CFR part 439 will not change this. However, process wastewater generated by research activities falling within this subcategory will continue to be subject to BCT and BAT limitations, as appropriate, established on a best professional judgment (BPJ) basis. In addition, indirect dischargers will be subject to local limits, as appropriate.

In its preamble to the 1983 regulations, EPA explained that it was specifically excluding subcategory E pharmaceutical research from all limitations and standards in the regulation other than BPT limitations because these operations do not involve production and wastewater generation in appreciable quantities on a regular basis. See 48 FR 49808, 49816 (Oct. 27, 1983). EPA also noted that research activities conducted at mixed and single subcategory plants (A, B, C, and D only) would be covered by that regulation. In today's Notice, EPA proposes to exclude subcategory E research operations from all limitations and standards in the proposed rule, other than the existing BPT limitations, at both stand alone and mixed subcategory plants. However, in order to clarify the scope of Subcategory E as described in the 1983 preamble, EPA proposes to define Subcategory E research operations specifically as bench-scale activities related to the development of pharmaceutical products. Bench-scale activities, in contrast to pilot-scale operations, do not involve production or wastewater generation in appreciable quantities on a regular basis and therefore describe the activities historically encompassed within Subcategory E, Pharmaceutical Research.

Consequently, under this proposal, bench-scale research activities that generate process wastewater at manufacturing facilities or at stand-alone Subcategory E facilities will be covered by the current subcategory E BPT limitations on BOD_5, COD, TSS and pH. This means that if a facility engaging in bench-scale research operations also engages in pharmaceutical manufacturing operations covered by subcategories A, B, C, or D, the process wastewater from the bench-scale research operations would be subject only to subcategory E regulations (and on a case-by-case basis BCT and BAT limitations based on BPJ, as appropriate). Conversely, if a facility engages in research operations on a pilot-scale level, then the wastewater generated by those operations would be subject to the standards and limitations applicable to the manufacturing subcategory (A, B, C, or D) that the wastewater most resembles. See 40 CFR 439.50 et seq.

The proposal that subcategory E applies to all bench-scale research operations irrespective of their proximity to pharmaceutical manufacturing process operations represents a change from the interpretation expressed by EPA in the preamble to the 1983 rule. In that preamble, EPA indicated that research activities conducted at mixed and single subcategory plants (A, B, C, and D only) would be covered by the regulations corresponding to the particular subcategory. Accordingly, the Agency is soliciting comment on whether facilities with both subcategory E and subcategory A, B, C, or D process operations should be subject to the standards and limitations corresponding to the manufacturing subcategory (A, B, C, or D) and not to subcategory E BPT limitations as proposed here. See Section XIV, solicitation number 5.2.

B. Water Use, Wastewater Discharge and Characterization

This section describes current water use and wastewater recycling practices, discharge practices and the general characteristics of wastewater at the plants that manufacture pharmaceuticals in the United States. A more detailed presentation can be found in Section 5 of the TDD. Almost all pharmaceutical manufacturing processes require the use of water, although use and discharge practices and the characteristics of the wastewater will vary depending on the process operations at individual facilities.

1. Water Use and Wastewater Generation

a. Water Use. EPA estimates the average daily wastewater generation by the pharmaceutical manufacturing industry to be 266 million gallons, based on the responses to questions in part A section 4 of the 1990 Pharmaceutical Manufacturing Survey. Pharmaceutical manufacturers use water for process operations and for other nonprocess purposes such as noncontact cooling and sanitation.

The water is used or generated in pharmaceutical manufacturing process operations in several ways, thereby generating process wastewater:

- Water of reaction: Water formed during the chemical reaction.
- Process solvent: Water used to transport or support the chemicals involved in the reaction process; this water is usually removed from the process through a separation step, such as centrifugation, decantation, drying, or stripping.
- Process stream washes: Water added to a process stream (i.e., the carrier, spent acid, or spent base) that has been separated from the reaction mixture, in order to purify the stream by washing away impurities in the stream.
- Product washes: Water added to the reaction medium to purify an intermediate or final product by washing away the impurities (this water is subsequently removed through a separations step); or water used to wash the crude product after it has been removed from the reaction medium.
- Spent Acid/Caustic: Spent acid and caustic streams, which may consist primarily of water, that are discharged from the process during the separation steps following the reaction step in which acid and basic reagents are used to facilitate, catalyze, or participate in the reactions.
- Condensed steam: Steam used as a sterilizing medium and in steam strippers for solvent recovery and wastewater treatment.

Other sources of process wastewater associated with pharmaceutical manufacturing operations include:

- Air pollution control scrubber blowdown: Water or acidic or basic compounds used in air emission control scrubbers to control fumes from reaction vessels, storage tanks, incinerators, and other process equipment.
- Equipment and floor washes: Water used to clean process equipment during unit shutdowns and floors during general housekeeping or for spill cleanup.
- Pump seal water: Direct contact water used to cool packing material and lubricate pumps.

In addition to process wastewater, non-process wastewater may be generated during pharmaceutical manufacturing. This non-process wastewater may include noncontact cooling water (used in heat exchangers), noncontact ancillary water (e.g., boiler blowdown, bottle washing), sanitary wastewater, and wastewater from other sources such as stormwater.

b. Water Conservation. In response to the 1990 detailed survey questionnaire, 137 of the 244 responding pharmaceutical manufacturers reported implementing water conservation measures with regard to process wastewater. Such water conservation measures include: careful monitoring of water use, installation of automatic monitoring and alarm systems on in-plant discharges, implementation of alternative production processes requiring less water, conversion from barometric to surface condensers, reuse of wastewater from other manufacturing processes, reuse of noncontact water as process makeup water, and treatment of contact cooling water to allow reuse.