



Project Summary

Safe Drinking Water Act Cost Impacts on Selected Water Systems

Bruce E. Burris and Robert C. Gumerman

Detailed site visits to eight U.S. water utilities assessed the capital and operation and maintenance (O&M) cost impacts of making treatment changes due to the existing and proposed requirements of the Safe Drinking Water Act (SDWA). New treatment facilities were constructed at each utility to correct water quality problems that had resulted in violations or concerns under the National Primary Drinking Water Regulations (NPDWR). The drinking water problems addressed in this report include coliform bacteria, turbidity, trihalomethanes (THM's), *Giardia lamblia*, and trichloroethylene (TCE). New treatment facilities constructed include conventional treatment using flocculation, sedimentation, filtration, and chlorination for coliform bacteria, turbidity, and *Giardia* removal. Preozonation was installed at one utility for reduction of THM's. Airstripping facilities constructed at three of the utilities were primarily for TCE removal from groundwater.

In addition to documenting the costs of meeting the SDWA, the individual reports prepared for each utility contain 10 years worth of data on many water system activities. These include capital and O&M costs for the categories of acquisition, treatment, distribution of water, and support services. Other information compiled includes detailed water quantity information, specific O&M information, as well as many other details on each utility.

This Project Summary was developed by EPA's Water Engineering Research Laboratory, Cincinnati, OH, to announce

key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Introduction

A significant number of the public water utilities in the United States have had or will have to make changes or additions to their treatment processes in order to meet the requirements of the SDWA. Site visits to eight U.S. water utilities reviewed records on capital and O&M costs for meeting the existing and proposed requirements of the SDWA. In addition, information was obtained for a 10-year period on the capital and O&M costs for the major water operations categories of acquisition, treatment, distribution, and support services. Other information obtained includes detailed water quantity information, including gallons per year of revenue producing water, treated water, purchased water, ground water, and surface water; more specific O&M costs including labor, electric power, and chemicals; depreciation and interest; quantity of pipe in system; number of water meters; and size of retail service area.

The (NPDWR) water quality violations that occurred at the utilities examined included: coliform bacteria, turbidity, and total THM's. Other contaminants included *G. lamblia* and the volatile organic chemical TCE. New treatment processes constructed to solve the drinking water problems include flocculation, sedimentation, and filtration for reducing coliform bacteria and turbidity, ozonation for reducing THM's, and airstripping for reducing TCE.



Individual Utility Reports

Documentation on each of the eight utilities where site visits were conducted is presented in various sections of the final report. Information presented for each utility includes the following general information:

- EPA Region Number
- U.S. Postal Service Code
- EPA Identification Number
- Years, 1-10
- Water System Name
- Water System Representative — Name, title, address, phone number
- EPA Regional Representative — Name, title, address, phone number
- State Representative — Name, title, address, phone number
- Population of Standard Metropolitan Statistical Area (SMSA)
- Population of County
- Population of City or Town
- Population of Retail Service Area
- Gas or Oil Fuel
- Treatment Process (for each process)
 - Treatment Number
 - Treatment Name
 - Treatment Code
 - Percentage Treated
- Chemicals (for each chemical)
 - Number
 - Name
 - Code
 - Amount and units

The following items are also included for each utility for each year in the 10-year period:

- Acquisition O&M Cost (\$/yr)
- Treatment O&M Cost (\$/yr)
- Support Services O&M Cost (\$/yr)
- Total O&M Cost (\$/yr)
- Payroll Costs (\$/yr)
- Labor Used (manhours/yr)
- Power Costs (\$/yr)
- Energy Used (kWh/yr)
- Total Chemical Costs (\$/yr)
- Total Depreciation Values (\$/yr)
- Total Interest (\$/yr)
- Total Capital Costs (\$/yr)
- Acquisition Capital Costs (\$/yr)
- Treatment Capital Costs (\$/yr)
- Distribution Capital Costs (\$/yr)
- Support Services Capital Costs (\$/yr)
- Special Taxes (\$/yr)
- Revenue Producing Water (MG/yr)
- Treated Water (MG/yr)
- Maximum Daily Flow (MG/day)
- Maximum Hourly Flow (MG/hr)
- Raw Water Purchased (MG/yr)
- Treated Water Purchased (MG/yr)
- Raw Water from Ground Supply (MG/yr)

- Raw Water from Surface Supply (MG/yr)
 - Amount of Pipe in System (mi)
 - Number of Consumer Water Meters
 - Number of Consumer Water Accounts
 - Number of Flat-Rate Accounts
 - Area of Retail Service (mi²)
 - Fuel (gas-scf/yr, oil-gal/yr)
 - Capital Costs to Conform with SDWA (\$/yr)
 - O&M Costs to Conform with SDWA (\$/yr)
- In addition, the following information was requested from each utility:
- Historical Water Rates
 - Top 10 Water Users, Water Usage and Water Bills
 - Treatment Effectiveness — Water Quality Records
 - Treatment Plant Design Criteria
 - Treatment Process O&M Costs
 - Water Department Organizational Chart
 - Fixed and Variable Costs
 - Financial Arrangements of Utility

Conclusions

A summary of the drinking water problem, new treatment required, average design flow capacity, and the additional costs to meet SDWA requirements is shown in Table 1 for each utility investigated.

Overall, the unit capital costs are considerably lower for the airstripping process than for conventional treatment. However, the overall lowest unit capital cost is for the 120 MGD conventional treatment facility. This facility also has the lowest unit O&M cost. This is partly due to the obvious economy of scale realized when comparing a 120 MGD treatment plant to 6 other plants with design capacities under 7 MGD and one plant with a design capacity of 50 MGD.

The full report was submitted in fulfillment of Contract No. 68-03-3216 by CWC-HDR, Inc., under the sponsorship of the U.S. Environmental Protection Agency.

Table 1. Cost Impacts of Safe Drinking Water Act on Selected Water Systems

Water System	Drinking Water Problem	Treatment Required	Design Capacity (MGD)	Additional Costs to Meet SDWA, \$/MG Treated		
				Capital	O&M	Total System
<i>Idyllwild, CA</i>	<i>Bacteria, Giardia</i>	<i>Package Filter Plant</i>	0.8	210	326	536
<i>LeRoy, NY</i>	<i>Turbidity</i>	<i>Flocculation Sedimentation Filter</i>	1.7	864	78	942
<i>Potsdam, NY</i>	<i>THM's</i>	<i>Ozone, Flocculation Sedimentation Filter</i>	2.6	1,195	380	1,575
<i>Tacoma, WA</i>	<i>TCE, 1,1,2,2 Tetrachloro-ethane</i>	<i>Airstripping</i>	7	56	77	133
<i>Everett, WA</i>	<i>Turbidity</i>	<i>Flocculation Filter</i>	50	167	49	216
<i>San Juan Suburban Water District, CA</i>	<i>Turbidity</i>	<i>Flocculation Sedimentation Filter</i>	120	50	23	73
<i>Hartland, WI</i>	<i>TCE</i>	<i>Airstripping</i>	1.4	260	64	324
<i>Scottsdale, AZ</i>	<i>TCE</i>	<i>Airstripping</i>	1.7	89	53	142

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Jeffrey Q. Adams is the EPA Project Officer (see below).

The complete report, entitled "Safe Drinking Water Act Cost Impacts on Selected Water Systems," (Order No. PB 87-227 260/AS; Cost: \$30.95, subject to change) will be available only from:

*National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Telephone: 703-487-4650*

The EPA Officer can be contacted at:

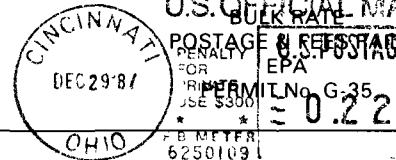
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