Safe Drinking Water
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SAFE DRINKING WATER

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A clear, sparkling, cool water is not necessarily a safe drinking water. Too frequently, a water supply is judged by its physical appearance, rather than the exacting sanitary report made by the bacteriological laboratory. Bacteria are too minute to be seen by the naked eye. Water that appears to be perfectly clear may contain many bacteria. If the water has come in contact with human fecal material it may be exceedingly dangerous. All water supplies, irrespective of their source, should be checked for their sanitary quality by submitting samples to a bacteriological laboratory, at least once each year.

A PURE WATER SUPPLY IS ONE OF MAN'S GREATEST HEALTH ASSETS

The value of pure water to health is vividly demonstrated by merely scanning any state's vital statistics and noting the death rates before the introduction of safe water supplies in the large cities and the death rate since the introduction of purification systems. In 1900, before the introduction of purification systems, Michigan had a typhoid fever death rate of 37 deaths per 100,000 population. In 1908 the first filtration plant was installed at Grand Rapids, and this was rapidly followed by others; later, the water was treated with chlorine to destroy bacteria that might survive filtration. Rapidly all urban water supplies were either changed from questionable sources or the questionable water was treated to render it safe. The result was that in 1928, the typhoid death rate for the state had fallen from the 37 of 1900 to 1.8 deaths per 100,000 population. In 1936, practically every public water supply is safe or the Michigan State Department of Health has condemned the water for domestic use. Today, water-borne typhoid fever is spread only by private water supplies. The elimination of these questionable supplies is a problem of the owner.

The Bacteriology Department is ready and willing to aid both urban and rural dwellers in improving their private water supplies. This service has been available at no charge for many years and will continue to be available so long as unsafe private water supplies are found.

MICHIGAN STATE COLLEGE
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R. J. Baldwin, Director

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TYPES OF WATER SUPPLIES

Rivers and Lakes

The amount of pollution in lakes and rivers is dependent entirely upon the amount of sewage entering. A stream passing through a populated area is invariably an unsafe source of water. As there are so few streams and lakes in this state that are free from pollution, one may safely generalize and state that all rivers and lakes in this state are unsatisfactory sources of drinking water unless treated.

Springs

In general, springs are safe water supplies if the water is properly protected. There are three types of springs: surface, hillside, and underground. Many spring waters show pollution, not because the water as it emerges from the ground is polluted, but because the method of collection is undesirable. Water from these springs generally shows bacterial pollution. If properly collected, these same supplies are desirable. The best method of collection is to drive a pipe or series of pipes deep into the ground at the source of the spring and convey the water through these pipes into a closed reservoir from which the water flows by gravity or is pumped to the point of use. This method avoids surface contamination at the point of collection and generally yields a satisfactory water supply. Hillside springs should be regarded with suspicion unless the high ground is uninhabited by man or animal. The presence of privies in the water-bearing area should condemn such supplies as dangerous.

Dug Wells

The dug well should be a thing of the past. The "old oaken bucket" is beautiful in song but in practice it is obsolete and dangerous. A safe dug well water is a rarity. Most dug wells have porous walls that allow the entrance of surface drainage that may carry undesirable bacteria. Many dug wells have planked tops that allow the seepage of waste water from the pump to return to the cistern beneath. It is not infrequent to find dead animals, such as rodents, in open top wells.

Driven Wells

Driven wells obtain their source of water from the same stratum of earth as dug wells. A properly constructed driven well should meet the following requirements: 1. The location should be such that the ground slopes away from the well rather than toward it; 2. A concrete platform should be placed at the base of the well and should be equipped with a drain to remove any waste water; 3. A cylinder type pump should be used; 4. The well should be at least 15 feet deep, and deeper, if possible, to prevent the seepage of surface water into the pipe; and 5. The well should be located at least 50 feet from any source of pollution, such as privies, slop dumps, seeping cesspools, septic tanks, etc.

The water should be examined bacteriologically at least once each year.

Deep Wells

Deep wells are drilled and, in most cases, penetrate into the bed rock. These wells are the best sources of water known. Water entering such wells comes from beneath the rock and is free from surface water. The water is practically bacteria-free. If such wells are properly constructed with tight connections at all joints, proper frost pits, and tight gaskets in all valves, the water is, generally, safe. These wells should be tested regularly once each year for sanitary condition.

THE SANITARY EXAMINATION OF A WATER SUPPLY

For the benefit of urban and rural dwellers, who desire to ascertain the purity of their water supplies, directions for the proper collection of samples is presented. A questionnaire is presented, which should be filled out completely and returned with the sample. No charge is made by the bacteriology department for this service.

THE METHOD OF COLLECTING WATER SAMPLES FOR BACTERIOLOGICAL EXAMINATION

The collection of a water sample should, if possible, be performed by a person trained in bacteriology. A great deal of care should be exercised in collecting the sample in order to prevent outside contamination entering the sample. The most important precautions to be observed are:

1. The sample bottle and stopper must be prepared as described below.
2. The sample should be representative of the supply.
3. Nothing should come in contact with parts of the bottle that come in contact with the water sample.
4. The sample should be shipped immediately after collection and at a time when the sample will reach the laboratory in the shortest time period.

The Sample Bottle

The best container available in most homes is a pint Mason fruit jar. A new cover and a new rubber should always be used and, if possible, a new jar. **Sample bottles are not supplied by the laboratory.**

Preparation of the Sample Bottle

The best method of preparation is boiling. Place the jar, with the rubber attached, and the cover in a pan of boiling water. Boil vigorously for at least 10 minutes.

Removal of Bottle From Boiling Water

Remove the bottle from the water bottom side uppermost. Secure the cover by the outside only.

Collecting the Sample

If the water supply is from a well, pump the well for about 15 minutes before taking the sample unless the well has been in use just previous to collecting the sample. If the sample is from a tap of a water system, allow the water to run for 10 minutes to clear the system of stagnant water. If the sample is taken from a stream or still body of water, plunge the jar beneath the surface of the water and keep moving up stream or forward while filling. This prevents the water coming in contact with the hand from entering the jar. Collect the water directly into the jar, prepared as described, filling the jar about three-quarters full. Seal at once. **Be sure that nothing comes in contact with the parts of the bottle that come in contact with the water.**

Shipping

Pack well, using ice if possible, and ship at once by parcel post or express. When possible, ship the sample during the early part of the week so the sample will reach the laboratory before Saturday. **All samples should be shipped immediately after collecting.**

The sample should be addressed to

DEPT. OF BACTERIOLOGY AND HYGIENE,
MICHIGAN STATE COLLEGE,
EAST LANSING, MICHIGAN.

HISTORY AND DESCRIPTION OF WELL

The questionnaire which is appended, should be filled out completely and mailed with the sample.

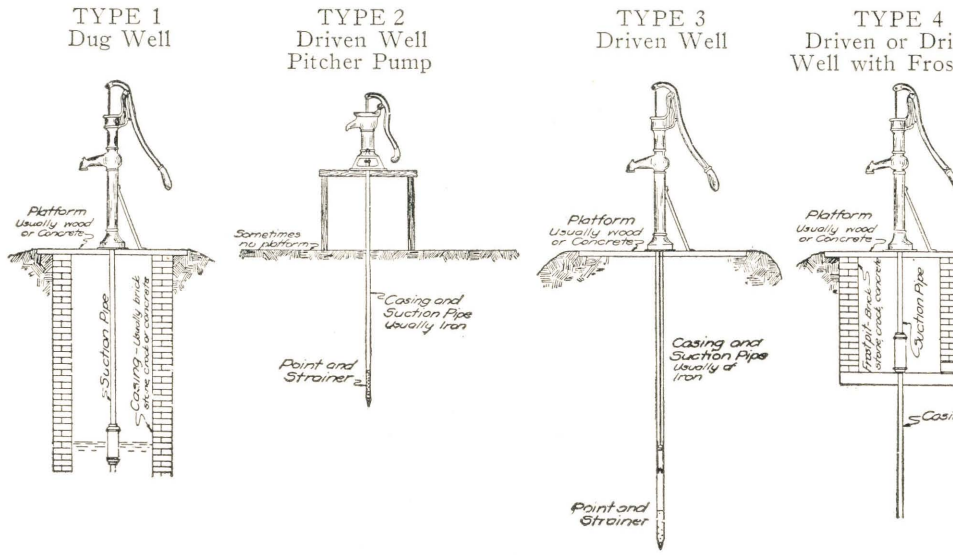
METHOD OF DISINFECTING A WATER SYSTEM

Occasionally, although the water entering a well from the water-bearing stratum of earth may be of good sanitary quality, the well system may be contaminated by colon organisms. This is particularly true of new installations. The resulting water upon bacteriological examination will be reported as unsatisfactory. It is impossible by means of bacteriological procedure to differentiate between pollution of the ground water and the well system itself. To rule out contamination from the well system the following procedure should be used:

Procure a small can (12 oz.) chlorinated lime at a grocery store. Remove the well head so access can be gained to the well cistern. Dump several tablespoonfuls of chlorinated lime directly into the well. A two-inch casing should receive two to three tablespoonfuls. As one part of chlorine to a million parts of water will effectively destroy the colon bacteria, the amount suggested is purposely an excessive amount. Allow the chlorinated lime to act for a period of four to

six hours, and then pump the well thoroughly. The absence of a medicinal taste in the water indicates a removal of the chlorinated lime. After using the water for several days, collect a sample, following the directions given in this circular, and submit for sanitary analysis. An unsatisfactory report on a well treated as suggested indicates a contaminated water supply. A well driller should be consulted for repairs or the installation of a new well.

All new wells or pressure water systems should be chlorinated in this manner to assure a sterile system for the water to traverse.



Select the type of well nearest the one from which this sample was taken and give i
other side of this sheet.—Wells with open top pitcher pump are Type 2.

If the well is a dug well (Type 1) state kind of wall (Brick, stone, crock, etc.).

Make any notations or drawings you wish on this side to explain as fully as possible
sample was taken from.

WATER SAMPLE QUESTIONNAIRE

Note: This sheet must be filled out completely as possible and returned to the laboratory before a report can be sent to you on the sample submitted, as this information is necessary in passing judgment on your supply.

Name.....Date of shipping.....19....(A.M., P.M.)

Address.....Date received.....19....(A.M., P.M.)

Source of sample:

Lake; river; dug, driven, or drilled well; spring.....
(See page 6 for type of well).

1. LAKES OR RIVERS:

Does sewage or other insanitary water empty into your supply?.....

Describe conditions fully.....

.....

.....

2. WELLS: Type and diameter of well (see diagrams).....

Depth.....Kind of soil.....Kind of subsoil.....

Depth to bedrock.....Slope of land relative to well.....

If dug well, state kind of wall.....Kind of platform.....

Do you prime the pump?.....Are walls and top water-tight?.....

Is frost pit dry?.....Do you have drain for waste water?.....

Is there air in the water when pumped?.....

Distance of well from surrounding objects:

House.....Manure piles or other refuse.....

Barn.....Dumping grounds for kitchen slops.....

Privy.....Type.....Pig pens.....

.....

3. SPRINGS:

Open reservoir.....Closed reservoir.....

Describe surroundings.....

.....

Do you have a water system?.....Pressure or gravity.....

Location of storage tank.....

What trouble have you had with this water?.....

Has the water been tested before?.....Report.....

Remarks:.....

.....

Types of wells:

(Diagrams and accompanying explanations are taken from Michigan Department of Health circular).