chlorine dioxide addition and washing; alkaline extraction and washing, and chlorine dioxide addition and washing.

The sequence may be modified to meet specific bleaching requirements. In general, less bleaching is required for mechanical pulps because they contain all of the wood substrate and would require massive amounts of bleaching. Therefore, mechanical pulps are used to produce lower quality paper products, such as telephone directories, newsprint, and disposable products. Chemical pulps may be brightened to a higher degree. Hydrosulfite, hypochlorite, chlorine, oxygen, and peroxides are used in bleaching and may be stored in areas exposed to storm water.

d. Papermaking. After pulps have been bleached, further mixing and blending may be necessary and noncellulosic materials may be added to prepare the pulp for the papermaking stage. Different types of pulp may be blended for desired effects. Softwood pulps are very strong and are used to make high strength, tear resistant paper. These pulps may be blended with hardwood pulps which add porosity, opacity, and printability qualities to the paper. Other materials may be added to the pulp such as clay, talc, or calcium carbonate to improve the texture, brightness, or opacity of the paper. By adding resin or starch, the paper becomes more ink or water resistant. Each of these additives may be a source of contamination for storm water if stored outdoors.

After noncellulosic materials have been blended with the pulp, it is ready for papermaking. The mixture of pulp and additives is called a pulp furnish. In making paper, fiber from a dilute pulp furnish is placed on a fine screen, called a wire. The water is drained through, and the fiber layer is removed, pressed and dried.

Two basic types of processes are used in papermaking: the cylinder machine and the Fourdrinier. The cylinder machine has wire cylinders which rotate in the dilute pulp furnish and collect fibers. The cylinders deposit the collected fibers on a moving felt to form a fibrous sheet. In the Fourdrinier process, the dilute pulp furnish is placed on a continuous wire belt where the fibrous sheet is formed. The cylinder machine is usually associated with the manufacturing of heavy grades of paper and paperboard; the Fourdrinier process is mostly used for producing paper, but may also be used to make paperboard.

The pressing and drying operations are similar for the two processes. After the fibrous sheet is formed, it is transferred to two or more presses to remove water and enhance smoothness and density. The sheet is then dried by being passed through heated hollow iron or steel cylinders. For a smoother finish, the sheet may be passed through a series of rollers (calendaring) used to produce high density paper.

After the sheet is dry, coatings may be applied to increase appearance, printability, water resistance, or texture. Coatings consist of a high density water slurry of pigments and adhesives that are blended together. Mixtures of starches, latices, polyvinylacetate, and recoverable solvents are used depending on the purpose of the coating. The coating is applied using rolls, air knives, blades, or metering rods. High gloss and smoothness is achieved by using high speed rollers with alternating steel and fabric-filled rolls. The coatings, when stored exposed to storm water discharges may be a source of contamination.

e. Wastewater Treatment. Most pulp, paper, and paperboard facilities have onsite wastewater treatment systems for treating process wastewater, although some facilities may discharge to a POTW. To reduce BOD_5 and TSS loads, many facilities use biological treatment. The most common treatment process is aerated stabilization. At nonintegrated facilities (facilities that do not produce pulp) and secondary fibers facilities, however, primary treatment may be the only method used. At these facilities, primary treatment is usually very effective in reducing BOD_5 .

f. Activities Contributing to Storm Water Contamination. Although there is diversity among the types of final products produced at pulp, paper, and paperboard facilities, several industrial activities are common to all. These activities are presented in Table B–1 Below.

Table B–1.—COMMON INDUSTRIAL ACTIVITIES AT PAPER AND ALLIED PRODUCT MANUFACTURING FACILI-TIES

Industrial Activities

Bactericide use Baghouse, cyclone, dust collectors Coating Corrugate Creasing Cutting Equipment storage Vehicle fueling Gluing Rail and Truck loading areas Material handling sites Printing Access Railroads Scoring Stitching

Table B–1.—COMMON INDUSTRIAL ACTIVITIES AT PAPER AND ALLIED PRODUCT MANUFACTURING FACILI-TIES—Continued

Industrial Activities

Storage areas Taping

aping

Typical activities performed at pulp, paper, and paperboard facilities include log washing, chipping and cutting of logs, log sorting, log storage, and loading and unloading of logs onto trucks or railroad cars for transport to other facilities. These log storage and handling activities may contribute bark and wood debris, TSS, and leachates to a storm water discharge. Leachates from the decay of wood products may contain high levels of TSS and BOD₅.

Many of the facilities in SIC Major group 26 employ the use of material handling equipment (forklifts, loaders, vehicles, chippers, debarkers, cranes, etc.), vehicles, and other machinery. These facilities store the equipment onsite and may also engage in equipment maintenance and repair activities. These types of activities are performed in either covered or outdoor areas of the facility. Associated with these activities is the storage of significant materials such as petroleum products and other maintenance fluids such as fuels, motor oils, hydraulic oils, lubricant fluids, brake fluids, and antifreeze. When exposed to storm water, these materials may cause contamination of a storm water discharge.

The manufacturing processes at paper and allied product manufacturing facilities are not typically exposed to storm water. Because of the lack of industrial activities occurring outdoors, the primary sources of storm water pollutants originate from materials handling, storage of materials, and waste management or disposal activities. Sources of pollutant are most often from spills and leaks of materials at loading and unloading areas, storage areas, and waste disposal areas. Table B-2 lists the materials that may be exposed to storm water at paper and allied product manufacturing facilities.

TABLE B–2.—COMMON SIGNIFICANT MATERIALS AT PAPER AND ALLIED PRODUCT MANUFACTURING FACILI-TIES

Significant Materials Onsite

Solvents Glues Fuels