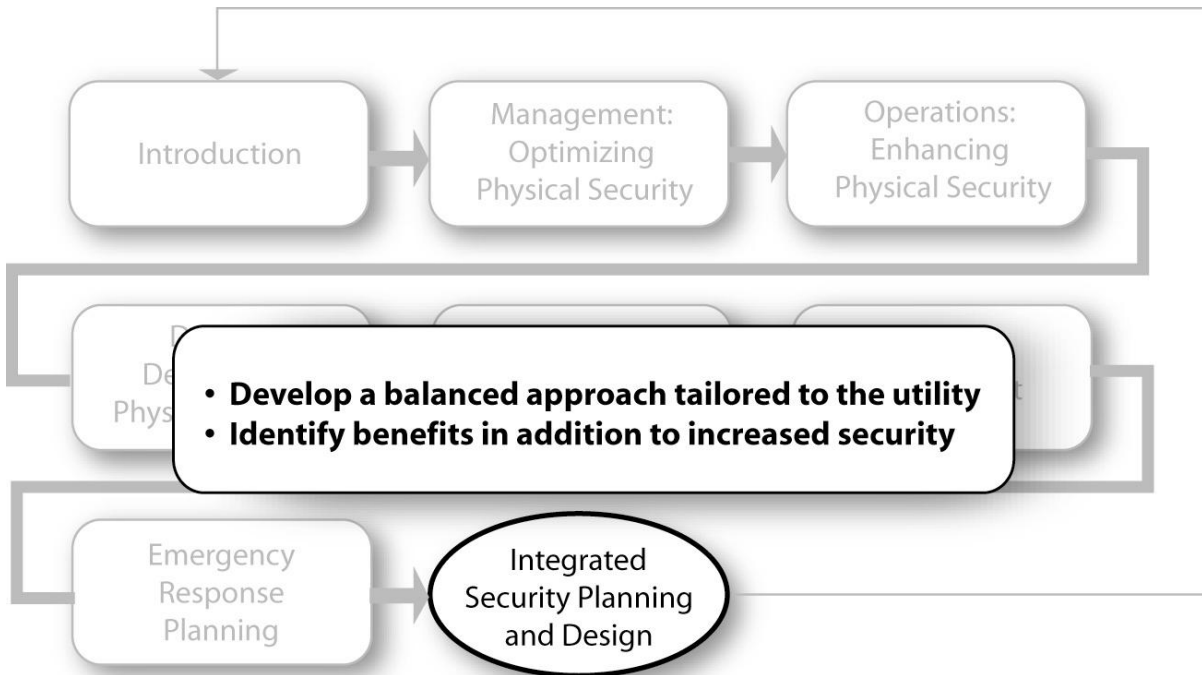


Pulling It All Together Through Fully Integrated Security Planning and Design



8.1 Overview

Water utilities throughout the United States have enough differences that the idea of developing a single physical security solution for protecting their systems is not realistic nor practical. The purpose of this AWWA Security Guidance is to provide utilities with a toolkit full of ideas ranging from design approaches and operational strategies to management practices. The best approaches that utilities have developed for their water systems have been those that integrate best practices from each of the three areas into an integrated approach.

8.2 Utility Case Studies

Table 8-1 and Table 8-2 provide examples of how utilities have applied this balanced approach to protecting different facilities in their water systems. The names of the utilities and water systems have not been identified to protect their confidentiality.

TABLE 8-1
Example 1 – Treated Water Storage Tank

	Utility A	Utility B
Design Basis Threat	Vandals	Saboteur/Terrorist
Design Approach	Boundary – Chain-link fence and hardened locks on gate	Boundary – Chain-link fence and hardened locks on gate
	Hatches – Welded steel bar	Hatches – Hardened steel lock and intrusion alarm
	Vents – Double-screened vents	Vents – Double-screened vents
Operational Approach	Daily site visits	Outlet pipeline – Automatic shutoff valve
		Daily site visits
		Standard operating procedure (SOP) – Automatic isolation of reservoir with hatch intrusion alarms
		SOP – Reverse pressure zone pumps to hydraulically isolate storage tank with hatch intrusion alarm
Management Approach	Key control policy	ERP – Response protocol to place system on pressure operation when storage tank isolated
		Key control policy Local neighborhood watch program

TABLE 8-2
Example 2 – Raw Water Storage Reservoir

	Utility A ¹	Utility B ²
Design Basis Threat	Vandals Accidental/Intentional Dumping	Vandals Accidental/Intentional Dumping
Design Approach	Containment structure around intake structure	Monitoring system at the Water Treatment Plant influent line
	Vehicle containment fence around reservoir	
	Monitoring system at stream inflow point	
Operational Approach	Response protocol to respond to spills in reservoir	SOP to switch raw water sources during water quality events
	Daily site inspections	Daily site inspections
Management Approach	Community watch program with Park Ranger Work with upstream gas wells to add containment onsite	Community watch program with Lake Ranger

¹ Utility A owned and operated the reservoir.

² Utility B did not control operations of reservoir and leased storage capacity.

8.3 What is the Optimal Solution?

There is no right or wrong approach for water utilities to implement physical security for their water systems. The solution needs to be consistent with a number of factors, such as those identified below, and is often independent of the size of the utility:

- Financial ability to pay for security improvements
- Design basis threat
- Community restrictions

- Political pressures
- Water system redundancy
- Sophistication of utility staff

Utility managers need to understand the internal and external factors prior to developing a plan for their water systems. Often, a utility manager will be asked to compare his utility's approach with the approaches of other utilities or directed to protect his system from an attack from international terrorists by the utility's governing body. This is when the utility manager needs to work with the utility's legal council to identify the most appropriate method to communicate to the governing body in a manner that does not jeopardize the overall water system approach to security.

8.4 Multiple Benefits in Security Enhancements

Utilities are faced with numerous funding requirements ranging from compliance with regulations to annual maintenance of their system. Competition for funding can be difficult when the requirement, such as security system compliance, may be perceived as just another unnecessary and poorly thought out federal requirement. An effective approach that utilities have used to tackle this dilemma has been to identify multiple benefits associated with the planned security improvements. Table 8-3 below provides some examples of security improvements that utilities have incorporated that have also improved other parts of their business.

TABLE 8-3
Multiple Benefits from Security Improvements

Security Improvement	Security Benefit	Operational/Management Benefit
Two operators per shift at WTP	Improved monitoring capabilities of security equipment	Improved safety of operators for off-hour operations
New treated water storage reservoir	Added ability to bypass reservoir during breach of tank	Improved delivery service for service area with additional storage capacity
New parallel pipeline	Added ability to maintain service if pipeline is disrupted.	Added operational flexibility to deliver water into system
Integrated water quality monitoring system	Added ability to detect, respond, and mitigate water quality contamination events	Improved operational knowledge of water quality in system, and improved ability to identify and correct an operational problem before system is in violation
Expanded backflow protection program	Protected against intentional contamination acts against water system	Protected water system during operational problems associated with sudden pressure loss in the water system
Security awareness training	Promoted cultural acceptance of security into utility	Improved employee awareness of water system operation and safety
Purchase spare parts for critical components	Improved response to restoring service during malevolent event	Improved operational ability to restore service associated with a maintenance failure
Back-up power	Protected critical facilities from intentional acts against power feed	Provided operational flexibility during power outages associated with natural events
Employee background checks	Protected against malevolent acts against system by insider	Reduced financial losses from insider theft

8.5 Doing What is Best for Your Utility

Utility managers have many tools available to put together the best solution for their water systems to enhance overall physical security. Utilities do not need to buy “luxury” when “economy” will accomplish the same task.

Example One. Utility A had a number of high-quality steel doors with glass windows in its water treatment facility. The initial thought was to replace them with steel doors with safety glass at a cost of \$1,000 to \$1,500 each. The utility also had a simpler solution—install a Lexan® PC resin plate on the inside of the window to provide the security required and still maintain the visual capabilities. The cost of the solution was less than \$50 per door. The utility asked the question--does practical have to be pretty? In the end, the utility went with the practical solution, saving thousands of dollars.

Example Two. Utility B had a number of wellheads in a local golf course that had open, unhindered access. The community would only allow decorative special fencing to be used around the golf course. The cost of the fencing was significant, so the utility came up with a more cost-effective solution. A small concrete pad was constructed around the wellhead and a heavy metal grating slipped over the wellhead to prevent tampering. The metal grates were constructed in the utility maintenance shop and installed for less than \$100 per wellhead.

Example Three. Utility C was concerned about undetected hatch entry into its distribution system storage tanks, but it did not have the funds to add detection devices or automatic shut-off devices to each tank. The utility identified the tanks that had no history of water quality problems and only required cleaning every 3 to 5 years. The utility welded shut the hatches to these tanks, which was sufficient for the DBT of kids and vandals. The cost of this solution was less than \$100 per tank.

Example Four. Utility D was concerned with its inability to track meters that were provided to contractors for construction water. The solution was to have utility staff to install the meters, then mark and lock in place backflow-protected construction meters. Contractors were charged a fee to cover these costs. Construction meters found in use that did not have proper utility markings and locks were confiscated.

Example Five. Utility E had many doors on each of its buildings that required detection and entry devices that would have been a very significant cost to the utility. The solution was to provide one access entry point into each of the buildings. The other doors were made egress-only by removing exterior hardware and, when necessary, installing concealed door hinges. Operations and maintenance staff had to adjust to not having numerous entry points into each of the buildings, but the capital and annual operating cost savings were significant.

When developing your approach to security, think simple and practical. Before inviting a security equipment vendor to discuss equipment, first identify what you really need to protect your system. Providing the appropriate level of physical security for your water system does not need to break the bank.

8.6 Pulling It All Together

Sections 1 through 7 have identified a number of areas for utilities to consider regarding developing and implementing the optimal security solution for their systems. Every utility has its own unique qualities that require a customized solution that fits its level of threat, organizational culture, and financial situation. Key considerations that utilities should include in security planning are:

- Integration of management, operations, and design strategies into the security approach
- Simple solutions
- Solutions that provide multiple benefits
- A cross-functional utility team to develop the solutions

Developing a security solution for a utility does not need to create a significant financial burden, impede existing operations, or require a complete redesign of the system in most cases. Utility staff members understand their system better than consultants, regulatory agencies, and equipment vendors. Using internal resources to develop the initial security master plan, which can be supplemented by external resources, will be by far the most cost-effective approach.

