SPRINGS

When the proposed water supply is an active spring, it must, as a minimum, meet the following requirements before this office can issue a building clearance:

1. Inspection by this office, accompanied by an accurate plot plan showing the location of all potential sources of contamination.

2. Yield test performed by a qualified individual other than the owner of the property, during the period from June 1st through October 30th. A yield of less than 1 GPM will deem the water source unacceptable. A yield of less than 5 GPM will require appropriate water storage facilities.

3. Be constructed in such a manner as to minimize the entrance of contaminants, such as surface water animals, insects, and wind-borne materials. A diagram, showing how the spring is constructed, will be required.

4. Water quality shall be assessed by appropriate bacteriological tests (and other testing if the sanitary survey indicates). See "construction requirements" for those springs that fail to meet the chemical and bacteriological standards.

SPRING DEVELOPMENT GUIDELINES

GUIDELINES FOR SPRING DEVELOPMENT AND SANITARY PROTECTION

DEVELOPMENT OF SPRINGS:

1. There are two general requirements necessary in the development of a spring source of domestic water: (A) Selection of a spring with adequate capacity to provide the required quantity and quality of water is its intended use throughout the year, and (B) The measures taken to develop a spring must be tailored to its geological conditions and sources.

2. The features of a spring encasement are the following: (A) An open-bottom, watertight basin intercepting the source which extends to bedrock or a system of collection pipes and a storage tank, (B) A cover that prevents the entrance of surface drainage or debris into the storage tank, (C) Provision for the cleanout and emptying of the tank contents, (D) Provision for overflow, and (E) A connection to the distribution system or auxiliary supply.

3. A tank is usually constructed in place with reinforced concrete of such dimensions as to enclose or intercept as much of the spring as possible. When a spring is located on a hillside, the downhill wall and sides are extended to bedrock or to a depth that will insure maintenance of an adequate water level in the tank. Supplementary cutoff walls of concrete or impermeable clay extending laterally from the tank may be used to assist in controlling the water table in the locality of the tank. The lower portion of the uphill wall of the tank can be constructed of stone, brick, or other material so placed that water may move freely into the tank from the formation. Back fill of graded gravel and sand will aid in restricting movement of fine materials from the formation toward the tank.

   The tank cover should be cast in place to insure a good fit. Forms should be designed to allow for shrinkage of concrete and expansion of form lumber. The cover should extend down over the top edge of the tank at least 2 inches. The tank over should be heavy enough so that it cannot be dislodged by children and should be equipped for locking.

5. A drain pipe with an exterior valve should be placed close to the wall of the tank near the bottom. The pipe should extend horizontally so as to clear the normal ground level at the point of discharge by at least 6 inches. The discharge end of the pipe should be screened to prevent the entrance of rodents and insects.

   The overflow is usually placed slightly below the maximum water-level elevation and screened. A drain apron of rock should be provided to prevent soil erosion at the point of overflow discharge.

   The supply outlet from the developed spring should be located about 6 inches above the drain outlet and properly screened. Care should be taken in casting pipes into the walls of the tank to insure good bond with the concrete and freedom from honeycomb around the pipes.

SANITARY PROTECTION SPRINGS:

1. LOCATION. So far as practicable, a spring should not be located on the side of or at the foot of a hill if cesspools, privies, sewers, or other sources of contamination are situated where they would be above the spring and in the path of the ground-water flow toward the spring. In no case may a spring be located closer than 200 feet to an upstream potential source of contamination. In limestone formations, however, contaminated material frequently enters the water-bearing channels through sink holes or other large openings and may be carried along with ground water for long distances. Similarly, if materials from such sources of contamination finds access to the tubular channels in glacial drift, this water may retain its contamination for long periods of time and for long distances.

2. The following precautionary measures will help to insure developed spring water of a consistently high quality.

   A. Provide for the removal of surface drainage from the site. A surface drainage ditch should be located uphill from the source so as to intercept surface-water runoff and carry it away from the source. Location of the ditch and the points at which the water should be discharged are a matter of judgment. Criteria used should include the topography, the subsurface geology, land ownership, and land use.

   B. Construct a fence to prevent entry of livestock. Its location should be quided by the considerations mentioned in item A. The fence should exclude livestock from the surface-water drainage system at all points uphill from the source.

   C. Provide for access to the tank for maintenance, but prevent removal of the cover by a suitable locking device.

   D. Monitor the quality of the spring water with periodic checks for contamination. A marked increase in turbidity or flow after a rainstorm is a good indication that surface runoff is reaching the spring.

DISINFECTION OF SPRING:

1. All newly constructed springs should be disinfected to neutralize contamination from equipment, material, or surface drainage introduced during construction. Every spring should be disinfected promptly after construction or repair.

2. An effective and economical method of disinfecting springs and appurtenances is that of using sodium hypochlorite, which is available in 14% (percent) by volume from swimming pool equipment supply outlets, or chemical supply houses. It is also commonly available as liquid household bleach with 5.25% (percent) available chlorine.

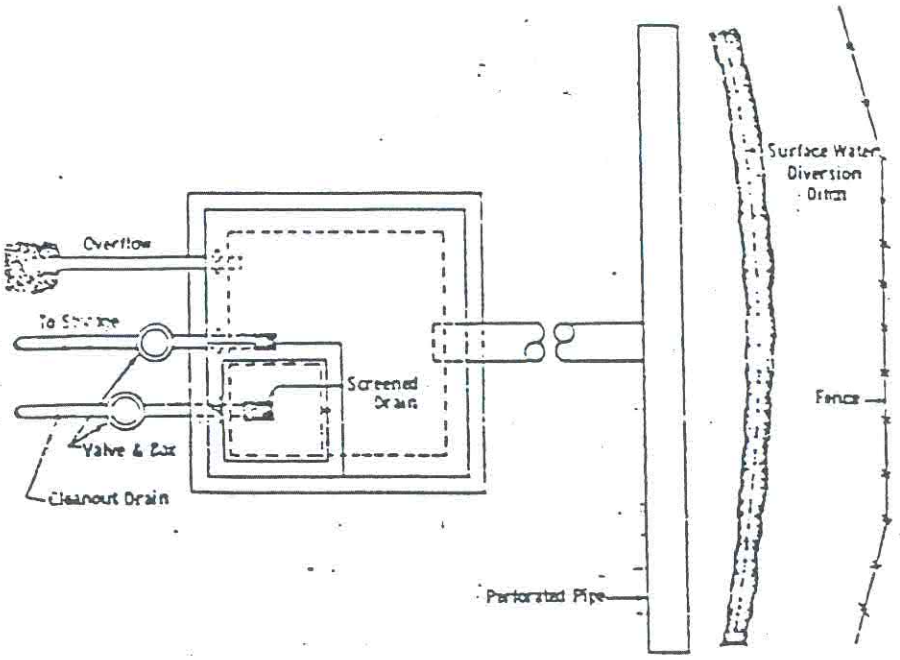
3. When used in the disinfection of springs, sodium hypochlorite should be added in sufficient amounts to provide a dosage of approximately 100 mg/l of available chlorine in the spring encasement. The table below shows quantities of sodium hypochlorite to be used in treating spring encasements of different diameters and water depths, using 5.25% available chlorine.

DEPTH OF WATER IN ENCASEMENT	ENCASEMENT DIAMETER (IN.)					
	36	48	60	72	84	96
5 feet	3 Q	5 Q	8 Q	11-1/2 Q	15-1/2 Q	20 Q
6 "	3-1/2 Q	6 Q	10 Q	14 Q	18-1/2 Q	24 Q
7 "	4 Q	7 Q	12 Q	16-1/2 Q	21-1/2 Q	28 Q
8 "	4-1/2 Q	8 Q	14 Q	19 Q	24-1/2 Q	32 Q
9 "	5 Q	9 Q	16 Q	21-1/2 Q	27-1/2 Q	36 Q
10 "	6 Q	10 Q	18 Q	24 Q	30-1/2 Q	40 Q
12 "	7-1/2 Q	12 Q	20 Q	26-1/2 Q	33-1/2 Q	44 Q
15 "	9 Q	15 Q	22 Q	29 Q	36-1/2 Q	48 Q

Q = Quarts Required. If 14% solution is used, reduce specified amount by approximately one-third.

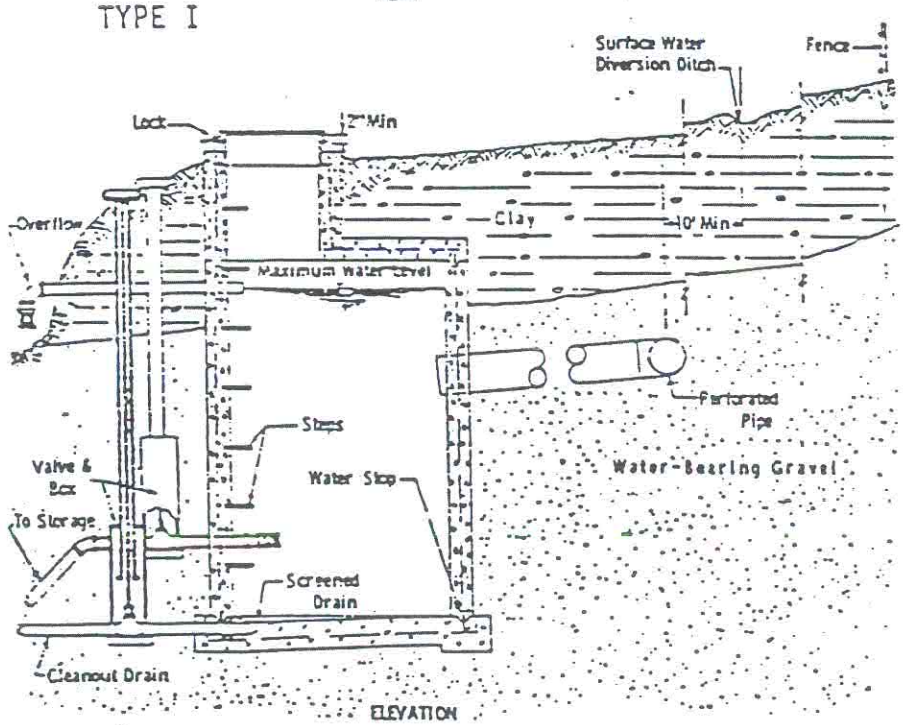
A bacteriological sample should be collected from the spring following the disinfection procedure and submitted to a laboratory for examination. If the laboratory analysis shows the water is not safe to use, the disinfection procedure should be repeated until the tests show the water is safe to use.

CONSTRUCTION FEATURES OF TWO TYPICAL SPRING COLLECTION SYSTEMS

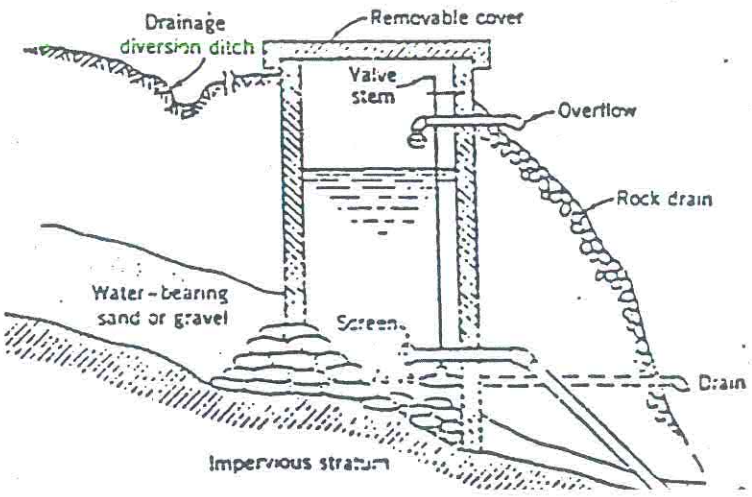


PLAN

TYPE I



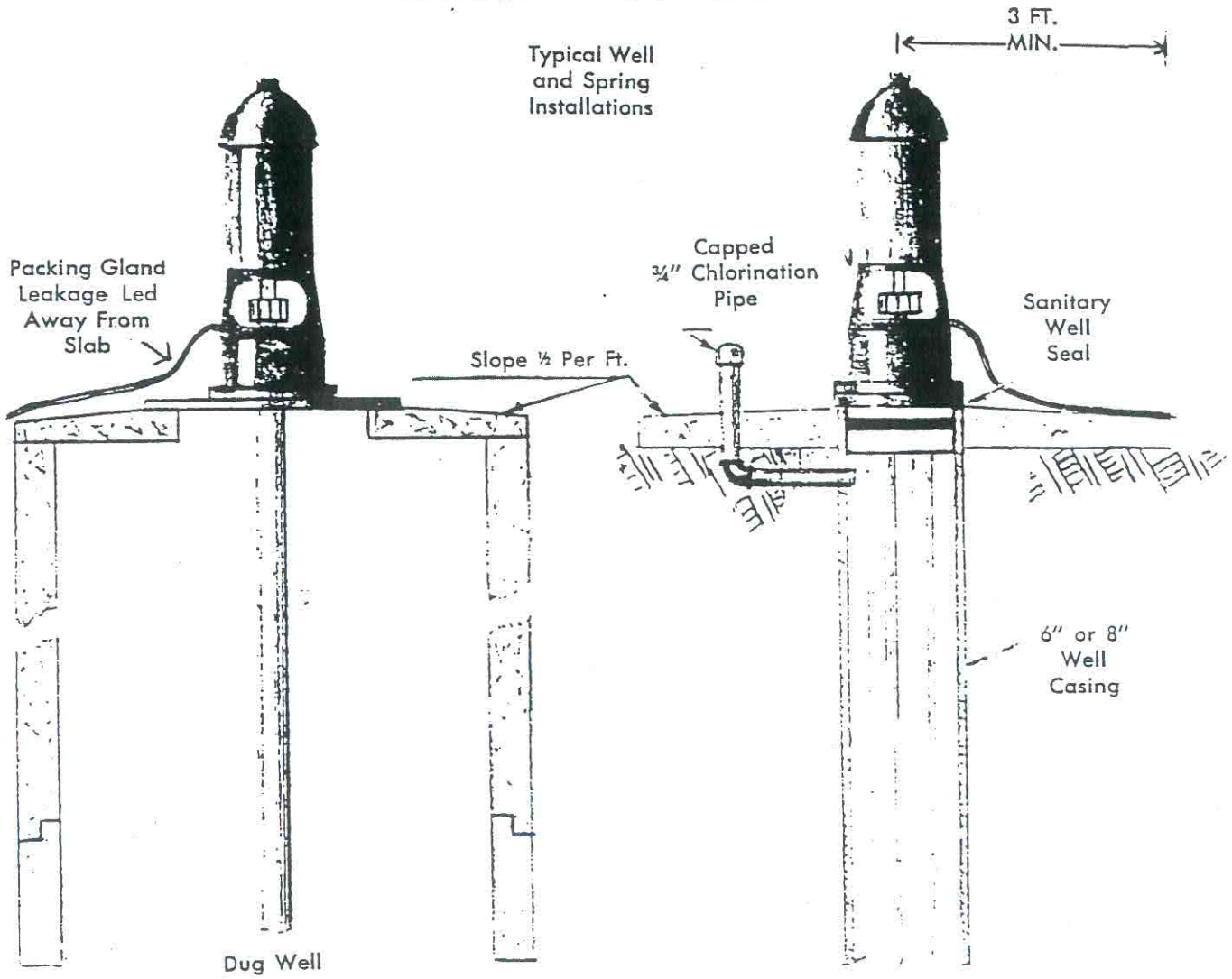
ELEVATION



TYPE II

NAPA COUNTY HEALTH DEPT.
P. O. Box 740 — Napa, California

Typical Well and Spring Installations



ALL JOINTS SEALED WITH ASPHALTIC SEAL