

CHAPTER 9

ECONOMIC CONSIDERATIONS

9-1. Introduction

This section provides economic considerations concerning water pollution control systems. In keeping with the intent of Executive Order 12088, budget requests for water pollution control work at Federal facilities should reflect an effective life cycle cost solution. This involves an evaluation of both capital and annual costs (total life cycle costs). Guidelines have been issued by DOD and DA for making life cycle costing studies. Total system costs are sensitive to materials of construction, i.e., steel tanks cost less than reinforced concrete tanks but have a shorter life; type of equipment; inflationary effects on material, chemical and labor costs; energy availability; and geographical location.

9-2. Construction Costs

Construction costs include expenditures for labor and materials to build facilities including piping, steel, concrete, excavation, buildings, electrical work, heating and ventilation, etc. Costs for special localized site development factors may include site or trench dewatering, piling, and rock excavation.

a. Cost curves. Appendix A contains typical construction cost curves for several treatment unit operations. The curves show the range of cost values associated with varying plant capacities. The bibliography contains additional references pertaining to treatment plant costs.

b. Cost indices. Cost indices relate costs at one time and place to costs at any other time and/or place. For example, if a project was estimated to cost \$100,000 in 1973 using an index of 1138, that same project would cost 2233/1138 multiplied by \$100,000 or \$196,221 in 1982 when the cost index rises to 2233. Geographical adjustments may also be necessary. AR 415-17 provides guidance on cost adjustment factors.

(1) Commonly used indices. Indices commonly used are the U.S. EPA Sewage Treatment Plant (EPA-STP) Cost Index and the *Engineering News-Record* (ENR) Indices (see figure 9-1). The slopes of the curves represent the relative increase in costs with time. The basic difference between the two indices is that the EPA-STP index includes skilled labor and mechanical equipment costs, while the ENR index includes structural steel, cement, 2 X 4 lumber, and common

labor (69). As a result of different price changes for the various types of material and labor, the relative slopes of the lines are different. Costs in appendix A are related to a EPA-STP index value. The ENR indices are updated weekly in the *Engineering News-Record* and the EPA-STP index value is updated quarterly in the *Journal Water Pollution Control Federation*.

(2) Geographic variability. Costs will vary at different geographical locations due to transportation and other expenses. Thus, cost indices at a given time will vary from place to place. Table 9-1 illustrates this point by the variation in the EPA-STP at several key U.S. cities. Appendix A relates all costs to a national index, rather than an index for a particular geographical location. The cost adjustment for foreign locations must be evaluated on a specific case-by-case basis. Sometimes availability of materials is critical and may affect design decisions. Thus, early assessment of foreign economic conditions is important.

Table 9-1. Typical geographical variations in cost indices (values are ENR construction cost index for March 1983).
Base Value: 1967 = 100

Location	Index Value
Atlanta	390
Baltimore -	350
Birmingham	352
Chicago	341
Cleveland	380
Dallas	410
Denver	365
Kansas City	406
Los Angeles	418
Minneapolis	347
New York	329
Philadelphia	381
St. Louis	347
San Francisco	390
National Average	374

9-3. Life cycle cost evaluation

All pollution control plans for military installations must include a life cycle cost evaluation when applicable. This evaluation is an analysis to determine the wastewater treatment system or component thereof which will result in the lowest total cost in meeting regulatory criteria. The evaluation must include total capital and annual costs for the complete treatment system and for alternative unit operations within the overall system. For this reason, the construction cost

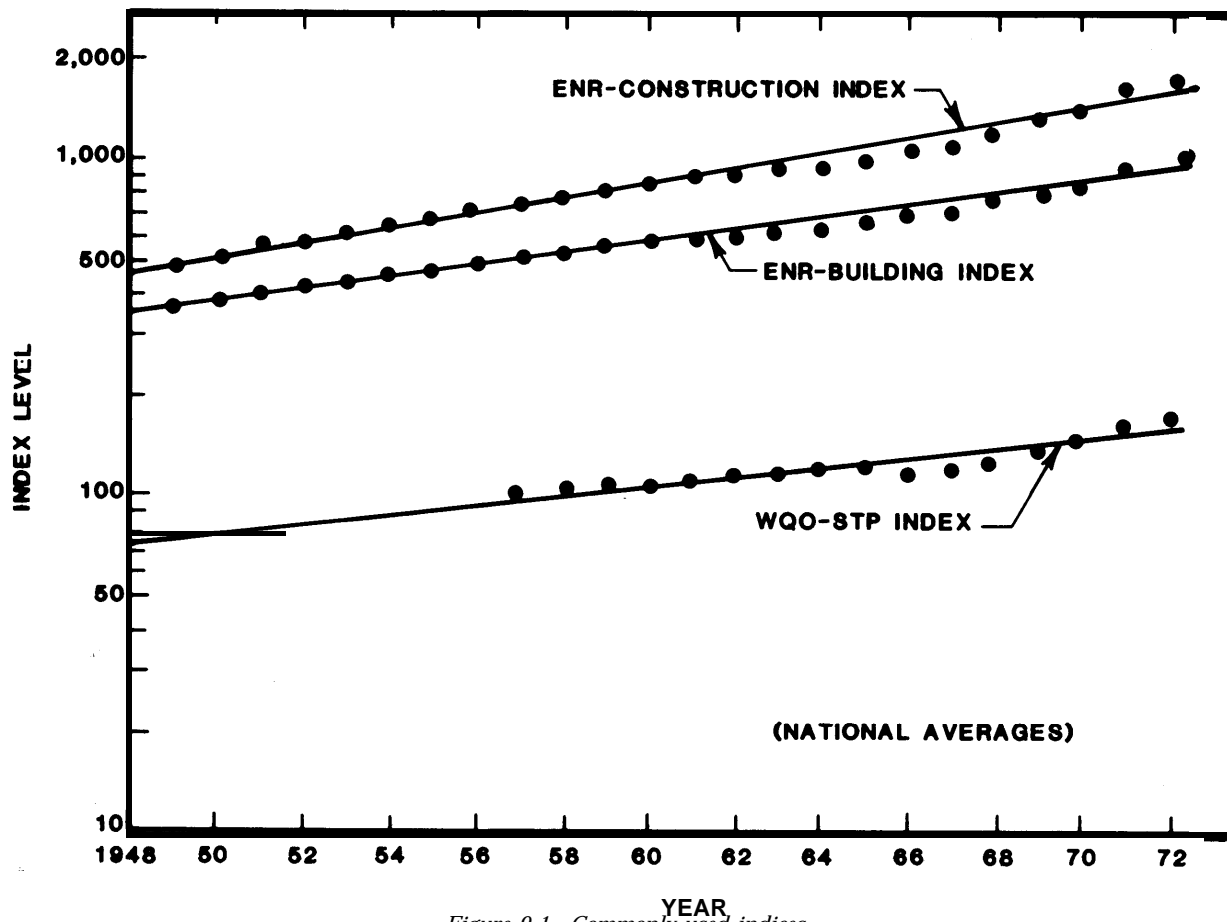


Figure 9-1—Commonly used indices.

curves in appendix A are presented on a unit operation basis such as pumping, sedimentation, filtration, etc., rather than a total treatment system such as trickling filter plant or activated sludge plant. The unit operations should be evaluated individually and assembled into a total treatment scheme capable of effecting the desired

treatment. Procedures for more detailed construction cost estimates used in facility design are outlined in TM 5-800-2. Questions relating to those pollution studies which are applicable specifically to water pollution abatement projects should be directed (DAEN-ECE-G) WASH DC 20314.