

(e) If the dilution is very great the standard may, with the approval of the Central Authority, be relaxed or suspended altogether. Our experience leads us to think that as a general rule, if the dilution, while not falling below 150 volumes, does not exceed 300, the dissolved oxygen absorption test may be omitted and the standard for suspended solids fixed at 6 parts per 100,000. To comply with this test no treatment beyond chemical precipitation would ordinarily be needed. If the dilution while not falling below 300 volumes does not exceed 500 the standard for suspended solids may be further relaxed to 15 parts per 100,000. For this purpose tank treatment without chemicals would generally suffice if the tanks were properly worked and regularly cleansed. These relaxed standards should be subject to revision at periods to be fixed by the Central Authority and the periods should be shorter than those prescribed for the general or for the more stringent standards.

(f) With a dilution of over 500 volumes all tests might be dispensed with and crude sewage discharged subject to such conditions as to the provision of screens or detritus tanks as might appear necessary to the Central Authority.

(3) These conclusions show that where dilution is small a high standard of effluent involving a high degree of treatment is required, but where there is considerable dilution a relaxation of the standard can be made to the extent that with a dilution of over 500 volumes crude sewage can be discharged to bodies of water with only screening and removal of grit.

(4) If sewage is continuously discharged into large bodies of water, the quantity that can be so disposed of without causing any nuisance is dependent upon the rate at which oxygen is made available either by re-aeration or by replacement of the water bringing in supplies of oxygen. The main source of oxygen is from absorption from the atmosphere. The rate of re-aeration of water exposed to the atmosphere is proportional to the deficiency of dissolved oxygen in the water; it is increased by turbulence and by wave action, is greater the greater the area exposed per unit volume of water, is not greatly influenced by temperature, and is reduced by films of oil or grease on the surface.

(5) As stated above, natural purification of polluting matter is effected without nuisance if sufficient oxygen is available to permit the changes to take place without exhausting the dissolved oxygen in the water. This can be arranged for any body of water by controlling the amount of organic matter in the sewage and its oxygen demand so that the dissolved oxygen in the water will not be exhausted during the process of natural purification. Where volumes of diluting water are great, large amounts of organic matter (or suspended solids) with a greater oxygen demand (biochemical oxygen demand—B.O.D.) can be permitted in the sewage or sewage effluent.

(6) Following discussions between the Auckland Harbour Board, the Medical Officer of Health, Auckland, and the Metropolitan Drainage Board standards have been determined—

(a) For the treated sewage prior to discharge to either Waitemata or Manukau Harbours; and

(b) For the harbour waters after discharge of sewage and at certain distances from the place of discharge.

(7) The standards for the quality of the effluent from the sewage treatment works provide for—

(a) Removal of grit, sand, &c.

(b) Reduction of suspended solids content.

(c) Removal of grease, scum, and fat.

(d) Reduction of the five-day biochemical oxygen demand.

(8) The standards for the harbour waters provide that the—

(a) Oxygen content of the waters shall not be reduced below 50 per cent. of the normal saturation quantity.

(b) Bacteriological quality of the waters shall not be below a standard which is recognized by health authorities as being safe for all recreational purposes.