Municipal Wastewater Treatment Systems

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PDH: 3

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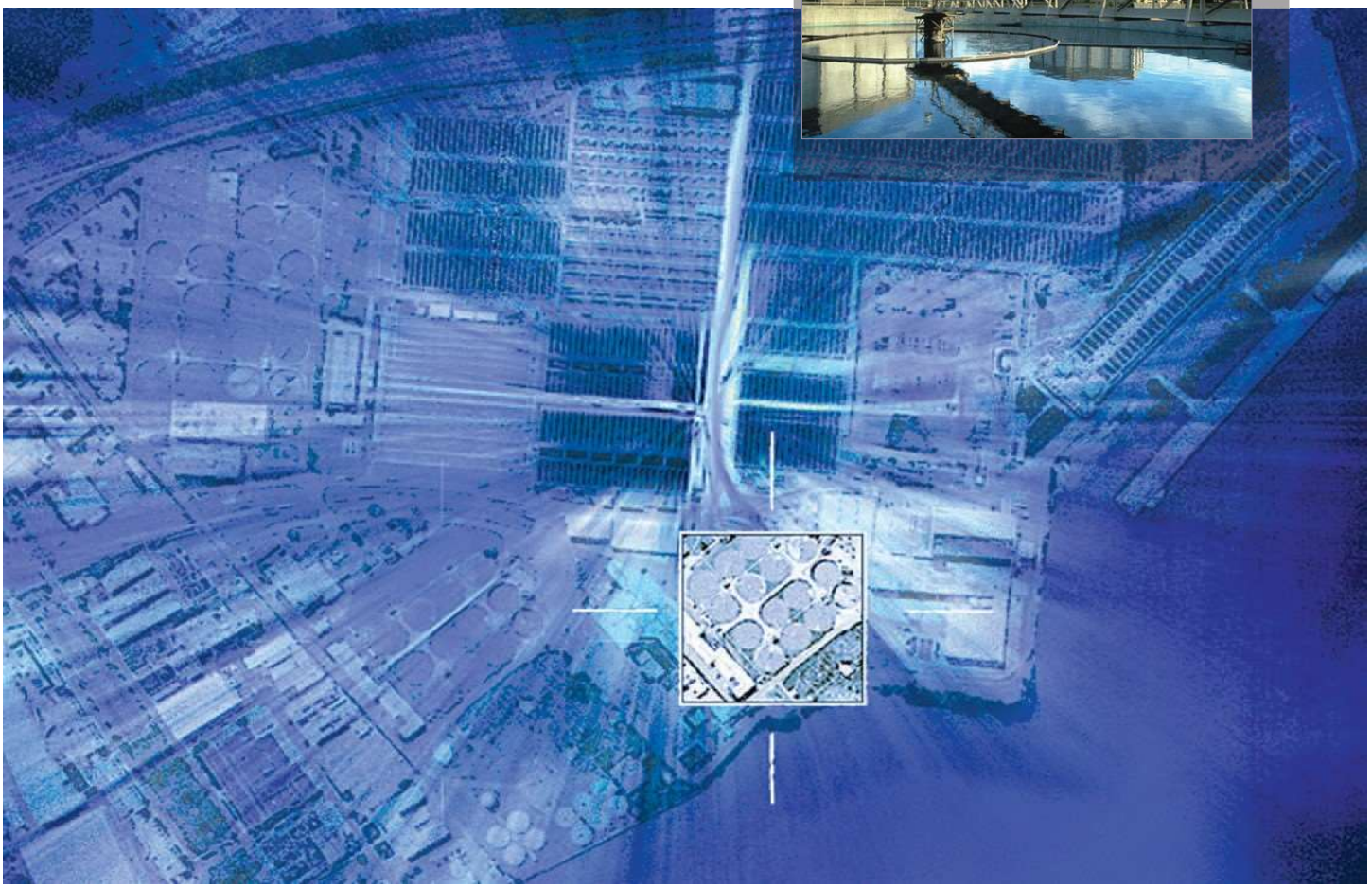
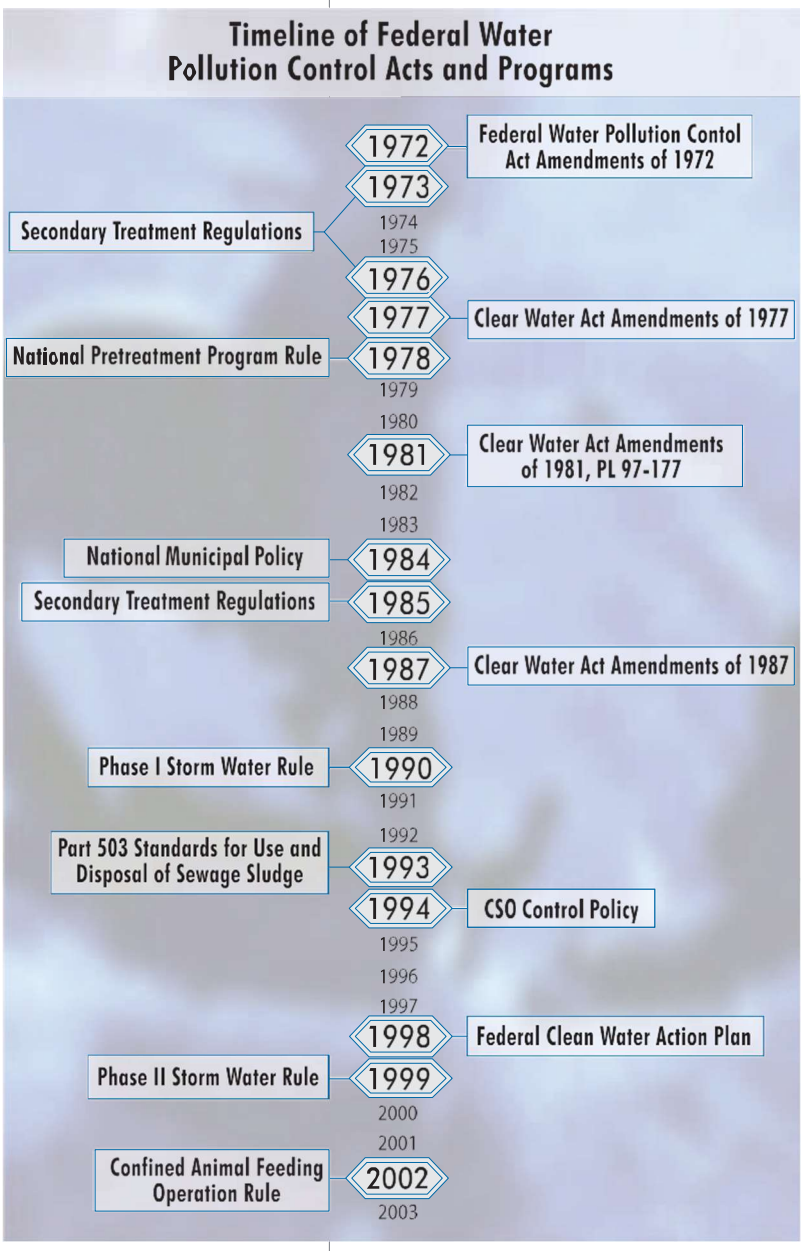




Clean Water Act Requirements for Wastewater Treatment

The 1972 Amendments to the Federal Water Pollution Control Act (Public Law 92-500–, known as the Clean Water Act (CWA), established the foundation for wastewater discharge control in this country. The CWA's primary objective is to 'restore and maintain the chemical, physical and biological integrity of the nation's waters.'

The CWA established a control program for ensuring that communities have clean water by regulating the release of contaminants into our country's waterways. Permits that limit the amount of pollutants discharged are required of all municipal and industrial wastewater dischargers under the National Pollutant Discharge Elimination System (NPDES) permit program. In addition, a construction grants program was set up to assist publicly-owned wastewater treatment works build the improvements required to meet these new limits. The 1987 Amendments to the CWA established State Revolving Funds (SRF) to replace grants as the current principal federal funding source for the construction of wastewater treatment and collection systems.

Over 75 percent of the nation's population is served by centralized wastewater collection and treatment systems. The remaining population uses septic or other onsite systems. Approximately 16,000 municipal wastewater treatment facilities are in operation nationwide. The CWA requires that municipal wastewater treatment plant discharges meet a minimum of 'secondary treatment'. Over 30 percent of the wastewater treatment facilities today produce cleaner discharges by providing even greater levels of treatment than secondary.

Primer for Municipal Wastewater Treatment Systems

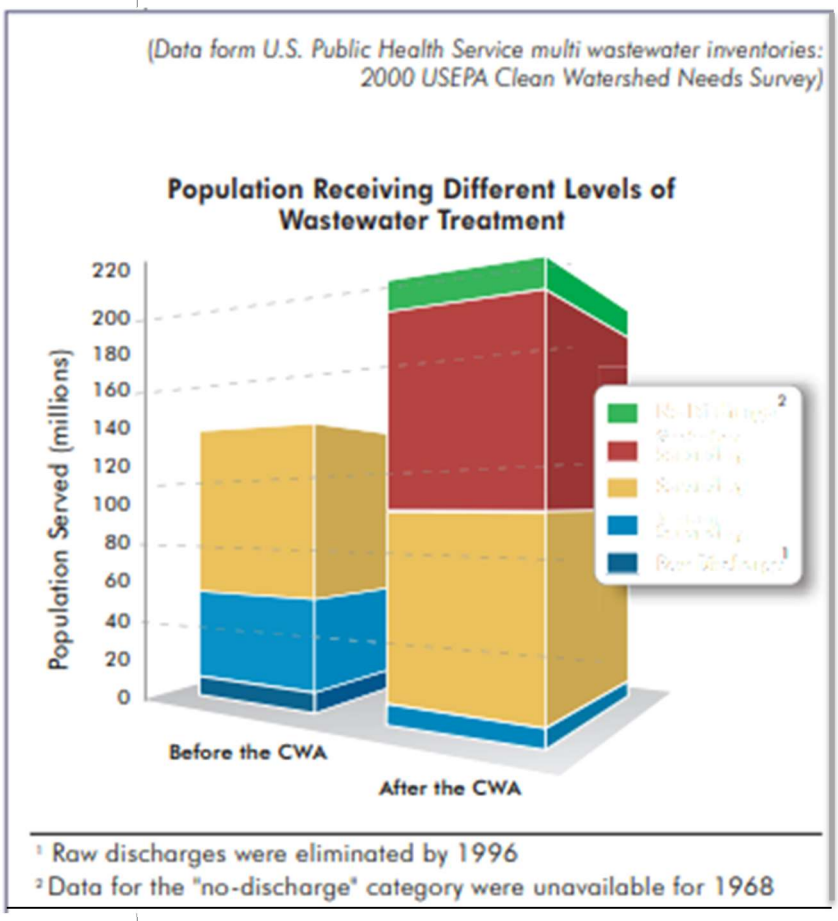
The Need for Wastewater Treatment

Wastewater treatment is needed so that we can use our rivers and streams for fishing, swimming and drinking water. For the first half of the 20th century, pollution in the Nation's urban waterways resulted in frequent occurrences of low dissolved oxygen, fish kills, algal blooms and bacterial contamination. Early efforts in water pollution control prevented human waste from reaching water supplies or reduced floating debris that obstructed shipping. Pollution problems and their control were primarily local, not national, concerns. Since then, population and industrial growth have increased demands on our natural resources, altering the situation dramatically. Progress in abating pollution has barely kept ahead of population growth, changes in industrial processes, technological developments, changes in land use, business innovations, and many other factors. Increases in both the quantity and variety of goods produced can greatly alter the amount and complexity of industrial wastes and challenge traditional treatment technology. The application of commercial fertilizers and pesticides, combined with sediment from growing development activities, continues to be a source of significant pollution as runoff washes off the land.

Water pollution issues now dominate public concerns about national water quality and maintaining healthy ecosystems. Although a large investment in water pollution control has helped reduce the problem, many miles of streams are still impacted by a variety of different pollutants. This, in turn, affects the ability of people to use the water for beneficial purposes. Past approaches used to control water pollution control must be modified to accommodate current and emerging issues

Effects of Wastewater on Water Quality

The basic function of the wastewater treatment plant is to speed up the natural processes by which water purifies itself. In earlier years, the natural treatment process in streams and lakes was adequate to perform basic wastewater treatment. As our population and industry grew to their present size, increased levels of treatment prior to discharging domestic wastewater became necessary.



Collecting and Treating Wastewater

The most common form of pollution control in the United States consists of a system of sewers and wastewater treatment plants. The sewers collect municipal wastewater from homes, businesses, and industries and deliver it to facilities for treatment before it is discharged to water bodies or land, or reused.

Centralized Collection

During the early days of our nation's history, people living in both the cities and the countryside used cesspools and privies to dispose of domestic wastewater. Cities began to install wastewater collection systems in the late nineteenth century because of an increasing awareness of waterborne disease and the popularity of indoor plumbing and flush toilets. The use of sewage collection systems brought dramatic improvements to public health, further encouraging the growth of metropolitan areas. In the year 2000 approximately 208 million people in the U.S. were served by centralized collection systems.

Some of the key challenges faced by wastewater treatment professionals today:

- Many of the wastewater treatment and collection facilities are now old and worn, and require further improvement, repair or replacement to maintain their useful life;
- The character and quantity of contaminants presenting problems today are far more complex than those that presented challenges in the past;
- Population growth is taxing many existing wastewater treatment systems and creating a need for new plants;
- Farm runoff and increasing urbanization provide additional sources of pollution not controlled by wastewater treatment; and
- One third of new development is served by decentralized systems (e.g., septic systems) as population migrates further from metropolitan areas.

Purchase this course to see the remainder of the technical materials.