sew´·ẽr sō·ci·ōl´o·gy, *the science of society, social institutions, and social relationships viewed through the eyes of a sewer; specifically the systematic study of the development, structure, interaction, and collective sewer use of organized groups of human beings.*

Monitoring Disasters

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Most sewer flows are characterized by repeatable diurnal patterns that vary among weekdays, weekends, and holidays. Variations are also observed when disasters and other major disruptions occur. In this issue, we examine three major disruptions and their impact on sewer flows.

World Trade Center Attack

Sept. 11 was a defining date in U.S. history. The composite hydrograph shown in Figure 1 offers a unique perspective on the events of Sept. 11 as observed by a flow monitor located north of the World Trade Center.

Note that this day started out like any normal day. That all changed at 8:46 a.m., when American Airlines Flight 11 hit the North Tower of the World Trade Center.

FIGURE 1. World Trade Center Attack of 2001

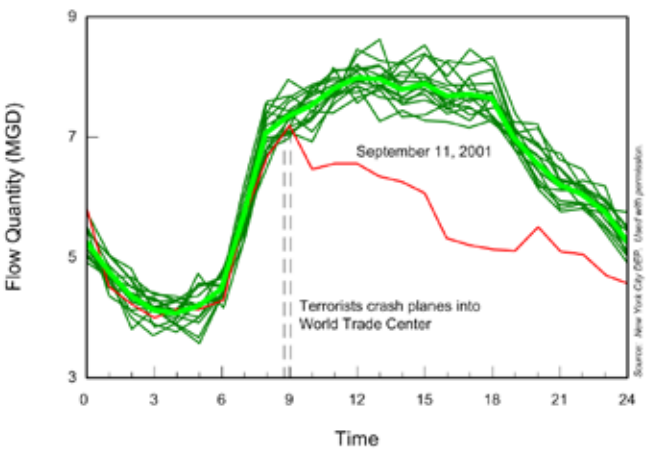
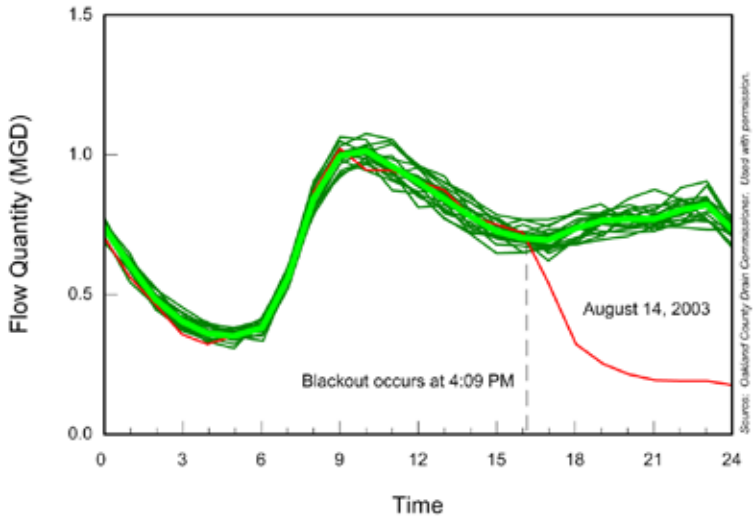


FIGURE 2. Northeast Power Blackout of 2003

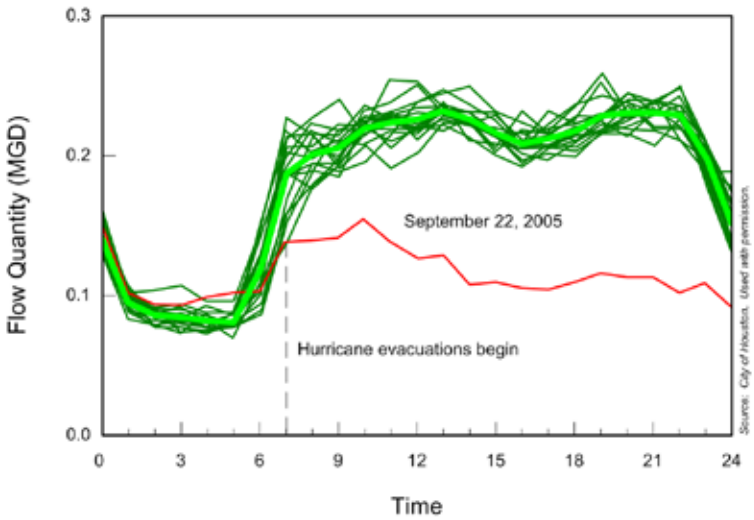


Much of New York City was evacuated as rescue and recovery efforts began. This clearly was not a normal or average day. Instead, this flow monitor has documented its own account of a historic tragedy from a unique, nonetheless compelling, perspective.

Northeast Power Blackout

Millions of people were left without power on Aug. 14, 2003, during the largest blackout in North American history. The blackout began when three transmission lines failed near Cleveland. Within minutes, more than 100 power plants in the United States and Canada were overwhelmed and knocked offline. The blackout affected several major metropolitan areas — including Detroit, Cleveland, New York, Toronto, Ottawa, and Columbus, Ohio. Figure 2 displays a composite hydrograph of normal dry weather conditions from a flow monitor located in Oakland County, Mich. Flow monitoring data from Aug. 14 are shown for comparison. Note the dramatic drop in flow after the power failure. The minimum flow during the blackout was well below the normal nighttime flow. This example illustrates how the disruption of one basic service can affect the use of another.

FIGURE 3. Evacuations from Hurricane Rita



Hurricane Rita

Hurricane Rita entered the Gulf of Mexico on Sept. 21, 2005, and strengthened to a powerful Category 5 hurricane. Only a month before, Hurricane Katrina had devastated New Orleans and other surrounding coastal communities. This time, storm-weary residents were not taking any chances. Early forecasts for Hurricane Rita included the metropolitan Houston area — with a population in excess of 5 million — prompting one of the largest evacuations in U.S. history. Media reports indicate that the ensuing evacuation involved more than 2 million people in Texas alone. Figure 3 displays a composite hydrograph of normal dry weather conditions from a flow monitor located in Houston prior to the evacuation. Flow monitoring data from Sept. 22, the evacuation day, also are provided. Assuming that the average dry day flow is directly related to population, approximately 36% of the residents fled this area within 2 days of the hurricane's landfall. After the evacuations, Hurricane Rita turned northward and made landfall as a Category 3 hurricane on Sept. 24 near Sabine Pass along the Texas–Louisiana border. Ironically, National Weather Service data from Houston Intercontinental Airport indicate that this area received sustained winds of only 64 km/h (40 mi/h) and rainfall totals less than 25 mm (1 in.). Houston had been spared. Sewer flows within this area returned to normal within a few days as residents returned home.

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