WATER STORAGE FACILITIES

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VULNERABILITY

The loss of surface, buried, and elevated water storage tanks can seriously affect the ability of a water supply system to provide sufficient water for fire suppression and to maintain a potable water supply for emergency facilities, such as hospitals, fire and police facilities, emergency operating centers, and individual consumers. In addition, collapse of a tank could cause injuries and property damage both from the fallen structure and the rapid release of water. Damage to potable and wastewater treatment storage facilities could have similar effects.

OBSERVATIONS OF DAMAGE

Considerable damage to storage facilities occurred in the 1964 Alaska earthquake. Typical types of failure were total collapse of tanks, roof buckling, failure at roof to shell connections, and shell buckling.

Damage to storage tanks in the 1971 San Fernando, California, earthquake focused primarily on welded or riveted steel tanks ranging in age from 1 to 42 years. The principal modes of damage were buckling of the steel shell, especially at the base; horizontal displacement from the foundation; and failure of the inlet-outlet piping connections. The latter effect was noted as well at a concrete tank.

In or near the cities of Brawley, Imperial, El Centro, and Calexico, three elevated water storage tanks sustained damage in the Imperial Valley, California, earthquake of 1979. A 100,000-gallon elevated tank south of Imperial, built in 1962, experienced minor damage to diagonal bracing at the upper level; a gusset plate pulled out of a leg section and a horizontal strut buckled slightly. An El Centro water tower, having been built in the 1930s and having survived the 1940 El Centro earthquake, experienced stretching of diagonal tie rods in the upper level, buckled horizontal struts, and stretched anchor bolts at the column base plates. South of Brawley, a 100,000-gallon elevated tank, constructed in 1961, collapsed. Failure appeared to have been initiated by one or a combination of the buckling of horizontal braces,