other than those involved in fiber introduction and milling, to be at levels below 0.2 f/cc. The level of exposure during braiding and twisting of treated asbestos yarn is controlled by local exhaust ventilation and is supplemented by general control measures, including dilution ventilation and systematic cleaning. In addition to wet mixing operations, sheet and gasket cutting causes very little generation of airborne fibers. Thus, OSHA has determined that it is feasible for these operations to comply with the 0.2 f/cc PEL.

Fiber introduction levels at these plants were reported to be in excess of 0.2 f/cc, with exposures at two of the plants reported to be in excess of 0.75 f/cc. OSHA, however, believes that these plants did not utilize the best available technology and that it is feasible for fiber introduction stations to comply with the 0.2 f/cc PEL. This determination of feasibility was made because the fiber introduction process in the gasket and packing industry is similar to that in other primary manufacturing industries where exposures are currently below 0.2 f/cc (e.g., A/C pipe and floor tile).

Asbestos Paper

In the manufacture of asbestos paper, raw asbestos fiber is most often introduced in unopened pulpable bags, although for some types of paper the fiber is dumped from the bags. In order to decrease exposures in cases where the fiber is dumped from the bags, asbestos may be obtained in noncompressed pulpable paper bags so that bags may merely be slit and added directly to the mixer, where it is immediately wetted. The use of batch sizes requiring whole bags of asbestos (rather than ⅓ or ½ bags) can further minimize asbestos handling and the potential for dust generation. As in other manufacturing processes, the asbestos fiber is carried under negative pressure by conveyor to a mixer. There, the fiber is wet-mixed with paper stock, binder, and other ingredients. The stock slurry flows into the papermaking machine and forms a sheet with a solids content of less than 5 percent. Although the moisture content is reduced greatly during transit through the paper machine, the wet nature of the material largely precludes the release of airborne asbestos.

The steam-heated rolls in the drying section typically have canopy hoods and exhausts to remove water vapor and heat. This type of hooding and exhaust augments the general ventilation in the area and aids in removing asbestos particulates released during the drying operation.

Local exhausts, area hoods, and central exhaust collection systems represent the normal control measures used to minimize asbestos exposure at the slitting and calendering stages. Housekeeping is also critical here.

The rewinding step involves the bulk packaging of paper products on spools, reels, or beams from larger rolls. The operation is dry, and the hoods and local exhaust may be used as dust-control measures during these operations.

Although airborne asbestos fibers are generated throughout the entire manufacturing process, exposure levels vary widely depending on the asbestos content of the product. If comparable control systems are used, airborne fiber levels at a plant producing a gasket paper containing 90 percent asbestos are normally higher than levels at a plant producing specialty papers, or beverage or pharmaceutical filters containing 10 percent asbestos. Emissions also can vary depending on the physical process itself. Some plants perform fiber introduction and stock preparation (i.e., wet-mixing) as separate operations and others combine these into a single operation.

Housekeeping in the stock preparation area represents a crucial control measure for minimizing operator exposure to asbestos. Central vacuum-cleaning systems and mechanical floor-sweeper-vacuum units often are used during these operations.

OSHA based its feasibility determination on data provided by the Quin-T Corporation's plant in Tilton, New Hampshire. As shown in Table 15, these data are the most recent and comprehensive available for asbestos paper production. The mean exposures for all areas were less than the 0.2 f/cc PEL. OSHA concludes that it is feasible for this industry to comply with the 0.2 f/cc PEL. This position is consistent with RTI's findings for two paper firms that responded to their survey [see Appendix C of the RIA].

TABLE 15.—WORKER EXPOSURE FOR ASBESTOS PAPER MANUFACTURE

Job classification process	Mean 8-hr TWA exposure (f/cc)	Standard deviation	No. of observations
Fiber introduction[1]	0.05	0.04	6
Wet mechanical	.09	.10	22
Dry mechanical[2]	.14	.12	17
Other	.08	.11	25

[1] These data omit one outlier of 0.56 f/cc. As all of other data were 0.1 f/cc or below, OSHA assumed that this observation was due to an equipment problem.

[2] These data omit one outlier of 1.3 f/cc. As all of the other observations were 0.4 f/cc or below, OSHA assumed that this observation was also due to an equipment problem.

Source: U.S. Department of Labor, OSHA, Office of Regulatory Analysis.

Coating and Sealants

Many types of coatings and sealants have asbestos added as a reinforcing agent and property modifier. In most instances, the final product is asphalt-based and is used for roof coatings and automobile undercoatings.

The production processes for surface coatings and sealants are similar. In the production of these products, the fibers must be opened, or fluffed, as much as possible. Thus, a fluffing operation to agitate the fibers follows the fiber introduction stage. Dry ingredients are then mixed with the opened fibers followed by the addition of the asphalt or coal tar and solvents. After mixing, the fiber is encapsulated and little asbestos dust is generated. The coatings and sealant blends are then packaged and prepared for shipment.

For this industry, the major potential sources of airborne fibrous exposures precede the mixing operation due to accidential spills during fiber receiving and storing, and from emissions during fiber introduction. As in the manufacture of other asbestos products, OSHA has determined that it is feasible to perform these tasks with with exposures below 0.2 f/cc. The fluffing and mixing operations are kept under negative pressure, and housekeeping around these operations is continuous.

OSHA based its feasibility determination on data provided by the Monsey Products Company for the firm's Indianapolis, Garland, and Rockhill plants. These data, which are the most comprehensive available on coating facilities that have good work practices,[1] are summarized in Table 16.

TABLE 16.—WORKER EXPOSURES DURING THE MANUFACTURE OF ASBESTOS COATINGS AND SEALANTS

Job classification process	Mean 8-hr TWA exposure (f/cc)	Standard deviation	No. of observations
Fiber introduction *	0.13	0.15	34
Other	.04	.05	13

* These data omit one outlier of 1.03 f/cc. As all of the other observations were below 0.7 f/cc, with most below 0.15 f/cc, OSHA assumed that this observation was due to an equipment problems.

Source: U.S. Department of Labor, OSHA, Office of Regulatory Analysis.

As indicated in the table, the average exposures for these work stations were less than 0.2 f/cc at both stations in the coating plants. OSHA, therefore, has determined that it is feasible for this industry sector to comply with the 0.2 f/cc PEL. This feasibility determination is

[1] Data provided indicate that the four other plants did not appear to have the same quality of control technology (Exhibit 312A, Section L).