



**SPECIAL  
WATER AND SEWAGE  
INVESTIGATIONS**

WATER - - ●  
SEWAGE - - ○

DOCT. 1, 1907, TO OCT. 1, 1913

## SANITARY SURVEY OF INDIANA RIVERS.

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In August, 1908, the investigation by the Indiana State Board of Health of the southern end of Lake Michigan bordering Indiana revealed a serious condition. It was found that the Lake water was "grossly polluted and unfit for use as a source of water supply for drinking and domestic purposes." The zone of pollution extended for five miles from shore. Although Indiana Harbor, East Chicago, Whiting and a portion of Hammond contributed domestic sewages directly to the Lake, it was found that this apparently had little influence on the character of the Lake waters. The main source of pollution was found to be the Calumet River with its great volume of sewage and manufacturing wastes. The portion of the lake investigated is readily seen on the accompanying map.

The deplorable situation called for a more thorough survey of the condition, and to this end preparations and plans were made for an investigation of the Calumet River, to determine the "exact condition of the river, the amount and kind of pollution entering it from the Indiana cities, how it was disposed of, and if possible, through its report to lend assistance for the final solution of the problem which faces the Indiana cities and also a part of Chicago."

About twenty-five miles of the Grand Calumet River was surveyed in the summer of 1910. It has a varying width of from twenty-five to three hundred feet and an average depth of six to eight feet until it reaches Lake Calumet, from which point it averages twenty-five feet. It receives most of the sewage and trade wastes from the four cities along its banks, together with a portion of that of Chicago. Many large manufacturing concerns contributed a large part of the most offensive refuse.

Forty-three sampling points were established in the East Chicago canal, the Grand Calumet River, The Little Calumet River and Lake Michigan. Samples for the putrescibility reaction, oxygen consumed and dissolved, were collected at all the sampling points and sewer outlets over

a period extending from June 29th to August 1st. In addition to this, bacterial analyses were made on river samples during that period. The portion of the river investigated is shown on the map of Indiana.

The results of this work were summarized as follows: "It appears that the Calumet River is, for a part of its course, a septic tank, in which the sewage entering it travels but a short distance from its point of entrance before undergoing putrefaction." As the conditions were serious, involving the health of the people of several cities and extending over a large territory, it was thought that the problem could be more advantageously dealt with by the formation of a sanitary district to study the conditions and reach a final solution, and it was so recommended.

At the same time these conditions along the lake were being investigated, the states bordering the Ohio River were much concerned with the condition of the river and a preliminary survey had been made of that portion of it bordering Ohio by the Ohio State Board of Health. Indiana was next in line in doing similar work along its borders, and in the summer of 1911 that portion of the river lying between Cincinnati, Ohio, and the mouth of the Wabash River, a distance of 357 miles, was surveyed. A houseboat was equipped for the survey in which living and working quarters were provided, and it was found to be admirably adapted to the work.

The total drainage basin to the Ohio-Indiana line is 80,947 square miles, and the population located on this area was about 8,000,000. Four hundred and fourteen samples were collected for chemical and bacterial analysis, 333 of which were river samples.

With the exception of three or four points in the river, and these at or near the entrance, the analysis did not show a serious condition to exist, one which at the stage of water encountered would create a nuisance. At no point along the river was the raw water found to be fit for drinking purposes, however.

One noticeable feature that should be mentioned is the high typhoid death rate in the cities using raw river water, and the decrease in the rate after the introduction of filter plants where this step had been taken. At Cincinnati for three years before filtered water was used the average rate was 64.0 per 100,000 and the average rate for the three years following the introduction of filtered water was 12.6.

As an Indiana problem alone, future investigations could be limited

to Cincinnati, Louisville or Evansville, and as the former are much the larger, contributing therefore a much larger amount of sewage and wastes, active steps toward an abatement of the problem at these two places will have to be taken before Indiana is affected. The question of the disposal of manufacturing wastes is a comparatively easy one for Indiana manufacturers. It is an individual problem for each concern to solve, but there are very few where a treatment of the waste would be required, and then only after the problem has been taken up at all points along the river.

In the report made in 1911 it was said that the problem was not one for the individual states, but that it would have to be controlled by the Federal Government, and preparations are now being made by the Government for a thorough survey of the entire river.

Continuing the policy of surveying our rivers, and therefore our natural water supplies, a survey of the Wabash River was made in the summer of 1912. From the experience gained the previous summer, a two-roomed houseboat was built, one room to be used for the laboratory work and the second for living quarters. The work covered the river from Bluffton near its source to the mouth, a distance of 450 miles. Because of the shallowness of the river at the upper end, this portion was covered in a rowboat, and samples shipped to Lafayette to the houseboat laboratory. From this point down, the houseboat was used. Eight hundred and twenty-three samples were collected for a chemical and bacterial analysis, 696 of them from the river.

At no point was the river seriously polluted; i. e., a nuisance did not exist. At a few places, however, as at Wabash, where a large strawboard plant is located; at Lafayette, where there is another one; at Terre Haute, with many manufacturing concerns, and at Vincennes, with its strawboard works and distilleries, considerable pollution was found. As this condition was always below the cities and they were not bothered, and the natural purification of the river remedied this condition before the cities and towns below were reached, no complaints were heard. The population on the watershed is not large in comparison with its size, and the flow is sufficient to care for the sewage and wastes by dilution.

Although from a physical standpoint the river was found to be in good condition, the analyses showed that it was unfit in its raw state for drinking and domestic purposes, and that it would be necessary to filter

the water to make it potable. The great burden imposed upon a filtration plant by the use of the river for the disposal of sewage and manufacturing wastes in constantly increasing quantities, should be lessened as much as possible. Some degree of purification of all manufacturing wastes and domestic sewage should be required. Partial purification, such as screening or the passing the sewage and wastes through Imhoff tanks, will give a satisfactory effluent for some time to come. Some such treatment should therefore be required of all cities and towns and manufacturing concerns, and it was so recommended.

Last summer similar work was done on White River from Winchester, near the source, to the mouth, a distance of about 388 miles being covered. From Winchester to Muncie the trip was made on foot; from Muncie to Indianapolis a rowboat was used; between Indianapolis and Martinsville, information and samples were collected in an auto, and from Martinsville down, the houseboat which had been used on the Wabash River was again put in service. It had been brought up to this point during the early spring.

Navigation was more difficult than had been previously experienced, and many obstructions in the way of snags and sand bars were met. Altogether 779 samples were collected, 334 of them from the river. The river for about 100 miles below Indianapolis was found to be in a serious condition, due to the great amount of sewage and manufacturing wastes introduced into the river at Indianapolis. The flow of the river during dry seasons is entirely too small to care for this great amount of sewage, and the only remedy for the situation is the treatment of this refuse, which has already been begun in an experimental way. When Indianapolis has relieved its portion of the pollution, other cities will have to do likewise, and in this way, the condition of the river will gradually be restored to as near its original state as possible.

Altogether, a total distance of 1,195 miles were covered in the survey of the last three rivers, and over 2,000 samples were analyzed, 1,363 of them river samples. The work done has revealed serious conditions on two of the rivers, the Calumet and White, steps for the improvement of which have already been taken. In the case of the other two, steps for the restoration of the water to its former condition should be taken, and future pollution prohibited. The accompanying map shows the extent of the work done on Indiana rivers.

These surveys have shown the need of more legislative power, to be vested in a central authority, naturally the State Board of Health, whereby the rivers, our natural water resources, can be saved for future generations. At the present time control of streams is given where they are used for water supplies, but no steps can be taken by the Board of Health unless petitioned by the health officer or citizens of the locality affected. The time is coming, and the sooner such control is given the easier will be the solution of the problem. The data collected will be invaluable in the future for comparative purposes, when the people become awakened to the seriousness of stream pollution.

