Chapter 10
Inspection Maintenance and Evaluation

10-1. General Maintenance

Relief wells require a certain amount of nominal maintenance to ensure their continued and proper functioning. Any trash or obstruction in the well or well guard should be removed immediately. Sand or other material that may have accumulated in and around flap gates to obstruct the flow or prevent functioning of the gates should be removed. Outfall ditches, bank slopes, or berms should be properly maintained in the vicinity of horizontal outlet pipes. The area in the immediate vicinity of the wells should be kept free from weeds, trash, and debris. Mowing and weed spraying should be extended at least 5 ft beyond the well, and the ground shaped and maintained for inspection and servicing of the wells.

10-2. Periodic Inspections

a. Periodic inspections of relief well systems should be carried out as described in ER 1110-2-100 and ER 110-2-1942**.** Relief well installations in readily accessible locations at dams and appurtenant structures where well flow is continuous should be visually inspected weekly. Observation should be made for evidence of wet spots on the dam or on the ground around the wells and structures, for evidence of sloughing or piping, for indications of discharge of sand or other materials from the wells, and for surficial signs of damage. The inspection should detect whether vandalism, theft, abuse by carelessness, unauthorized use of the wells or associated piezometers, or other irregularities have occurred. The inspection should include an examination of check valves, gaskets, well guards, cover plates, flap gates on tee outlets, and other appurtenances. Malfunctioning or damaged items should be repaired or replaced. At yearly intervals, piezometric levels and flow quantities should be measured, and wells should be sounded for evidence of deposition of sand or other material in the wells. Where relief wells penetrate two or more aquifers, the well flows at various depths should be checked at yearly intervals to determine whether flows between aquifers are occurring. Piezometric levels and flow quantities should also be measured approximately one week after the attainment of an unusually high reservoir level. Wells in relatively inaccessible locations, as beneath stilling basins, should be inspected whenever the structure is unwatered for a general maintenance inspection, or when there is evidence of significantly decreased effectiveness, as shown by changes in flow quantities or piezometric levels for a constant combination of reservoir level and tailwater level.

b. Flowing wells located in areas in which failure would not constitute a hazard to life or property, as on excavated slopes of canals, should be visually inspected at monthly intervals. Measurements of piezometric levels and flow quantities should be made annually.

c. Relief wells located along the toe of levees and at locations where they flow infrequently should be inspected annually, preferably immediately prior to normal high-water seasons and more often during major high waters. Flow quantities and piezometric levels should be measured approximately a week after a peak in the reservoir level or in the river level at a levee. Pumping tests should be performed at five-year intervals on wells that flow infrequently. The tests should be performed to determine the specific capacities and the efficiencies of the wells. The amount of sediment in the wells should be measured before and after performance of the pumping tests.

10-3. Pumping Tests

All wells should be pump tested every five years using procedures described in Chapter 8. Wells in relatively inaccessible locations should be pump tested whenever the structure is unwatered or when piezometric data indicate that well efficiency has decreased significantly. Wells should be checked for sanding before and after pumping. All wells requiring removal of sediment should be pump tested after cleaning to see if any appreciable loss of efficiency has resulted from foreign material entering the well. In the case of continuously flowing wells, the discharge should be measured at high pool levels to determine specific capacity and indications of sanding. If the pumping tests indicate that the specific capacity is less than 80 percent of that determined at the time of installation, then corrective measures should be employed. Investigations as described in Chapter 10 should be conducted prior to initiating the rehabilitation methods described in Chapter 11. If the rehabilitation are unsuccessful in restoring the wells to at least 80 percent of their original efficiency, consideration should be given to replacing these wells.

10-4. Records

A record should be kept of all inspections and maintenance performed on each well. The record

should include all pumping test data, descriptions of rehabilitation efforts, and summaries of well flows and piezometric data during periods of high river stages or pool levels.

10-5. Evaluation

a. It should be noted that a reduction in well discharge accompanied by a fall in piezometric levels in downstream areas probably indicates a decrease in seepage due to siltation in the reservoir, riverbed areas, or riverside borrow pits, which is a favorable condition. It is possible, however, that such a reduction was caused by erosion or excavation of an impervious top stratum at a point downstream of the line of wells, thus permitting exit of seepage to tailwater much closer to the wells. This condition would be unfavorable, because it would indicate a higher value of the seepage gradient and an increased potential for piping immediately downstream from the well line. A reduction in well discharge accompanied by an increase in piezometric levels indicates clogging or obstruction of the relief wells, and requires immediate remedial action. Observation of changes in flow and piezometric levels must be related to changes or lack of changes in both reservoir level and tailwater level. Often, variation in tailwater level at a dam has greater influence on well performance than variation in reservoir level, because the point at which the tailwater has access to the aquifer is considerably closer to the well than the point at which the reservoir pressure can enter the aquifer.

b. The values obtained from measurement or piezometric levels and flow quantities should be extrapolated to predict the values that would be produced by a maximum design reservoir or river elevation. If these values are greater than those for which the structure was designed, or if the specific capacities or the efficiencies of the wells are less than 80 percent of the values that were obtained at the time of installation of the wells, additional investigations should be performed to determine the cause of the inadequacies. Investigations may include the examination of the well screen by means of a borehole camera, sounding the well with a caliper, and the performance of chemical tests on the water and on any deposits or incrustations found in the well. If there are any inclinometer tubes installed in the foundation in the vicinity of the wells, they should be read to determine if there has been any horizontal movement of the foundation that would cause disruption of well screens or risers.