

Waste systems for power reactors have employed conservative design criteria in terms of safety, pollution control, and plant performance. These criteria include the following salient features:

(1) Waste plant capacities are sized to handle higher than normal volumes and activities which might be caused by higher than expected corrosion and leakage rates, frequency of maintenance, and radioactivity from fuel failures.

(2) Plant flexibility is provided to accommodate waste from future fuel types, new decontamination solutions, and unforeseen abnormal wastes and cleanup solutions from accidents.

(3) Some dilution of liquid wastes by mixing with main condenser discharge water or other water is permitted in order to keep well below radiation protection standards; however, the dilution capacity of surface water streams receiving the condenser discharge water is not used to meet acceptable radiation protection standards.

(4) Limited use is made of on-site disposal for low- and intermediate-level liquid wastes or packaged, solid wastes.

(5) Piping and tanks (for all except very low-activity liquids) are provided with separate secondary containment by placing them in pipe trenches and in concrete enclosures, so that leakage can be detected and collected and returned to the waste system.

Treatment and storage systems at water reactors now operating (and those planned for the expanding industry in the next decade or more) include radioactive decay hold-up tanks, evaporators, ion exchangers, steam-stripping, catalytic recombination of hydrogen and oxygen, fixation of solids and liquids in concrete, incineration, baling, and liquid and gas filtration. In many cases, liquid wastes are stored to permit decay of short-lived radioactivity. They are then monitored to assure that they meet acceptable standards and then are released without further treatment. The waste volumes handled at power reactor facilities are not large (50 to 100,000 gallons per day for 200 to 400 milliwatt reactors) in comparison with industrial waste volumes from many other industries. The total radioactivity handled in these wastes is quite small. Radioactivity concentrations in existing power plant effluents, with no environmental dilution, have ranged from 1 to 3 percent of internationally accepted radiation protection standards for the general public. The plants have used conservative methods for establishing discharge limits.

Solid combustible wastes are generally baled (volumes reduced by 4-6:1 through the use of standard baling machines), then sealed in fiber drums or boxes and shipped off site for land burial at approved sites. Incineration of combustible wastes at power reactor sites has not been widely used because of high operating costs and the relatively small volumes of such waste handled. Disposal of ion exchange resins, evaporator concentrates, and contaminated noncombustible waste is accomplished by fixation in concrete in standard 55-gallon drums and transported by commercial firms off site for land burial. Solid waste volumes for reactor facilities of the Dresden and Yankee types amount to several thousand cubic feet per year. Final disposal of these wastes is readily achieved through commercial land burial operations at special locations on Government-owned land—currently in the States of New York, Kentucky, Nevada, and Washington—where the necessary perpetual control is assured. The capacity and