Prospecting for gas has been much more encouraging. The boring at the mouth of Pelican River, although disappointing so far as oil is concerned, proved the presence of a great reservoir of gas in the Dakota sandstones, and heavy flows were struck at 820 and 837 feet. In southern Alberta, also, gas is found in paying quantities. A good field exists at Medicine Hat, and flows have been obtained at several different points west of that city. At Bow Island a flow of several million feet is obtained.

Thus, while the presence of oil in commercial quantities remains to be proved, boring operations have demonstrated beyond a doubt the existence of large reservoirs of natural gas, and it seems probable that further exploratory work throughout the wide area underlain by the Cretaceous rocks should lead to the discovery of other reservoirs.

It is believed that the Devonian limestone is the source of the gas and petroleum products of northern Alberta, while the porous Dakota sandstone forms the reservoir into which they have risen and in which they have been retained by the overlying shales. The Dakota sandstone is the productive formation at the mouth of Pelican River, and it is also believed to be the gas-bearing formation at Bow Island in southern Alberta. As the Devonian limestone and Dakota sandstone are of wide distribution and probably underlie the western part of Manitoba and a great part of Saskatchewan and Alberta the prospects for the discovery of other gas fields seem favorable. On account of the great thickness of sediments overlying these formations, the driller, however, must be prepared to go to a considerable depth.

INCREASE OF "RUN" IN MECHANICAL FILTERS.

IN a paper presented to the American Waterworks Association at Minneapolis Mr. Frederick H. Storer, Bacteriologist and chemist to the Louisville Water Company, has dealt with one of the causes of trouble in mechanical filters.

It is shown that though it might reasonably be inferred that the operation of the mechanical filter would be easiest at times when bacteria and suspended matter are present in the raw water in the least amount, many filter superintendents are finding that such is not always the case, and that warm weather and clear water bring troubles peculiarly their own, shortening the filter runs and producing odors in the filters. At such times the unfiltered waters are found to contain very minute forms of life, diatoms and a few algæ, accompanied by considerable amounts of very fine matter of indeterminate form capable of adhering together in flakes. This matter is supposed to be the result of bacterial action on organic substances. Thus, conditions of clear, warm, shallow water, abundant sunlight and sluggish current afford these micro-organisms the most favorable conditions for development, and their numbers increase rapidly at such times, while the sedimentation basins give the required conditions.

An instance is quoted where, during a period of twenty-six days, the number of micro-organisms present in the unfiltered water remained practically constant; yet during this period the length of the filter runs steadily decreased, and this result was considered as being due to the cumulative effects of a constant number of organisms. When, however, copper sulphate was added to the water in the sedimentation basins there was a general increase in the length of the runs. Also later, when the organisms had died from natural causes, a similar increase in the length of the runs was noted. During this time the degree of turbidity of the water had remained unaltered, and it was found that the length of the filter runs followed quite closely the variations in the number of micro-organisms present. The manner in which the clogging occurred is described as differing from that experienced with water of greater turbidity.

It was at first believed that with waters of very low turbidity, owing to the fact that the size and consistency of the film formed on the filter surface was reduced, the very fine suspended matter was able to penetrate into the sand in a manner which was not the case with water of greater turbidity, and in the absence of any considerable number of organisms the shortening of the filter runs was first attributed to fine turbidity alone. It was, however, found, on microscopic examination, that the sand generally showed the presence of numerous diatoms and other organisms apparently cemented together in a matrix of amorphous matter and fine turbidity, and the author is of opinion that the living organisms accelerate the formation and retention of this gelatinous film upon the sand grains. Practically, the surface of the sand under these conditions became abnormally hard and compact in a short time, and when broken up the sand grains showed a slight tendency to stick together, and this condition could not be wholly corrected even by thorough washing.

Under these conditions it was considered that some method of treatment should be adopted to prevent the clogging, and three methods were tried, though it seems that only one of these—the successful method—received any great degree of care, owing to the difficulties of application under the particular circumstances. The killing of the micro-organisms by chemicals was attempted, but owing to lack of equipment for applying it accurately as a continuously fed solution, hypochlorite was applied to one of the filter beds in the form of powder. This was done by draining off the filter till about 3 in. of water remained on it, and scattering the powder over the surface and allowing the bed to stand thus for twenty-four hours. The result did not prove to be useful, and the bacterial efficiency of the bed was, moreover, impaired. Copper sulphate was then applied in the second sedimentation basin, and in the coagulant basin, and favorable results were at once obtained. The method adopted was that of dragging bags of the copper sulphate through the water. The third method was that of using the river water without preliminary sedimentation, the water being run direct to the coagulant basins. This was done on two occasions, and in both cases encouraging results were obtained, although in each case an increase in turbidity followed within a few days, and thus left no opportunity to see how long the improvement would have lasted.

The summary at the end of the paper states that the water of the Ohio River, when of a turbidity below 30 parts per 1,000,000, almost invariably causes decreases in the lengths of the filter runs. If such turbidities are accomplished by micro-organism and much amorphous matter, still greater decreases follow. Filter runs may be greatly increased by the judicious use of copper sulphate, although aftergrowths of bacteria sometimes follow its application, and must be guarded against. Small doses of hypochlorite of lime do not affect these micro-organisms in such a way as to increase the length of the filter runs. The determination of the time of filtration of samples of water through small laboratory filters will in some instances enable the operator to select the water from that point of his system which will give the longest filter runs.