

Regular meter maintenance (testing and repairing) or replacement programs are helpful to adequately maintain water systems. Due to the high cost of maintenance, many utilities have found that regular meter replacement can be as cost-effective as meter maintenance.<sup>17</sup>

#### Leak Detection and Repair

Leaks in distribution systems waste both water and energy and can undermine roads and other structures. Even though leaking water may percolate to a usable aquifer, it must be pumped, treated, stored and usually pumped again to consumers.

In a 1971 report for the National Water Commission, Howe et al. estimated the nationwide loss through leaks in utility systems is about 12 percent of distributed water and that nine percent could be saved.<sup>18</sup> The report lists age, construction materials, physical and chemical soil properties, water properties, water pressure and improper maintenance as the principal causes of such leaks.

Leak detection and repair involves the analysis of unaccounted for water. Sources of unaccounted for water include defective hydrants, abandoned services, unmetered water (e.g., for municipal uses such as fire-fighting), inaccurately metered water, leaking meters, illegal hook-ups, unauthorized use of fire hydrant water, and leaks in mains and services.

The costs of a leak detection and repair program will vary considerably from system to system. A scan of the system may be appropriate if a lot of water is lost due to leakage. A water audit (combination of flow measurements and scanning usually performed by a consultant) may be in order to detect unaccounted for water that is not caused by leaks.