of the drain on the system was caused by leaks in customers' buildings.

Nearby areas assist Florida City

Among the hardest hit areas was Florida City, a low-income community. Richard A. Coates, assistant director of utilities for North Miami Beach, was one of several utility personnel from farther north who spent three weeks helping to direct repair efforts, coordinate assistance from other areas, and provide the short-staffed and beleaguered utility with administration and continuity.

Arriving the day after Andrew hit, Coates found Florida City "basically demolished." Although the water infrastructure survived virtually intact, the distribution system suffered numerous service-line and water-main breaks because of uprooted trees. Buildings had been razed, and water was running freely throughout the system. In a system with fewer than 3,000 service connections, there were hundreds of leaks. As a result, twice as much water was being used after the storm, even though the people had left.

With so many leaks, many water systems in the area were depressurized. And as Segars says, "When the system's depressurized, it doesn't matter how much raw water you have pumping in." Most systems weren't pumping much, because the hurricane had disrupted power all over Dade and Broward counties. Many treatment facilities had emergency generators, but most did not have enough or have them in enough locations. At Miami–Dade, for example, water plants were equipped with emergency generators but wellfields were not, limiting water to some regional plants. On the sewer side, many lift stations were without power. Without electricity, all of Florida City's 24 sewer pump stations were rendered inoperative. "Had the storm been wetter," notes Segars, "we could have had a serious wastewater problem."

In the first few days after Hurricane Andrew hit, drinking water became a critical item. Immediately after the storm, a boil-water advisory went into effect—but without power, only people with gas grills and adequate fuel supplies could comply. Some residents relied on overchlorination to render the water potable, but much of the population was dependent on outside water supplies.

The US Public Health Service distributed bottled water and ice at various sites in storm-hit communities, and helicopters delivered water supplies from other regions of Florida as well as from neighboring states. WASA set up emergency water stations at about half a dozen points in the south end of the system. "In south Dade County," Tom Segars points out, "we were distributing water the day of the hurricane in areas that had been completely devastated by Hurricane Andrew."

For all water systems, the main concern was restoring potability to the water they delivered. That meant getting control of the distribution system.

A wind pierces paradise

On Sept. 11, 1992, a major tropical storm hit Hawaii. The word "Iniki" is translated as "piercing wind," and Hurricane Iniki lived up to the name. Driving sustained winds of 150 mph and gusts up to 225 mph, Iniki stormed through all the islands but reserved the worst of its fury for Kaua'i, where damages totaled $1.5 billion.

A lush botanical Eden renowned for its spectacular scenery, Kaua'i is a popular destination for tourists. The population of 50,000 is served by 14 private water systems and 15 systems operated by the Kaua'i Department of Water (KDW). The largest KDW system serves about 15,000 consumers, the smallest fewer than 100 consumers. Together, the systems deliver roughly 3 bil gal/year. One hundred percent of the water sources are deep wells. All wells but one are driven by electric motors; the remaining site depends on a diesel engine.

Raymond Sato, now deputy manager for the Honolulu Board of Water Supply, was manager and chief engineer of the KDW when Iniki struck. According to Sato, virtually every home on Kaua'i suffered some damage, and the majority sustained major damage. Electrical and telephone lines were down all over the island, wiping out power and communications. Debris from buildings and vegetation blocked roads. As Hurricane Andrew had done in Florida, Iniki uprooted trees, resulting in shifted water lines, pulled-up pipes, and numerous service-line breaks.

Almost every home on Kaua'i had some damage, but many looked like this oceanfront home.

KAUA'I DEPARTMENT OF WATER

Kaua'i had experienced a serious hurricane—Iwa—10 years previously. With sustained winds of 75 mph and gusts up to 100 mph, Iwa was not