large amount of evidence, and the conclusions, are, for the purposes of this review condensed into the following table.

Strength of Sewage in parts per 100,000 of suspended matter.	Grade of Material.	Gallons per cubic yard per day.	Material to be cleansed once in years.
30	3 in. diameter and upwards	50	2 years
10—20	"	100	10—15 years
4—7	"	100 to 150	———
1—4	"	150 to 200	———
30	1-2 in to 1 in. diameter	25	2 to 3 years
10—15	"	50	3 to 4 years
4—7	"	75—100	3 to 5 years
1—4	"	150—200	1 to 2 years
4—7	1-4 inch diameter	75—100	4 to 5 years
1—4	"	150—200	4 to 5 years

The above may be taken as within safe limits, there are cases within the author's knowledge where larger rates of flow have been continued with satisfactory results. In designing plants, the above data allow ample factor of efficiency, unless of course, there are exceptional characteristics appertaining to the sewage to be dealt with requiring exceptional treatment.

Par. 159 contains the following statement:—"It is not necessary for purposes of aeration to expose the sides of a percolating filter to the atmosphere, in order to obtain good results." In fact, it has been amply shown that sufficient air is always drawn into the filter from the top surface, provided that drainage and sub-ventilation are good. The Commissioners, therefore, lay great stress upon ample base drainage and the necessity of providing a layer of coarse material around and over such drains.

Pars. 162-164.—With reference to fungoid growths there is practically nothing new, and the general custom of giving the filters 2 to 3 days rest will prove an efficient remedy. These growths generally appear during the first 6 or 7 weeks of working, and after rest the growths do not as a rule reappear.

Relative Cost of Contact Beds and Percolating Filters.

Par. 166.—The Commissioners in considering the relative cost of contact beds and percolating filters, as in the case of contact beds assume:

"That ample fall is available." "An average domestic sewage which would require 100 parts of oxygen by weight, for the oxidation of the organic matter contained in 100,000 parts of sewage." A flow of 1,000,000 gallons per day dry weather. In time of storm, twice the dry weather flow is passed through the filters.

Para. 167.

Comparison Between Contact Beds and Percolating Filters.

Preliminary Process	Strength of Tank liquor in parts weight of oxygen per 100,000 required for theoxidation of the organic matter	Amount of Suspended matter in Tank liquor (parts per 100,000)	Contact Beds		Percolating Fillers	
			Rate of Filtration per cubic yard per day	Cubic contentsof filtering material required to treat 1,000,000 gals. per day	Rate of Filtration per cubic yard per day	Cubic contentsof filtering material required to treat 1,000,000 gals. per day
			Gals.	cub. yds.	Gals.	cub. yds.
Quiescent Settlement with chemicals	50	1 to 4	140	7,143	175	5,714
Continuous flow settlement with chemicals	60	3-6	85	11,765	150	6,666
Quiescent Settlement without chemicals	70	5-8	55	18,182	100-125	8,928
Continuous flow settlement without chemicals.	80	10-15	40	25,000	75-100	11,494
Septic Tank	80	10-15	40	25,000	75-100	11,494

From the above it will be at once apparent that in the case of percolating filters there is a great saving in filtering media as against contact beds.

Par. 168.—Initial cost of contact beds and percolating filters:—

	Contact beds.	Percolating filters
Quiescent settlement with chemicals	$42,635	$36.880
Continuous flow settlement with chemicals	74,590	44,180
Quiescent settlement without chemicals	110,400	52,980
Continuous flow settlement without chemicals	114,230	69,120
Septic tanks	114,230	69,120

From the above the initial cost of percolating filters is in each case less than that of contact beds. In connection with the above 15 per cent. has been allowed for engineering and contingencies, and $1.50 per cubic yard for filtering material. All tank work of both base and walls is of concrete, and all of the best workmanship. It will be observed that as far as the initial cost is concerned, that with chemical treatment such systems work out at the least cost. When, however, the cost of up keep is considered the systems without chemicals work out at cheaper rates.

Par. 176 gives us the estimated cost per annum, taking into account the cost of land required at $500 per acre, labor and supervision, loan charges at 3 1-2 per cent. per annum repayable in equal instalments over a period of 30 years, chemicals and all other charges.

Total cost of complete treatment per annum.

PRELIMINARY PROCESS	CONTACT BEDS.			PERCOLATING FILTERS.		
	Total Cost of Preliminary Treatment.	Total Cost of Filtration Process.	Total Cost of Complete Treatment.	Total Cost of Preliminary Treatment	Total Cost of Filtration Process.	Total Cost of Complete Treatment.
Quiescent Settlement with Chemicals	$6,290	$ 4,000	$10,290	$6,290	$2,660	$9, 55
Continuous Flow Settlement with Chemicals	5,670	5,895	11.570	5,670	3,305	8 980
Quiescent Settlement without Chemicals	3,620	8,365	11,990	3,620	3,830	7-450
Continuous Flow Se lement Chemicals	2,820	10,160	12,980	2 820	4 800	7,625
Septic Tanks	3,145	10,160	13.305	3,185	4,800	7,945

It now becomes apparent in accordance with the Commissioners estimate that the cheapest method in the above systems when up keep is concerned is that of continuous flow settlement without chemicals followed by percolating filter treatment. The difference between percolating filters and contact beds preceded by continuous flow settlement amounts to an annual sum of $5,355 in favor of the former per each 1,000,000 gallons of sewage treated per day. Taking it that 1,000,000 gallons of sewage represents a population of 10,000 people, viz., allowing 100 gallons per head per day, the annual cost of continuous flow settlement with percolating filters would amount to 75 cents per head per annum.

It must be noted that these estimates are only of comparative value as far as Canada is concerned, as they are figured out on the basis of the price of labor and material in Great Britain. They are, however, slightly higher than the estimates in the Report as £1 has been taken at a value of $5 and not at $4.83 for the purposes of this review.

Relative Efficiency of Contact Beds and Percolating Filters.

Par. 178.—The Commissioners adopt a unit standard of purification by which effluents from various filters may be compared as to their degree of purity, thus: "to express the number of units of purification effected by a filter, we have deducted the number of parts by weight of oxygen taken up by 100,000 parts of the effluent from the filter, from the number of parts by weight of oxygen taken up by 100,000 parts of the liquor going onto the filter. The figure so obtained has been multiplied by the number of gallons of liquor, per cube yard, passing through the filter in 24 hours. The Commissioners then proceed to give the results of a large number of experiments testing the relative efficiency of the two systems of filtration. The results are tabulated in par. 189, thus:—

	Units of Purification per cube yard.
Crude or partially settled sewage treated on double contact beds	3,000—4,000
Crude or partially settled sewage treated on percolating beds	2,500—3,500
Well settled sewage treated on percolating filters.	7,000—11,000
Septic tank liquor treated on single contact beds.	3,000—4,500
Septic tank liquor treated on double contact beds.	3,500—4,500
Septic tank liquor treated on percolaing filters.	7,000—11,000