Whatever system of disposal is decided on, sedimentation tanks will be necessary for the arrestation and deposit of matters in suspension. In some cases where trade wastes have to be dealt with chemical treatment may be necessary, but this should be in very exceptional cases only. Screening of the sewage, excepting in pumping schemes, is rarely desirable or necessary. The proper trapping of the inlets and outlets of the tanks act more efficiently. The capacity of the tanks should be not less than half the daily volume of the sewage. Two or more tanks are to be preferred to one tank only. These should be constructed that they may be used either in combination or singly, so that one may be in use while others are being emptied of sludge. The tanks should be placed in such a position that the sludge may be drawn off to a lower part of the works by gravitation. The adoption of the Dortmund type of tank will often obviate the pumping of sludge. A detritus tank or deposit channel is often necessary to intercept mineral matter before reaching the tank. When works have to be situate near public highways or dwelling houses, and nuisance from smell has to be suppressed, the adoption of the Dibdin slate bed in lieu of sedimentation or septic tanks may be found advisable. Slate beds, however, necessitate a loss of head as the sewage must be drawn off from the floor level, whilst in sedimentation tanks it is drawn off from the surface. The covering over of sedimentation or septic tanks with costly roofs is not necessary. If for any reason it is desired to obscure the surface a light roof of corrugated iron may be used.

In the selection of a biological system for purification, and when economy is to be an important factor, there will be roughly two systems available, viz., (1) the percolating or trickling filter, and (2) the contact bed system. Effective purification can be better obtained from the former system. A uniformly high degree of purification superior to that from contact beds has been obtained from percolation filters designed by and constructed under the author's supervision at Sutton, Surrey, with a depth of 5 feet 6 inches, whilst good results have been obtained from another filter having a depth of 4 feet 3 inches only. The area of land required for percolating filters on which to purify a given quantity of sewage to a given standard is less than half that of contact beds, whilst the cost of construction of such filters when compared with that of contact beds with concrete walls and floors has been 50 per cent. less at works under the charge of the author.

The first coarse grain or primary contact bacteria beds in England for the treatment of crude sewage were constructed at Sutton by the author, acting on suggestions made by Mr. W. J. Dibdin, and these works acquired the reputation of being "the home of the contact system." It was only after very prolonged investigation that a departure was made from that system and the percolating system adopted. The results have fully justified the change.

Where contact beds are decided upon (and there will be cases where owing to local conditions such may preferably be adopted) expenditure may be restricted by constructing the enclosing walls (where below ground) on a batter and of cement concrete not more than 6 inches thick. A depth of material of more than 6 feet in contact beds is not generally advisable. Shallowness in depth of beds ensures better aeration and less liability to clog up. Percolating filters, too, of a greater depth than that named do not appear to be warranted. The use of cheap material for contact beds is not in general an economy. Such material as burnt clay ballast, improperly burnt destructor clinker, and broken loca stone of a non-absorptive and smooth surface are not to be recommended either for contact beds or percolating filters.

One of the great advantages of percolating filters over contact beds is that the former may be constructed without artificial walls, whilst the latter require such walls for both primary and secondary beds. To excavate the soil to a considerable depth to secure open ground around percolating filters and then to exclude the air by surrounding them with concrete walls is somewhat anomalous. The sides of a percolating filter may be built up with lump clinker. Aeration of the interior is assisted by this method of construction.

There does not appear to be any sound reason why percolating filters may not be constructed below ground level if desired. A filter 80 feet in diameter, and 4 feet 3 inches in depth, so constructed by the author at a cost of £485, and treating 75,000 gallons per day, has been quite successful. The collecting channel is carried through the centre of the floor of the filter, and discharges into a humus chamber.

It is open to controversy as to whether double filtration by two sets of percolating filters, one generally being built up with very coarse material, and the second with finer material, is justified. Single filtration through one filter, composed of material of ¾in. gauge in the upper part, and of 3-in. gauge in the lower, treating a properly sedimented tank effluent under proper management, is in general adequate for securing a good effluent. Where the effluent is to be discharged into a stream used for potable purposes, further treatment in a sand filter may be advisable.

The endeavor which is sometimes made to obtain an effluent much superior to the standard required by a rivers conservancy board or county council, is one which is good in theory, but when carried out at the cost of a small community is not to be commended.

One of the most difficult problems to deal with at sewage works is connected with the disposal of sludge. In some cases it is possible to pump the sludge into trenches on land and then plough it in, but this is generally practicable only in comparatively large works, and where power is available. The method adopted by the author at the Sutton works was to construct special sludge beds or lagoons in compartments, so that one bed was always ready to receive a new supply from the sedimentation tanks. These beds were provided with shallow underdrains a few feet apart, which were connected to a main drain, and discharged into the low-level sedimentation tanks. These drains were covered with coarse clinker, and over the whole surface of the bed was spread a 6-in. layer of ashes, from house refuse. Upon this the sludge was discharged by gravitation. The excessive moisture was quickly drained away from it, leaving the comparatively solid sludge behind, which was readily cleared away in carts by farmers. There is singularly little smell from such sludge, and it is often used as a top-dressing to lawns for private houses. The cost of such a method is very small.

It is expedient to notice that the periodical removal of sludge from sedimentation tanks should not be too long delayed, and in this and the supervision of filters and contact beds good management is the essence of success. Excellently designed works may be, and are too commonly, failures through inefficient management, whilst indifferently designed works may, on the other hand, by good management, give satisfaction. It has often been considered that authorities owning small works should have the advantage of