

above a city intake, but the writer has seen the same material dropped in the open end of a cast-iron water main as it lay in the ditch. Nothing but careful sanitary supervision can meet such abuse.

Naturally the officer in charge of formulating the rules governing the camp, if worthy of his responsibility, would see to it that the regulations were suited to the local conditions, and, while strict enough to safeguard health, were not so loaded with unnecessary caution as to become a burden. No hard-and-fast rule can be laid down which will state, for instance, the exact point beyond which pollution will become dangerous and short of which one can count upon safety. The writer had upon one occasion testified that five thousand head of cattle would seriously damage the water of a certain stream upon the banks of which they were corralled. The cross-examiner asked if twenty-five hundred would likewise cause serious pollution, and the answer was "Yes." The next question was, "Would twelve hundred cattle produce serious pollution?" To this the reply had to be made that, "while willing to halve the number of cattle actually covered by the facts in the case at issue, it would be unwise to attempt further division for fear of finding a single cow polluting the entire valley."

Protection of the Watershed

The prominence usually given to what may be termed the auto-intoxication of a camp may well mask the equally important matter of the danger a camp may be to the well-being of those whose homes are in the same drainage area. Camps are, of course, of all sizes, depending upon the magnitude of the job, but it is no error to assume that for the same quantity of proposed work a larger number of laborers must now be provided than were needed for the same work a few years ago. As an instance, it was formerly common on railroad construction to find four men carrying a hundred-pound rail, where now twelve are demanded; and, while one man could in the past shoulder a railroad tie, it now must be lifted by two men, one at each end, except in those cases where the tie is creosoted, when four men using lifting tongs are required.

Of course, such circumstances increase not only the expense of construction, but they also call for greater vigilance to provide against sanitary risks arising from enlarged camp population.

Nothing short of conscientious sanitary inspection, followed by promptness in necessary action, can meet the difficulties that confront those in charge of water-shed protection.

It is of the utmost importance that engineers and foremen should remember that in a very real sense they are health officers and sanitary instructors as well. The men under their care are likely to be largely ignorant of elementary sanitation and need both instruction and advice. If the camp be sufficiently large to support a meeting hall, great good will follow the inauguration of lectures and instructional moving pictures. Not only needed information is thereby supplied, but entertainment also.

It goes without saying that the camp water supply is a matter of major importance, and it is the manifest duty of the parties in charge to so arrange matters that a suitable volume shall be always available, and that its quality shall be suitable as well. Small groups of men can usually be safely supplied locally, but large camps may demand the exercise of considerable skill of a special character to meet their needs. No haphazard guessing nor the application of household tests should be employed to determine the suitability of a water for use in a large

camp. At this point we are reminded of a quaint old book by John Smith, printed in 1712. Its title is "The Curiosities of Common Water, or the Advantages Thereof in Curing Cholera, Intemperance, and Other Maladies." In it we note: "How to distinguish water." "The way to do this is by the taste and scent—for if it have no taste nor small, being purely fresh, nor salt; nor sweetish, nor ill-scented, it is good, provided it be pure and clear." "All water that will make good lather with soap is wholesome to drink without boiling, but none else."

It may be that no little difficulty will be encountered in persuading the men to avoid the attractive water from some polluted well and use the safer camp supply, as the latter may have been carried some distance in slightly buried pipes, and consequently be lacking in coolness. If the camp water should have a taste due to algæ, there would be still greater difficulty in securing its use. Algal taste can be successfully removed by a small dose of potassium permanganate, as first proposed by Houston. Removal of the means of raising the water from an open and polluted well is the best plan for stopping its use if such a procedure be permissible. Deep or driven wells furnish supplies that may be nearly always accepted with confidence.

Bathing should be encouraged, and, unless the camp be very small, showers of simple construction should be built. In the absence of showers, abundant provision should be made for the washing of both body and clothes, and no charge should be made for soap.

To insist upon and secure periodical bathing is rather more than those in charge of labor camps can accomplish; all they can do is to see to it that provision is made for maintaining cleanliness and leave the rest to the discretion of the men. Fifty gallons of water per day per capita should be supplied to large camps; this will very liberally suffice for all purposes.

Using Same Water Repeatedly

It is interesting to observe the economies that have to be practised during the present war in localities where water is scarce. Thus we note in the "Journal of the Royal Army Medical Corps," 27:363: "Baths at the front where water is scarce. Add lime to the water after use and mix by hand-power. Insoluble lime soap separates, settles, and carries down impurities. Settlement is effected in three successive concrete tanks. Sodium carbonate is added to the water in the third tank, whereby calcium carbonate is precipitated and oils are caused to float. The latter are absorbed by sacking on frames. After settling in this third tank, the water is passed through a charcoal bed four inches thick." The water treated as above is described as quite clear and "free from dirt, soap, lime and soapy oils." The same water is used indefinitely.

As to the character of the pipe for camp plumbing and the possibility of its being acted upon by the water carried, there is not the same necessity for careful selection as when more permanent construction is being undertaken. "Red water," due to an attack upon iron by a soft surface supply, is not likely to appear immediately, so that even an inferior galvanized pipe will probably last long enough to outlive the purposes of the camp, and we know that action upon the protecting coating, whereby zinc is carried into solution, will cause no injury to those drinking the water. Large amounts of zinc have been swallowed by sundry communities over long periods of time without ill effects. Thus Hazen reports that at Brisbane, Queensland, the water, which is stored in tanks built of galvanized iron, contains over seventeen