October 1987. "Development Document for Effluent Limitations Guidelines, New Source Performance Standards, and Pretreatment Standards for the Organic Chemicals and the Plastics and Synthetic Fibers Point Source Category Volume I." Industrial Technology Division, Office of Water Regulations and Standards.