

## CONVERSION COSTS AT SPECIFIC FACILITIES

These 20 water utilities were able to convert from chlorine gas railcars to effective alternatives at a reasonable cost.<sup>32</sup> A single day's expenditures on the war in Iraq could have easily paid for all these conversions.

- **The Metropolitan Wastewater Treatment Plant in St. Paul, Minn.**, switched from chlorine gas railcars to liquid bleach in late 2005. The aging plant required upgrades that were projected to cost about the same whether staying with chlorine gas or switching to liquid bleach. Actual construction cost \$7.8 million, and chemical costs increased \$85,000 per year. Annual operating costs of preventive maintenance, energy, and emergency preparedness decreased about \$65,000, while in-plant security decreased an estimated \$35,000. The entire metropolitan wastewater system serves about 2.4 million people; annual conversion costs, including otherwise necessary construction, are about 20 cents per person served.
- **The Columbia Boulevard Wastewater Treatment Plant in Portland, Ore.**, switched from chlorine gas railcars to liquid bleach in 2005. Construction cost \$4.4 million, and increased chemical costs are more than offset by operating savings anticipated from reduced need for maintenance, electric power, training, labor, and emergency planning. The facility serves some 550,000 people, who will benefit from the offset of operating costs in the long term.
- **The Akron Water Supply Plant in Kent, Ohio**, switched from chlorine gas railcars to liquid bleach in 2004. Construction cost about \$1.1 million (or one-fourth the cost of a new chemical building) and operating costs increased about \$65,000 per year, primarily to cover chemicals. The facility, however, avoided over \$1.2 million in construction costs by eliminating chlorine gas. By switching, the facility avoided constructing a containment building to enclose railcars (\$308,000), installing an emergency gas scrubber (\$598,000), and upgrading certain process equipment such as a chlorine gas evaporator (\$369,000). Even without considering avoided costs, the facility's 280,000 customers pay only approximately 50 cents more each year.
- **The Edward P. Decher Secondary Wastewater Plant in Elizabeth, N.J.**, switched from chlorine gas to liquid bleach in 2003. Construction upgrades cost \$750,000 and chemical costs increased \$291,000 from 2002 to 2004, while maintenance and training costs decreased an estimated \$70,000 per year. The facility serves about 500,000 people; annual conversion costs are about 55 cents per person served.
- **The South Treatment Plant in Renton, Wash.**, switched from chlorine gas to liquid bleach in 2003. Construction cost \$2.4 million, and chemical costs increased about \$350,000 per year. The entire wastewater system serves about 1.4 million people; without accounting for any operating savings, annual conversion costs are less than 40 cents per person served.
- **The Western Lake Superior Sanitary District in Duluth, Minn.**, switched from chlorine gas to liquid bleach in 2006. Construction cost \$1.6 million. Operating costs initially remained about the same, with increased chemical costs offset by decreased demurrage charges that resulted from keeping a chlorine railcar on-site. A newly revised discharge permit will likely lengthen the disinfection season and increase chemical costs in the future. The facility serves 110,000 people; annual conversion costs are thus far about a dollar per person served.
- **Crescent Hill Water Treatment Plant in Louisville, Ky.**, is building an on-site generating facility for bleach disinfectant at an estimated capital cost of roughly \$10 million. Accounting for depreciation, the facility estimates the cost of switching over from chlorine gas at about \$500,000 annually. The entire water system serves about 850,000 people; estimated annual conversion costs are about 60 cents per person served.
- **The City of Richmond Water Purification Plant in Richmond, Va.**, is switching from chlorine gas railcars to liquid bleach in early 2007. Construction cost \$11 million for a new building, about one-third directly linked to storage of liquid bleach. Chemical costs are anticipated to increase \$450,000 per year. The facility serves about 500,000 people;

without accounting for any operating savings, annual conversion costs are about \$1.50 per person served.

- **Blue Plains Sewage Treatment Plant in Washington, D.C.**, switched from chlorine gas railcars to liquid bleach immediately after September 11, 2001. According to the plant's chief engineer at the time, the change adds about 25 cents per month to the average household customer's utility bill.<sup>33</sup>
  - **The Nottingham and Baldwin drinking water treatment plants in Cleveland, Ohio** completed conversion from chlorine gas to liquid bleach in late 2002 and 2005, respectively. Construction cost an estimated \$2,475,000 for both plants, and chemical costs increased about \$208,000 per year. The Cleveland division of water serves some 1.5 million people; without accounting for any operating savings, annual conversion costs are less than 25 cents per person served.
  - **The Buckman Water Reclamation Facility in Jacksonville, Fla.**, switched from chlorine gas railcars to ultraviolet light in 2001. Construction cost \$6 million, including about \$1 million for unrelated upgrades. Electricity costs increased about \$150,000 per year over the previous cost of chlorine gas, but only if not considering recent dramatic chlorine price increases. The entire wastewater system serves about 575,000 people; annual conversion costs are about 80 cents per person served.
  - **The Wyandotte Wastewater Treatment Facility in Wyandotte, Mich.**, switched from chlorine gas railcars to ultraviolet light in 2000. Construction cost \$8 million, and operating costs increased from about \$320,000 to \$350,000 each year. The wastewater system serves about 415,000 people; annual conversion costs are about \$1.30 per person served.
  - **The Mill Creek Wastewater Treatment Plant in Cincinnati, Ohio**, switched from chlorine gas railcars to liquid bleach in 2001. Constructing a temporary conversion cost less than \$40,000; planned permanent construction is projected to cost less than \$3 million. Chemical costs increased about \$290,000 per year. The entire metropolitan sewer district serves about 800,000 people; without
- accounting for any operating savings, annual conversion costs are about 60 cents per person served.
- **The City of Philadelphia** converted its Northeast, Southeast, and Southwest water pollution control plants from chlorine gas to liquid bleach. Capital costs for conversion were \$5.9 million for all three plants, and chemical costs increased about \$275,000 per year. After converting to liquid bleach, these facilities jointly save roughly \$75,000 each year in reduced labor and risk management planning costs. The entire wastewater system serves about 2.2 million people; annual conversion costs are about 25 cents per person served.
  - **Samuel S. Baxter Water Treatment Plant in Philadelphia, Pa.**, converted to liquid bleach in 2005. Construction costs were about \$2 million, and chemical costs increased about \$670,000 in 2006. Estimated savings on labor and emergency planning are at least \$25,000 per year. The entire drinking water system serves about 1.6 million people; annual conversion costs are less than 50 cents per person served.
  - **The Middlesex County Utilities Authority wastewater plant in Sayreville, N.J.**, switched from chlorine gas railcars to liquid bleach in 2001. Construction cost \$1.3 million, and chemical costs increased from 2002 to 2006 about \$1.5 million, as chlorine prices more than tripled. The wastewater system serves some 800,000 people. Discounting two-thirds of increased chemical costs for price change, and not accounting for any operating savings, annual conversion costs are still less than a dollar per person served.
  - **The Back River Wastewater Treatment Facility in Baltimore, Md.**, switched from chlorine gas railcars to liquid bleach in 2004. Construction cost \$2.6 million, and chemical costs increased from 2003 to 2008 about \$2.4 million, during which time chlorine prices more than doubled. For this and other reasons the facility is planning further conversion to generating bleach on-site. The entire wastewater system serves 1.3 million people. Discounting one-half of increased chemical costs for price change, and not accounting for any operating savings, annual conversion costs are still less than a dollar per person served.