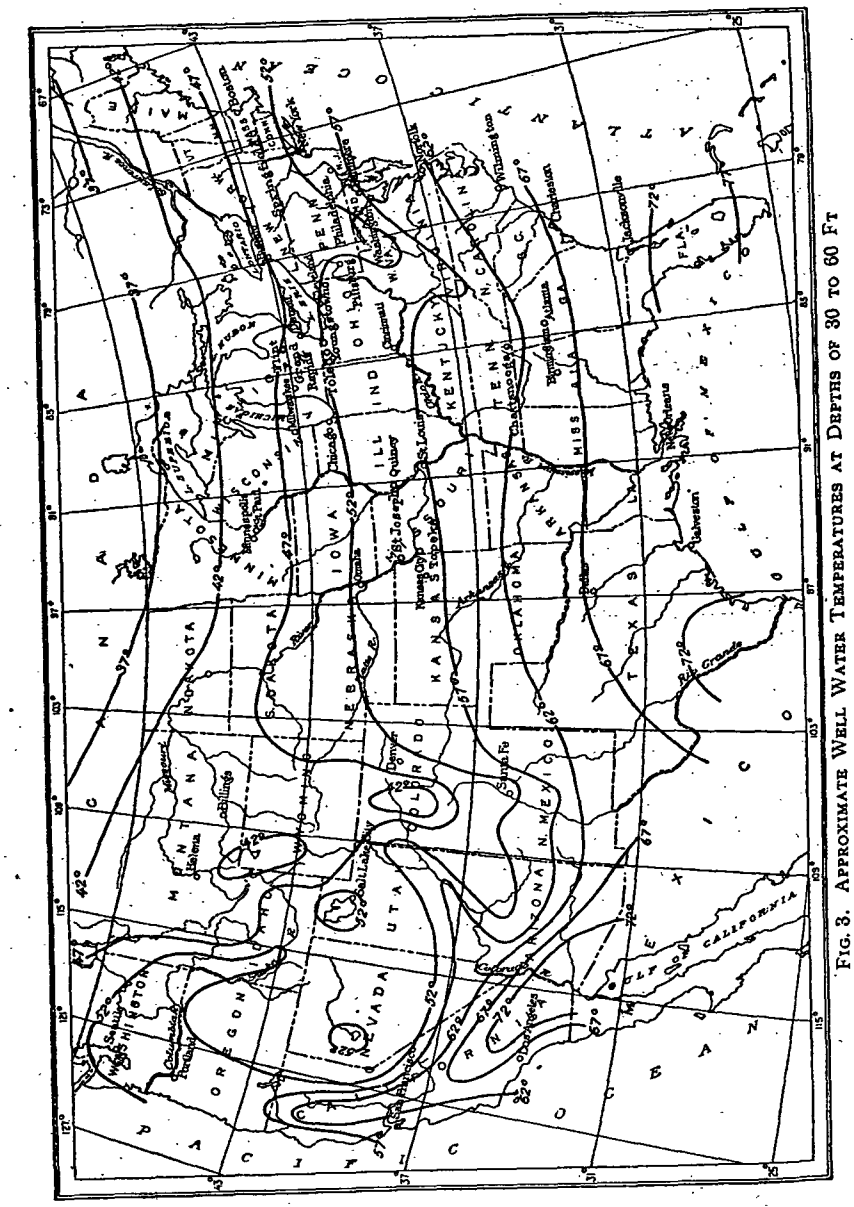


FIG. 3. APPROXIMATE WELL WATER TEMPERATURES AT DEPTHS OF 30 TO 60 FT

As the heat content of the air increases, its wet-bulb temperature rises. (See Chapter 1.) Because it is impractical to leave the air in contact with water for a long enough time to permit the wet-bulb temperature of the air and the temperature of the water to reach equilibrium, atmospheric water cooling equipment aims to circulate only enough air to cool the water to the desired temperature with the least expenditure of power.

In an air washer, humidifier or dehumidifier, the air is first conditioned by water to change its moisture and temperature, and it is then sent to the place where it is to be used. In water cooling equipment the temperature of the water is reduced by air, and the cooled water is carried to its point of usage. In the air washer, an excess of water is used to condition a fixed quantity of air, while in water cooling equipment, an excess of air is used to cool a fixed quantity of water.

Both types of equipment have a common basis of design in that the size of the equipment is determined by the quantity of air to be handled. With the air washer, the size of the equipment is fixed by the quantity of air to be conditioned, and the amount of conditioning is controlled by the quantity and temperature of the water supplied and its method of application. With water cooling apparatus, its size and the quantity of air required bear no direct relation to the quantity of water being cooled, but vary through a wide range for different services and conditions.

Selection of Water Cooling Equipment

The proper size and type of water cooling equipment for a given installation cannot be determined accurately without considering the characteristics of all types, together with all requirement factors and other matters which influence the selection. Very few installations are exactly alike in details of requirements, and conditions governing performance and operation of the several types of water cooling equipment vary widely with geographical location as well as other considerations. It necessarily holds, therefore, that requirement factors and equipment characteristics are closely interlocked and deserve careful study as a related whole.

Before the characteristics of a specific water cooling apparatus can be judged desirable or undesirable the survey must conclude definitely the importance of each of the following items: first cost including all necessary auxiliaries, area, height, weight, effect of wind velocity and direction, drift nuisance, make-up water requirements and cost of chemical treatment if needed, total power for pumping (plus fan operation in the case of mechanical draft), maintenance, available locations (with due thought to possible future expansion, wind restrictions, space cost, proximity and accessibility, etc.), appearance, the equipment's operating flexibility for most economical conformance to varying loads or seasonal changes, and other considerations occurring with regard to a specific application.

Sizes of Equipment

Assuming a definite quantity of water, the size and design of atmospheric cooling equipment are affected by the following primary conditions:

1. Temperature range through which the water must be cooled.
2. Number of degrees above the wet-bulb temperature of the entering air to which the water temperature must be reduced.
3. Temperature of the atmospheric wet-bulb at which the required cooling must be performed.
4. Time of contact of the air with the water. (This involves height or length of the apparatus and velocity of air.)