DRINKING WATER

GRADE: D+

Introduction

Drinking water infrastructure throughout Indiana typically includes supply systems, treatment systems, distribution and storage systems, and operation and maintenance components. Drinking water systems require continual attention for operation and maintenance, rehabilitation and/or replacement of aging components, capacity upgrades, and compliance with regulatory requirements.

In developing this report, research was based on existing available data relating to municipal drinking systems. Topics not evaluated include private on-site drinking water wells and infrastructure owned and operated by private providers.

Capacity and Condition

The supply aspect of drinking water infrastructure includes the availability of raw water, ability to extract the water, and treatability of available water for consumptive use. There are 4,263 public water systems in Indiana, of which 97 percent rely on groundwater; however, only 55 percent of the state's population is served by systems utilizing groundwater. Public water systems supply drinking water to an estimated 83 percent of Indiana residents (5 million out of 6.4 million), while the remaining 1.4 million residents receive drinking water from private water providers.

Groundwater is stored natural water beneath the earth's surface. The natural water source of groundwater is called an aquifer. Aquifers are generally plentiful in northern and central Indiana. Southern Indiana, however, sits primarily on a foundation of limestone, making groundwater highly susceptible to contamination despite an abundant quantity. Surface waters, on the other hand, are waters available from above-ground sources such as lakes, rivers, streams, and creeks. Surface water is also plentiful in Indiana, and large communities with solid revenue sources have developed and maintained large reservoir systems to store and use surface water as their primary supply sources.

The adequacy of drinking water distribution systems is more difficult to quantify than the adequacy of supply and treatment systems. Distribution systems are buried and more difficult to inspect. Most of the distribution system installed in the 30 years following World War II is reaching the end of its anticipated design life. Oftentimes, water main breaks and customer complaints of low pressure are the only indicators of failure of the distribution system. Newer pipe materials will help extend the life of the distribution system. However, resources are not always available to replace as much of the distribution system as required.

Funding

Most community water systems in Indiana face a significant shortfall in capital funds to maintain and improve drinking water systems. The Environmental Protection Agency (EPA) regularly publishes information on drinking water needs. The EPA's most recent report in 2007 identifies the 20-year capital improvement need for drinking water infrastructure projects.[10] Results of this report help determine funding for the drinking water capitalization grants as a part of the State Revolving Fund (SRF). The progression of Indiana's drinking water needs is shown in Table 1.

	1995	1999	2003	2007
US Needs (in Millions of Dollars)	200,400	198,200	331,400	334,800
Indiana Needs (In Millions of Dollars)	2,424	2,224	4,827	5,944
Indiana's Percentage of US Total Needs	1.22	1.21	1.52	1.83

* Needs are presented in millions of January 2007 US dollars.

As shown in the Table 1, Indiana's needs in 2007 comprised 1.83 percent of the total needs in the US. However, Indiana's percentage of the total US population was 2.1 percent, which indicates Indiana is faring well compared to other states.

Funding for drinking water infrastructure improvements typically comes from state and local governments. A 2007 report from the US Conference of Mayors states local government share of water supply systems funding is more than 99 percent.[9] Census Bureau data indicates local government spending increased 81 percent from 1991 to 2005. With less federal funding, municipalities are turning to the state to provide funds for projects that will achieve and maintain compliance with the current and future requirements of the Safe Drinking Water Act (SDWA).

For fiscal year 2010, Indiana received a $22 million capitalization grant to fund the SRF program.[6] In 2010, there were $282 million in applications for projects submitted for SRF funding. The American Recovery and Reinvestment Act of 2009 (ARRA) is estimated to have funded $16 million in projects, which leaves $266 million left to be funded through SRF. To secure SRF funding for a project, a utility has to meet certain criteria and follow the review guidelines established by the Indiana Finance Authority (IFA). SRF estimates mentioned here do not include projects that fail to qualify for SRF funding.

With a lack of grant funds available, many communities are turning to increased water rates and/or privatization of systems to meet funding needs. Rate increases are never popular, especially in uncertain economic times, and privatization has had mixed results in ability to maintain and operate drinking water systems.

Future Need

While available water resources are adequate, the supply and treatment infrastructure needs a thorough review to ensure its ability to supply adequate water to meet projected future demand and to overcome regulatory pressures

in meeting water quality requirements. As will be discussed in the Resilience section of this analysis, Indiana's water supplies are in danger of becoming contaminated by various sources, including untreated stormwater runoff, air pollution, and combined sewer overflows. Should the water supply become contaminated, costly upgrades to treatment systems will be required to ensure the water distributed to the public stays safe for consumption.

Predicted climate change impacts in the Midwest will result in a combination of prolonged drought periods and radical rainfall events, which will tax water supplies, increase the need for storage, and put drinking water facilities (i.e., intakes and reservoirs) located near waterways at risk due to increased flooding.[1] While only a small part of Indiana lies within the Great Lakes natural watershed, the Great Lakes initiative, finalized in 2009, capped the future water withdrawal rate from Lake Michigan at current levels in large population centers. As a result, existing drinking water sources in Indiana will likely be utilized by these growth areas, thereby increasing demand on the water supply.

The EPA and the federal government are considering a number of currently non-regulated chemicals to bring under the safe drinking water compliance statute. Currently, non-regulated contaminants (i.e., pharmaceuticals, personal care products, herbicides, etc.) detected in Indiana's surface waters and drinking water supplies may be regulated in the future. Groundwater quality in Indiana is generally good; however, it is susceptible to contamination from fertilizers and natural mineral deposits. The recently enacted Ground Water Rule (GWR) requires public water systems to conduct sanitary surveys and source monitoring for viral and bacterial contamination in groundwater sources of drinking water.[5] The GWR requires corrective actions, treatment, and public notification in contaminated areas. Many smaller systems may require additional sources of funding to comply with the GWR. Significant funding to upgrade treatment and monitoring facilities will be necessary to comply with any future standards.

Operation and Maintenance

Operation and maintenance activities for a drinking water system occur on a continual basis. General operation and maintenance items include labor, equipment, supplies, electrical power, and replacement parts. Drinking water distribution systems include flow monitoring, valve exercising, booster station pumps, tank painting/coating, emergency power generators, and supervisory control and data acquisition systems. Water treatment facilities include process equipment, pumps, blowers, emergency power generators, chemicals, supervisory control and data acquisition system, possible sludge disposal, laboratory analysis, and flow monitoring.

Municipalities incur continual costs to operate and maintain their drinking water systems. To pay for these costs, municipalities typically account for operation and maintenance in their user rates.

Public Safety

Within the state of Indiana, there were 1,748 systems in violation of standards in 2008, and of those, 1,182 systems had only monitoring and reporting violations. These monitoring/reporting violations are procedural and do not include exceeding maximum contaminant levels (MCL) set by regulatory agencies. Violations of the MCL were found in 406 systems, of which the majority were in violation of the Total Coliform Rule (TCR) followed by inorganic chemicals. Total coliform is a measure of water-borne pathogens in drinking water. Septic systems, livestock feeding operations, and use of fresh manure as fertilizer are all potential sources of groundwater pathogen contamination. Surface water can become contaminated from many sources, including incomplete or ineffective wastewater treatment, stormwater runoff, agricultural feedlot, or the normal activity of wildlife in the watersheds. Inorganic chemicals, on the other hand, enter drinking water sources from non-biological sources. While complete elimination of total coliform and inorganic chemicals from drinking water is not economically feasible, and their presence below the MCL is not known to be harmful to human health, federal and local government regulations require the water providers to maintain their concentration levels below the MCL.

Water suppliers in Indiana were required by federal statute to conduct security vulnerability assessments in 2003. These plans need to be updated and funded with sufficient government grants to ensure the highest level of security for Indiana's water sources and treatment facilities.

Resilience

Safe, resilient pubic drinking water systems in Indiana are essential to quality of life, economic development, and growth for current and future generations. Resiliency

of public water systems can depend upon several factors, including redundancy in water supply, treatment, storage and distribution; exposure to potential natural or man-made contaminants; energy backup availability; vulnerability to security; and adaptation to radical weather impacts, including those created by climate change and natural disasters. Drinking water service disruptions for any of these reasons can negatively affect health, safety, and the economy.

In general, Indiana's public drinking water systems are not highly resilient. Many existing systems lack true redundancy in all or part of the water supply system. Surface water systems are vulnerable to many contaminants from untreated stormwater run-off (urban and agricultural); combined sewer overflows; and settled airborne contaminants, such as mercury from Indiana's numerous coal-burning power plants. Nutrients from farming practices, existing mineral deposits in aquifers, and over-pumping of limited aquifer capacity for increasing energy, agricultural, and human demands continues to affect groundwater source quality. Such vulnerability can potentially reduce water resources options for utilities, and may require expensive treatment processes to maintain adequate supply from current sources or to look for alternate sources.

Conclusion

Indiana generally has an adequate supply of drinking water. The state's source and treatment systems are generally well maintained and able to meet existing needs. Future needs for treatment systems will likely be met due to their high visibility and regulation (to avoid public uproar and fines for violations). Improvements to the distribution system will likely be unable to find funding, as many communities divert funds away from distribution projects to more visible areas of the drinking water system, such as fixing pipe breaks and installing new treatment systems to meet more stringent regulatory requirements.

While Indiana has an adequate water supply, due to the lack of available funding, lack of resiliency and threatened quality, Indiana's drinking water infrastructure rates a grade of D+. This is higher than the overall national grade of D- due to Indiana having an adequate water supply, unlike part of the rest of the country. Significant funding improvements, especially from the federal level, can greatly improve the quality of the distribution systems, the resilience of the systems, and the overall water quality.

Suggestions to increase the grade of Indiana's wastewater infrastructure system include:

- Increasing public awareness of the current system condition
- Increasing funding availability
- Continuing research and development of products to increase the longevity of system components
- Working closely with the EPA to continually update the drinking water needs assessment to get a better understanding of the condition and funding requirements of the state's drinking water infrastructure.

Sources

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4. Indiana Department of Environmental Management Drinking Water Branch, 2008 Annual Compliance Report for Indiana Public Water Supply Systems, August 2009.
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7. Indiana Geological Survey
8. Purdue University Extension, Purdue Pesticides Program, Atrazine and Drinking Water: Understanding the Needs of Farmers and Citizens, December 2006
9. The United States Conference of Mayors, Who Pays for the Water Pipes, Pumps and Treatment Works? – Local Government Expenditures on Sewer and Water – 1991 to 2005, 2007.
10. U.S. Environmental Protection Agency, 2007 Drinking Water Infrastructure Needs Survey and Assessment, Fourth Report to Congress, March 2009.