

# Control of Water Pollution in the United States

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## ***Introduction***

In 1972, the United States Congress passed a landmark legislation called the Clean Water Act (CWA). This legislation has been central in United States' endeavors to improving the quality of the environment. This law mandates that all levels of government (federal, state and local) and the private sector work together to resolve pollution problems caused by untreated municipal wastewater and industrial effluents and to mitigate the pollution caused by runoff from farmlands, city streets, and other so called non-point sources. Considering the state of affairs some 30 years ago, the CWA has been extraordinarily successful in improving the quality of the nation's waters.

In late 1960s, President Lyndon Johnson declared the Potomac River (near Washington D.C.) a national disgrace. Excessive growth of blue-green algae killed fish and destroyed other aquatic habitat. The river was also a genuine threat to public health and anyone that fell in the water was required to have a tetanus injection. Perhaps the most memorable icon of those times was the Cuyahoga River in Cleveland. Excessive industrial pollution caused it to catch fire. Massive algae blooms in Lake Erie and Lake Ontario caused countless fish kills and tainted the water supply of millions of people.

During this time, the water pollution laws existing in the different states were limited in scope and effectiveness. Federal pollution laws were non-existent. The environmental incidents at this time created public outrage and concern nationwide which provided the fuel for the environmental movement in the United States. The congress responded to the concerns of the American people by enacting the CWA of 1972 and forming the United States Environmental Protection Agency (USEPA). The new law required municipal and industrial dischargers to meet technology-based standards, established a public works program and provided

finances to build and expand wastewater treatment facilities, and established a permit and enforcement program to regulate discharges.

The results of the CWA over almost 3 decades have been very dramatic and a great success story in the U.S. national affairs. The Potomac River now supports recreational fish. President Bush caught a 3-pound bass there during his presidency. Summer-time recreation (fishing, swimming, and windsurfing) is at its peak and the concern for tetanus does not exist any longer. Lake Erie's fishery is recovering, and the algae blooms are a thing of the past. The Hudson River has fish species in quantities not seen in decades. Many other water bodies across the country are also returning to healthy condition. Almost two-third of nations water bodies meets the current water quality standards.

Today the challenges are different: contaminated runoff from agricultural and urban areas, mining and forestry operations, and industrial sites; combined sewer and sanitary sewer overflows; contaminated sediments; wetlands and other habitat loss; degradation of estuaries and other coastal waters; atmospheric deposition of acidic agents; heavy metals and other toxins in the waters of the United States; and recovery of endangered aquatic species, etc. Some of these concerns can be addressed under the existing CWA. Other laws may have to be enacted. Emphasis is being given to pollution prevention rather than pollution control. The philosophy is that end-of-pipe control and waste disposal should be the last line of defense, not the front line.

### ***The Clean Water Act***

The "Clean Water Act" (CWA) was enacted by the U.S. Congress in 1972. This was the 500<sup>th</sup> public law passed by the 92<sup>nd</sup> Congress; hence its short title is PL 92-500. Since the enactment of the CWA, U.S. water quality policy has been built upon five pillars contained in PL 92-500:

1. Discharge of pollutants into navigable waters of the United States is a privilege not a right, and must be authorized by a delegated agency.
2. These authorizations (or discharge permits known as NPDES permits) shall include limitations on type and concentration of pollutants.
3. Violations of the terms of these permits shall be subject to fines and imprisonment
4. Best Control Technology must be required regardless of the receiving water's ability to purify itself naturally.

5. Even higher standards (with relatively more stringent limitation) may be required beyond best technology for necessary protection of the quality of the receiving waterbody.

The 1972 statute has been amended many times since then. However, Congress has retained the philosophy on which PL 92-500 was based upon.

### ***National Pollutant Discharge Elimination System (NPDES) Program***

The Intent of the NPDES program is to regulate all pollutants from all facilities into virtually all waters of the U.S. The USEPA or the delegated states issue NPDES permits. The permits are issued for a period of 5 years. Prior to issuance, a draft permit is made available to the public to provide an opportunity to comment on it. Based on the comments received the permit is modified and a final permit is issued.

A discharge permit is a legal document that authorizes the discharge of certain pollutants at certain concentration or loading to surface water, groundwater or municipal sanitary sewer. A discharge permit contains requirements that a permittee must comply with in order to protect the environment.

The permitting process begins with a permit application, which must be filed with the permitting agency well ahead of the time before a discharge commences. Generally this time period is 180 days or six months. The application must contain information on the type of industry and the quality of the proposed discharge. This includes concentrations of pollutants predicted or known to be present in the discharge. The permit application should accompany an engineering report on any proposed wastewater treatment system and predicted associated effluent quality. The application should also contain information on water quality and known or desired beneficial uses of the receiving water body.

The issuing authority then reviews the application, and develops a factsheet that contains the basis for permit conditions including effluent limitations. The effluent limitations are based on technology used to treat the wastewater and/or on meeting water quality standards, which ever is more stringent.

Once the factsheet and permit is developed, it is sent out for entity and public comments for a period of 30 days. Complex permits may require a full public hearing. Comments received during this time are responded to and the permit/factsheet is modified accordingly.

Once permit is issued, the permittee begins monitoring the discharge at a predetermined frequency (once a month, twice a month, etc.) and submits monthly discharge monitoring results to the permit issuing authority. Any non-compliance with permit limitations is enforced through warning letters, penalties or in some cases termination of the permit and an order to cease and desist.

### ***Technology Based Effluent Limitations***

Federal Regulations were developed by USEPA following the passage of the CWA law. These regulations govern the different types of industries and set an industry category specific effluent limitations based on available technologies.

The first generation of technology based standard for "existing" industries as required by the CWA is called "best practicable control technology (BPT)" which is based upon average of the best existing performance by well operated wastewater plants within each industry category. BPT is applicable to conventional pollutants (Biochemical Oxygen demand (BOD), total suspended solids (TSS), coliform bacteria, pH, and oil/grease) which was required to be achieved by July 1, 1977.

The "best conventional pollutant control technology (BCT)" is the next level of BPT and was required to be completed by March 31, 1989.

For toxic pollutants (for example, benzene, etc.) the industry must meet a more stringent limitation of the "best available control and treatment technology" (BAT) that have been or capable of being achieved. BAT was required to be completed by March 31, 1989

BPT, BCT and BAT have been developed for various industries, which are documented in the Code of Federal Regulations. For example, for municipal wastewater discharge the BCT is 30 mg/L BOD, 30 mg/L TSS, 200 organisms /100 ml fecal coliform and a pH of 6 to 9. These limitations (BPT, BCT or BAT) are then used as minimum effluent limitations in a discharge permit that a municipality or an industry must meet.

### ***Water Quality Based Effluent Limitations***

Under the direction of the CWA, USEPA developed water quality criteria for the protection of aquatic life from acute and chronic toxicity. The USEPA also

developed drinking water standards following the passage of the Safe Drinking Water Act in 1974 (this replaced the 1962 Public Health Service Drinking water Standards). In recent years, USEPA also developed the National Toxics Rule (NTR) that established standards for carcinogens. USEPA mandated that all states comply with the NTR criteria in 1992. All these standards must be taken into consideration when evaluating technology (whether BPT, BCT, BAT or some other newer technology) and the beneficial uses of the receiving water body. If the technology can not achieve the water quality standards then the facility must take additional measures, like, source control, best management practices, or use of alternative raw materials. If after the best effort effluent concentrations can not be reduced to below water quality standards, a limited mixing zone in the receiving environment is granted. In some cases, where mixing is also insufficient to reduce concentrations, the facility may be altogether denied a permit to discharge.

### ***Groundwater Standards***

All discharges to ground including leachate from landfills must comply with groundwater standards. These standards are similar to the drinking water standards. Technology based standards are applied at the end of the treatment system. This can be a point of discharge prior to land application or in the vadoze zone if soil/plant system is also used for treatment. The point of compliance with groundwater standards is at the groundwater table and is established through sampling of groundwater at a monitoring well.

### ***Enforcement***

The legal system is used to ensure that the permit conditions are met. However, attempt is always made to resolve any non-compliance issues through providing technical assistance and voluntary compliance. Enforcement is used when consistent non-compliance and total disregard to laws and regulations are observed. Enforcement can be monetary penalty or imprisonment, or both.

### ***Control of non-point sources of pollution***

The regulatory mechanism for urban storm water runoff pollution control has been developed over the last decade or so. Storm water runoff from industrial areas is being authorized under a federal storm water general permit that basically requires that the entity prepare and implement a storm water pollution prevention plan. This plan considers "best management practices" on site including source control.

## ***Bangladesh Perspective***

For a water pollution control program to work, the citizens must be educated on how pollution control would benefit health and safety and protect beneficial uses of waterbodies. A general awareness of the importance of sanitation; and the risks associated with exposure to pathogens, pesticides, herbicides, and petroleum products, would build a desire to move towards a better environment. It should be the duty of the government to protect the health and welfare of its citizens. However, the citizens must let their political leaders know that this is what they want. This would begin a political process with the culmination of not only effective environmental laws but also participation and desire of the whole nation.

The government should inculcate the spirit of volunteerism among the citizens. A better environment can not be achieved if the citizens' total disregard to the environment results in a continuous proliferation of pollution. The spirit of belonging must be developed. "This is my home, my city and my country, and I must keep it clean" -- should be the spirit that drives one to pick up a glass bottle by the roadside and put it in the garbage bin. The government has a role in providing the infrastructure (access to garbage disposal cans, restrooms throughout the city and along major highways) for this to happen.

Non-point source of pollution is a major concern in Bangladesh and ironically an area where the citizens and the government can have the most impact. This can be achieved through mechanisms discussed above.

The point source pollution control would require a process similar to that followed in the United States. However, it should be remembered that by the time the CWA was enacted and implemented, the citizens desire for a better environment reached a level where they would willingly pay taxes to improve environment, participate voluntarily to reduce pollution, recycle or reuse solid waste, and speak out openly to condemn polluters. It is at this level of the state of mind that the citizens should be encouraged to reach.