# Emergency Treatment of Army Camp Sewage

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SPEEDY CONSTRUCTION of military camps often finds roads and buildings finished and such utilities as the water distribution system and sewage pipes installed long before the sewage treatment plant, whose design and equipment-procurement are necessarily time-consuming, can be completed. Inasmuch as military authorities are anxious to move men into these establishments as soon as possible, some type of emergency sewage treatment that could serve until the permanent facilities are ready would obviously be an advantage. The purpose of this article is to suggest a type of emergency treatment using lime to precipitate the solids and also sterilize the sewage.

Because sewage treatment has not been standardized as have barracks, sewers and water mains, it consequently requires a longer time to install sewage treatment facilities than other units making up the camps. First, careful study has to be made on each project to determine the degree of treatment required to maintain sanitary conditions of the stream into which the sewage effluent is discharged.

The next step is to decide on the type of treatment to give the desired results and to determine the size of the various units to make up the plant. As equipment deliveries are controlled by priority ratings, the sooner equipment orders are placed the better the chance of having them filled in time. Engineer-architects who design sewage treatment plants differ in their procedure in handling this work. Some prefer to prepare complete structural drawings and have the equipment purchased by the contractor, but this procedure delays the delivery of the equipment by the amount of time it takes to make the design. Other engineers, and by far the majority, prefer to prepare equipment specifications, and purchase the equipment before designs are started. This procedure has the advantage of saving several weeks on the delivery of the equipment and eliminates revision of drawings should the equipment purchased be somewhat different than the designs called for in the completed plans. Still a third procedure, which has been found to save time over the two mentioned above, is to utilize "allocation contracts" for equipment, as permitted by the War Department.

### Lime easy to apply

Experience has shown that contractors have been able to build the concrete structures of the sewage treatment plant such as sedimentation tanks, trickling filters, etc., long before the equipment to be installed in them arrives on the job. It is, therefore, suggested that, where the settling tanks are completed, lime be used to clarify and disinfect the sewage temporarily. This can be done at very small expense as little additional equipment would be required. A chemical feeder to feed the lime is the main item needed. High-calcium hydrated lime purchased in bags is preferred to quicklime. Mixing of the lime with the sewage can be arranged by installing temporary baffles in the channel leading to the primary settling tank; or where a Parshall flume precedes the settling tank, the milk of lime could be added ahead of this flume, as thorough mixing will be accomplished between the lime solution and sewage passing through this unit.

Lime was used to treat sewage in England over fifty years ago and was actively promoted in this country from about 1915 to 1926, either alone or in connection with an electrolytic process. In 1924 and 1926 lime treatment plants were installed at New Holstein and Gillett, Wisc., where the domestic sewage contained cheese factory and cannery wastes. These plants are still giving satisfactory results. Many other plants using lime as a precipitant were installed and are still operating.

The action of the lime is to precipitate calcium and magnesium bicarbonates from the sewage, giving a voluminous precipitate, which when settling carries with it the suspended solids. In actual practice, sewage with proper lime additions and mixing gives a water-white clear effluent. It is advisable to add lime to a point of causticity, as bacteria are also destroyed at this point; causticity of 10 to 20 ppm. appears to be preferable. The reactions with lime are similar to water softening reactions and, as a matter of fact, this process results in softening the sewage liquor. The amount of lime will vary from 600 to 1,500 lb. per mg. of sewage, depending on its character. Waters which are soft may require small amounts of coagulant to assist in the clarification.

### Disposal of sludge

The sludge resulting from this treatment can be disposed of on sand beds without nuisance. The sewage solids are diluted with the mineral precipitates and, as the sludge is caustic, flies will light on it for only a second as the nature of the sludge acts as a repellent.

Until the sludge removal mechanisms can be installed, the sludge will accumulate in the sedimentation tanks. As most of these tanks have a slight slope, some of the sludge can be removed by simply opening the sludge draw-off line. The balance of the sludge can periodically be moved to the sludge draw-off by hand squeegees. The sludge in the tank will not readily become septic if the sewage treatment is always properly controlled to or a little above the caustic reaction.

With this lime treatment, scum due to grease is not a problem as the lime reacts with the grease, and the heavy precipitate formed carries it to the bottom of the tank as sludge.

As a temporary expedient, to allow troops to be moved into the camps where tanks are available but where equipment delivery is delayed, it is thought advisable to make the above suggestions. With the proper application of this method, suspended solids can be reduced approximately 90 percent; B.O.D. at least 70 percent; total bacteria approximately 90 percent; and B. Coli approximately 99 percent.