IN THE

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1927.

State of Wisconsin, State of Minnesota, State of Ohio, and State of Pennsylvania, Complainants,

vs.

State of Illinois and Sanitary District of Chicago, Defendants.

State of Missouri, State of Kentucky, State of Tennessee, State of Louisiana, State of Mississippi, and State of Arkansas, Intervening Defendants.

No. 7, Original.

State of Michigan, Complainant,

vs.

State of Illinois and Sanitary District of Chicago, Defendants.

No. 11, Original.

State of New York, Complainant,

vs.

State of Illinois and Sanitary District of Chicago, Defendants.

No. 12, Original.

REPORT OF THE SPECIAL MASTER.

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REPORT OF THE SPECIAL MASTER.

To the Supreme Court of the United States:

In the cause entitled, *State of Wisconsin, et al.*, v. *State of Illinois and Sanitary District of Chicago, State of Missouri, et al.*, intervening defendants, being No. 7, Original,

October Term, 1927, this Honorable Court appointed me as Special Master, by its order dated June 7, 1926, as follows:

> "It is ordered that this cause be referred to Charles Evans Hughes, Esquire, as the special master with directions and authority to take the evidence and to report the same to the Court with his findings of fact, conclusions of law, and recommendations for a decree—all subject to examination, consideration, approval, modification, or other disposal by the court. The special master shall have authority (1) to employ competent stenographic and clerical assistants, (2) to fix the times and places of taking the evidence, and (3) to issue subpoenas to secure the attendance of witnesses and to administer oaths. When the special master's report of his findings of fact, conclusions of law, and recommendations for a decree is completed the clerk of the court shall cause the same to be printed; and when the same is presented to the court in printed form the parties will be accorded a reasonable time, to be fixed by the court, within which to present exceptions. The special master shall be allowed his actual expenses and a reasonable compensation for his services to be fixed hereafter by the court. The allowances to him, the compensation paid to his stenographic and clerical assistants, and the cost of printing his report shall be charged against and be borne by the parties in such proportions as the court hereafter may direct. If the parties to the related suit of State of Michigan *v.* State of Illinois and Sanitary District of Chicago, now pending in this court, so elect and so notify the special master they shall be permitted to participate in the taking of evidence and in the hearing before the special master in like manner and with like effect as if that suit had been consolidated with this cause by the court's order; and the court specially reserves to itself authority to order such a consolidation if it becomes proper to do so. If the appointment herein made of a special master is not accepted, or if the place becomes vacant during the recess of the

court, the Chief Justice shall have authority to make a new designation, which shall have the same effect as if originally made by the court herein."

By order of November 23, 1926, the Court directed that the parties to the suit of the *State of New York* v. *State of Illinois and Sanitary District of Chicago* be permitted to participate in the taking of evidence in the hearing befor the Special Master in like manner as if the suit of the State of Wisconsin and that of the State of New York had been consolidated.

All the parties, complainants and defendants, in the above-entitled suits appeared before me, as Special Master, by their respective counsel, at public hearings in the city of Washington, District of Columbia, at various times between November 8, 1926, and June 3, 1927, and have presented their evidence, and have been heard in argument, with respect to the findings of fact, conclusions of law, and recommendations for a decree, which they have requested, respectively.

Now, pursuant to the above-mentioned orders, I have reported the testimony and the exhibits, received by me as Special Master, by filing the same in the office of the Clerk of this Court with my certificate; and I herewith submit to the Court my findings of fact, conclusions of law and recommendations.

Respectfully submitted,

CHARLES E. HUGHES
Special Master.

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State of Wisconsin, State of Minnesota, State of Ohio, and State of Pennsylvania, Complainants, *vs.* State of Illinois and Sanitary District of Chicago, Defendants. State of Missouri, State of Kentucky, State of Tennessee, State of Louisiana, State of Mississippi, and State of Arkansas, Intervening Defendants.	No. 7, Original.
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REPORT OF THE SPECIAL MASTER.

The Pleadings.

The original bill was filed by the State of Wisconsin on July 14, 1922. The bill sought an injunction against the diversion of water from Lake Michigan through the Sanitary and Ship Canal, which extends from the Chicago River

to the Des Plaines River. At the time the suit was brought there was pending in this Court an appeal by the Sanitary District of Chicago from a decree in a suit brought by the United States enjoining the Sanitary District from diverting water from Lake Michigan in excess of 250,000 cubic feet per minute, or 4167 cubic feet per second, the amount then allowed by a permit of the Secretary of War. In January, 1925, this Court affirmed that decree, without prejudice, however, to any permit that might be issued by the Secretary of War according to law. On March 3, 1925, the Secretary of War gave a permit allowing a diversion not to exceed an annual average of 8,500 cubic feet per second, the instantaneous maximum not to exceed 11,000 cubic feet per second, upon certain conditions.

On October 5, 1925, by leave of Court, the State of Wisconsin filed an amended bill, and the States of Minnesota, Ohio and Pennsylvania became co-complainants. The amended bill, like the original, alleged that the diversion at Chicago had caused a lowering of the level of Lakes Michigan, Huron, Erie and Ontario, and of the waterways connecting these lakes, and of the St. Lawrence River above tide-water, not less than six inches below the level that would otherwise exist, to the serious injury of the complainants. It was alleged that the defendant, Sanitary District of Chicago, had not complied with the conditions of the permit of March 3, 1925; that the acts of the defendants in the diversion of water from Lake Michigan had never been authorized by Congress and were in violation of the legal rights of the complainant States, and of their people, to the free and unobstructed use of Lake Michigan, and the ports and harbors thereof within the borders of said States, for the purposes of navigation, trade and commerce, free from any interference with the navigable capacity of such waters, by any agency other than the complainant States, or the United States Government, and their rights to the free and unobstructed navigation of Lakes Michigan, Huron, Erie and Ontario, and the navigable waters between these lakes and from them into the Mississippi River and

the Atlantic Ocean, both under the common law and under the express guaranty in the Ordinance of June 13, 1787, for the government of the Northwest Territory; and also that the acts of the defendants were in violation of the provisions of the Act of Congress of March 3, 1899, and particularly of Section 10 of that act.

The amended bill seeks an injunction restraining the defendants from causing any water to be taken from Lake Michigan, in such manner as permanently to divert the same from the lake. There is a further prayer that, if the Sanitary and Ship Canal shall be used as a navigable waterway of the United States and be subject to the same control on the part of the United States as other navigable waterways, the defendants shall be restrained against permanently diverting any water from Lake Michigan in excess of the amount which the Court shall determine to be reasonably required for navigation in and through said canal and the connecting waters to the Illinois and Mississippi Rivers, without injury to the navigable capacity of the Great Lakes and their connecting waters. It is also prayed that the defendants be restrained from dumping or draining into the Sanitary District canal any sewage or waste in such quantity and manner as excessively to pollute and render the canal, the Chicago, Des Plaines and Illinois Rivers, unsanitary and injurious to the people of the complainant States navigating said waterways.

To the amended bill the State of Illinois filed a demurrer and the Sanitary District of Chicago filed its answer, which included a motion to dismiss. The States of Missouri, Kentucky, Tennessee and Louisiana, by leave of Court, became intervening co-defendants and moved to dismiss the bill. The demurrer was overruled and the motions to dismiss were denied, without prejudice, on March 22, 1926; and thereupon the intervening defendants and the defendant the State of Illinois filed their respective answers. The States of Mississippi and Arkansas were permitted to intervene as defendants, and adopted the answers filed by the other intervening defendants.

The answer of the defendant Sanitary District of Chicago denied the injuries alleged, set forth the nature of the site, the history of the canal and of the diversion of water from Lake Michigan, and its purposes, and averred authority for the diversion under acts of the legislature of Illinois, and under acts of Congress and permits of the Secretary of War authorized by Congress in the regulation of interstate commerce. The answer alleged full compliance with the conditions of the permit of the Secretary of War of March 3, 1925. It also set up the defense of laches, acquiescence and estoppel, it being alleged that the fact that the canal was to be, and was being, constructed, its purposes and the diversion of water from Lake Michigan, were known to the people and the officials of the complainant States, and that no protest or complaint had been made in their behalf, prior to the filing of the original bill of complaint.

It was alleged in the answer of the defendant Sanitary District of Chicago that the lowering of the mean lake levels of Lakes Michigan, Huron, Erie and Ontario and the connecting waterways, due to the Chicago diversion as authorized by the permit of March 3, 1925, did not, and would not, exceed four and three-quarters inches. The answer of the intervening defendants was substantially to the same effect. The answer of the State of Illinois adopted the answer of the defendant Sanitary District of Chicago, and the answers of the other defendants, except that part which averred that the lowering of the mean level of the Lakes and connecting waterways, by reason of the diversion, did not exceed four and three-quarters inches, and denied that the mean level of these waters had been lowered to any extent greater than that which would exist in the absence of such diversion. While presenting similar defenses to those of the Sanitary District of Chicago, the answer of the intervening defendants stressed the point that the diversion of water from Lake Michigan improved the navigation of the Mississippi River, and was an aid to the commerce of the Mississippi Valley.

The State of Michigan, on March 8, 1926, filed its bill in this Court against the State of Illinois and the Sanitary District of Chicago, for the same relief; and the defendants filed their answers on June 1, 1926.

On October 22, 1926, the State of New York filed its bill in this Court against the State of Illinois and the Sanitary District of Chicago, for the same relief; and on April 18, 1927, it was ordered that the answer filed by the defendants in the suit brought by the State of Michigan should be accepted and treated as their answer to the bill of complaint, other than the third paragraph thereof; and subsequently, on May 31, 1927, this paragraph was stricken out, without prejudice.

Findings of Fact.

The facts deemed to be established by the evidence, and which may be considered material to the contentions of the parties in relation to the site and the history of the canal, the extent and effect of the diversion, the action of the State and Federal Governments, the plans for the disposal of the sewage and waste of Chicago and the other territory within the Sanitary District, and the character and feasibility of works to compensate for the lowering of lake levels, or to regulate such levels, are as follows:

1. *The site.*—The city of Chicago lies on a low prairie, between Lake Michigan and the Des Plaines River. The continental divide, separating the drainage basins of the Great Lakes-St. Lawrence system and the Mississippi River system, passes about ten miles to the west of the southwestern end of Lake Michigan and, in a state of nature, was from ten to eleven feet above the level of that lake. Between the divide and the lake lay the basin of the Chicago River, with its two branches, both near the shore of the lake, the North Branch, which flows in a southerly direction, and the South Branch, flowing northerly. About one mile from the lake, these branches unite to form the main channel of the river. It has been shown to be the opinion of competent students that, in a remote past, an earlier Lake Michigan, with a higher level, had an outlet through a river filling the lower portion of the Des Plaines valley. But I find no reason to doubt, after consideration of the testimony and early maps and narratives, that during the time of which we have records of discovery, exploration and settlement of this continent, and prior to the artificial changes about to be described, there was the continental divide above mentioned, and that in a state of nature, as known within historic time, the Chicago River and the waters of its drainage basin, flowed into Lake Michigan.

The Little and Grand Calumet Rivers rise in the State of Indiana, and flow in a westerly direction, across the boundary line between the States of Indiana and Illinois.

After entering the State of Illinois, these rivers curve to the north and east, and in a state of nature, as known within historic time, the waters of the Little and Grand Calumet Rivers, and of their drainage basins, flowed into Lake Michigan.

On the other side of the divide is the Des Plaines River, which rises in southern Wisconsin and flows in a southerly direction, parallel to the lake shore, until it reaches a point about due west of the mouth of the Chicago River, where it turns to the southwest and joins the waters of the Kankakee River to form the Illinois River, which flows into the Mississippi.

Between the Des Plaines River and the South Branch of the Chicago River there was a swampy tract, known as Mud Lake, through which, in times of freshet, the waters of the Des Plaines poured over the divide into the Chicago River basin. The early explorers were able at such times to navigate canoes and bateaux across the divide, and even in dry weather there was only a short portage. This naturally became a principal route between Lake Michigan and the Mississippi River for exploration, colonization and trade. The feasibility of a canal to afford a continuous connection between Lake Michigan and the Illinois River was early pointed out, and the importance of such a waterway, for both military and commercial purposes, was emphasized.

2. *The Illinois and Michigan Canal.*—By Act of March 30, 1822 (3 Stat., 659), Congress authorized Illinois to survey and mark, through the public lands of the United States, the route of a canal connecting the Illinois River with Lake Michigan. The Act provided for a perpetual reservation of 90 feet on either side for the use of the canal. This Act was modified by the Act of March 2, 1827, (4 Stat. 234), by which Congress made a further grant to aid the construction of the canal. It was completed in 1848. The State Act (January 9, 1836, Illinois Laws, 1834-37, p. 118) provided for a canal not less than 45 feet in width at the surface, 30 feet at the base, of a depth to insure navigation of

at least four feet, to be supplied with water from Lake Michigan, and such other sources as the canal commissioners should think proper. This canal crossed the continental divide between the Chicago and Des Plaines Rivers, on a summit level eight feet above the lake, and then paralleled the Des Plaines and the Upper Illinois Rivers to La Salle, Illinois, where it entered the latter stream. The summit of the canal was supplied with water by pumps located in a plant on the Chicago River. Originally, only enough water was pumped to answer the needs of navigation. In 1861 (Illinois Laws, 1861, p. 277), the legislature of Illinois provided for surveys and estimates to disclose the comparative costs and benefits of different methods proposed for improving the navigation of the Illinois River, by dredging or excavation of the channel and wing dams, or by supplying water from Lake Michigan, through the enlargement of the Illinois and Michigan Canal or otherwise, or by opening a channel from Lake Michigan, by way of the South Branch of the Chicago River and Mud Lake, to the Des Plaines River, and down said canal to a point that would secure an ample supply of water, sufficient for the navigation of the Illinois River at all times when not obstructed by ice.

The Chicago River, in its natural state, was a sluggish stream, especially in its lower reaches. Receiving the sewage of a rapidly growing city, together with the waste of industrial plants, it became very offensive. In 1865 (Illinois Laws, 1865, p. 83), upon the representation of the city that, in order to purify the river by drawing a sufficient quantity of water from Lake Michigan, and through the summit division of the canal, the city would advance sufficient funds to cut down the summit level so as to provide a gravity flow from the lake, the legislature of Illinois authorized this plan of construction, known as the "deep cut plan", which had been the original plan but had been abandoned for lack of funds. In the same year, for the immediate relief of the city, an arrangement was made by the municipal authorities by which the

canal commissioners agreed to pump water from the river in excess of the needs of navigation. This pumping was done chiefly in the summer and early fall and the usual rate was 200 cubic feet per second, or a little less.

By 1872, the summit level of the canal had been lowered, and it was hoped that this would result in the establishment of a permanent flow of lake water through the South Branch of the Chicago River, sufficient to keep it in good condition. This result was not achieved. The volume discharged down the canal was less than had been expected, while, under certain conditions of wind, rainfall and lake level, the flow toward the lake was re-established. In 1879, there was a lakeward current for thirty days, and no perceptible current either way for ten days. The mean flow was less than 300 c. f. s.[1] The canal was grossly polluted.

In 1881, the legislature of Illinois (Illinois Laws, 1881, p. 159) passed a resolution reciting the inadequacy of the deepening of the canal, the pollution of the Des Plaines and Illinois Rivers, the consequent injury to fish life, and the spread of disease germs through the river valleys, and authorizing the installation of pumps at Bridgeport, the northern terminus of the canal, with a capacity of not less than 1,000 c. f. s., to draw water from Lake Michigan through the Chicago River and the canal. Pumps were installed by the city of Chicago accordingly, and pumping was begun in 1883. For a few years, this afforded sufficient dilution in the canal. But at that time, Lake Michigan stood at a high stage, and the pumps had sufficient capacity to provide 1,000 c. f. s. only under that condition. In 1886, the lake level began to fall, and it continued to fall, until in 1891 it was about two feet lower than when the pumps were installed. Their capacity was thus reduced to a little more than 600 c. f. s. As the city continued to grow, the nuisance along the canal was at times as bad as ever.

3. *The authorization of sanitary districts and of a greater canal between Lake Michigan and the Des Plaines*

[1]For convenience, the abbreviation c. f. s. will be used for cubic feet per second.

River.—(*a*) Between 1880 and 1889, much had been done to create a public sentiment demanding better drainage and water supply. There were investigations, discussions and reports. In 1887, a preliminary report of a commission of engineers consisting of Rudolph Hering, Samuel G. Arlingstall, and Benezette Williams, known as the Drainage and Water Supply Commission, considered three methods of sewage disposal, and recommended as most economical the discharge into the Des Plaines River through a canal across the continental divide, providing a waterway of such dimensions as would furnish ample dilution. Besides the economical advantage of this plan, the commission pointed out that "the proposed canal will, from its necessary dimensions and its regular discharge, produce a magnificent waterway between Chicago and the Mississippi River, suitable for navigation of boats having as much as 2,000 tons burden. It will establish an available water power between Lockport and Marseilles fully twice as large as that of the Mississippi River at Minneapolis, which will be of great commercial value to the State. The Calumet region will be much enhanced in value, by having a direct navigable channel to the Des Plaines River, and by a lowering of the flood heights of Calumet Lake and River."

(*b*) The legislature of Illinois, by Act of May 29, 1889 (Illinois Laws, 1889, p. 125), authorized the creation of sanitary districts to provide for drainage, with power to construct channels, to improve any navigable or other waterways, and for this purpose to condemn property. This Act required (section 20) that any channel constructed which should cause the discharge of sewage outside the district should be of sufficient capacity to produce a continuous flow of water of at least 200 cubic feet per minute for each 1,000 of population. The following provisions of the Act relate explicitly to the canal subsequently constructed and through which the diversion complained of is effected:

> "§ 23. If any channel is constructed under the provisions hereof by means of which any of the waters

of Lake Michigan shall be caused to pass into the Des Plaines or Illinois rivers such channel shall be constructed of sufficient size and capacity to produce and maintain at all times a continuous flow of not less than 300,000 cubic feet of water per minute, and to be of a depth of not less than fourteen feet, and a current not exceeding three miles per hour, and if any portion of any such channel shall be cut through a territory with a rocky stratum where such rocky stratum is above a grade sufficient to produce a depth of water from Lake Michigan of not less than eighteen feet, such portion of said channel shall have double the flowing capacity above provided for, and a width of not less than one hundred and sixty feet at the bottom capable of producing a depth of not less than eighteen feet of water.

"If the population of the district drained into such channel shall at any time exceed 1,500,000, such channel shall be made and kept of such size and in such condition that it will produce and maintain at all times a continuous flow of not less than 20,000 cubic feet of water per minute for each 100,000 of the population of such district, at a current of not more than three miles per hour, and if at any time the general government shall improve the Des Plaines or Illinois rivers, so that the same shall be capable of receiving a flow of 600,000 cubic feet of water per minute, or more, from said channel, and shall provide for the payment of all damages which any extra flow above 300,000 cubic feet of water per minute from such channel may cause to private property so as to save harmless the said district from all liability therefrom, then such sanitary district shall within one year thereafter, enlarge the entire channel leading into said Des Plaines and Illinois rivers from said district to a sufficient size and capacity to produce and maintain a continuous flow throughout the same of not less than 600,000 cubic feet of water per minute with a current of not more than three miles per hour, and such channel shall be constructed upon such grade as to be capable of producing a depth of water not less than eighteen feet throughout

said channel, and shall have a width of not less than one hundred and sixty feet at the bottom.

"In case a channel is constructed in the Des Plaines river as contemplated in this section it shall be carried down the slope between Lockport and Joliet to the pool commonly known as the upper basin, of sufficient width and depth to carry off the water the channel shall bring down from above. The district constructing a channel to carry water from Lake Michigan of any amount authorized by this act may correct, modify and remove obstructions in the Des Plaines and Illinois rivers wherever it shall be necessary so to do to prevent overflow or damage along said river, and shall remove the dams at Henry and Copperas Creek in the Illinois river, before any water shall be turned into the said channel.

"And the Canal Commissioners, if they shall find at any time that an additional supply of water has been added to either of said rivers, by any drainage district or districts, to maintain a depth of not less than six feet from any dam owned by the State to and into the first lock of the Illinois and Michigan Canal at LaSalle, without the aid of any such dam, at low water, then it shall be the duty of said Canal Commissioners to cause such dam or dams to be removed. This act shall not be construed to authorize the injury or destruction of existing waterpower rights.

"§ 24. When such channel shall be completed, and the water turned therein, to the amount of three hundred thousand cubic feet of water per minute, the same is hereby declared a navigable stream, and whenever the general government shall improve the Des Plaines and Illinois rivers, for navigation, to connect with this channel, said general government shall have full control over the same for navigation purposes, but not to interfere with its control for sanitary or drainage purposes."

(*c*) At about the same time, May 28, 1889, the legislature of Illinois passed a joint resolution (Illinois Laws, 1889, p. 376), providing as follows:

"1. That it is the policy of the State of Illinois to procure the construction of a waterway of the greatest practicable depth and usefulness for navigation from Lake Michigan via the Des Plaines and Illinois Rivers to the Mississippi River, and to encourage the construction of feeders thereto of like proportions and usefulness.

"2. That the United States is hereby requested to stop work upon the locks and dams at La Grange and at Campsville, and to apply all funds available and future appropriations to the improvement of the channel from La Salle to the mouth, with a view to such a depth as will be of present utility and in such manner as to develop progressively all the depth practicable, by the aid of a large water supply from Lake Michigan at Chicago.

"3. That the United States is requested to aid in the construction of a channel not less than 160 feet wide and 22 feet deep, with such a grade as to give a velocity of three miles per hour from Lake Michigan at Chicago to Lake Joliet, a pool of the Des Plaines River immediately below Joliet, and to project a channel of similar capacity and not less than 14 feet deep from Lake Joliet to La Salle, all to be designed in such manner as to permit future development to a greater capacity."

(*d*) By Act of June 10, 1895 (Illinois Laws, 1895, p. 168), section 20 of the Act of 1889 was amended, so as to provide that the sanitary district constructing a channel under that act shall, at the time any sewage is introduced therein, turn into said channel "not less than twenty thousand cubic feet of water per minute for every one hundred thousand inhabitants of said district, and shall thereafter maintain the flow of such quantity of water."

4. *The Sanitary District of Chicago.*—The defendant, the Sanitary District of Chicago, was organized under the Illinois Act of 1889. Its organization was completed in 1890. Originally, the district embraced an area of 185

square miles. By later acts this was increased so that the district now comprises approximately 438 square miles, extending from the Illinois State line on the south and east, to the northern boundary of Cook County on the north, with about 34 miles of frontage on Lake Michigan, thus embracing what may be called the metropolitan area of Chicago, consisting of Chicago and its suburbs, a total of 54 cities, towns and villages.

5. *The Sanitary and Ship Canal and its connections.*—(*a*) The Sanitary District of Chicago at once entered on the construction of the principal canal, called the Sanitary and Ship Canal, which extends from the West Fork of the South Branch of the Chicago River, near Robey Street (a point about six miles from Lake Michigan), to the Des Plaines River at Lockport, a distance of about 28 miles. It was dug 13 miles through earth to Willow Springs, 24.4 feet deep, measured from hydraulic grade line established by an assumed flow of 14,000 c. f. s. with the lake at Chicago city datum, and from 250 to 300 feet wide. It was blasted out of solid rock from Willow Springs to Lockport, with a width of 161 feet and a depth of 24.4 feet. Thirteen bridges were built over this main canal, with a clearance of 16½ feet; and they are so built that they may be moved out of the way of passing vessels. Controlling works were built at Lockport,—seven sluice gates, each 30 feet wide, and a movable dam 160 feet long. By the opening of these gates, or the lowering of the dam, the amount of water flowing in the main channel could be regulated at all times.

In connection with the construction of this canal, the Des Plaines River was straightened for many miles above Lockport, and its channel was improved from Lockport down through Joliet, so that it would be capable of taking the combined floods of the Des Plaines River watershed and the Chicago River watershed, or a total of about 25,000 c. f. s.

The actual construction of this main drainage canal was begun in 1892, and it was opened on January 17, 1900.

Since that time, the flow of the Chicago River has been reversed; that is, it has been made to flow away from Lake Michigan.

(*b*) This canal, as originally constructed and opened, ended in a non-navigable tail-race. There was no lock at the southwestern end. By Act of May 14, 1903 (Illinois Laws, 1903, p. 113), the legislature of Illinois extended the corporate limits of the Sanitary District of Chicago, authorized the construction of additional channels, gave the right to use what had been known as the Calumet Feeder of the Illinois and Michigan Canal, and adjacent lands, and also gave the right to construct a channel across the Illinois and Michigan Canal, without any obligation to restore that canal, or the feeder, to its former usefulness. The act also provided that the rules of the United States Government then in force regulating the navigation of the Chicago River should govern navigation in the channels of the Sanitary District and that the speed of all vessels while passing through the earth sections should not exceed eight miles per hour. The Sanitary District of Chicago was also authorized to construct dams, water wheels, and all such other works, north of the upper basin of the Illinois and Michigan Canal, as might be appropriate to develop and render available the power arising from the water passing through its main channel and any auxiliary channels then or thereafter constructed by the District.

Pursuant to this statute, the main channel was extended from the basin at the controlling works at Lockport, to the proposed site of the power-house, some 11,000 feet. This work, including the construction of the power-house, the installation of the machinery and the completion of the transmission lines and the tail-race, was finished in 1907.

In 1908, the Constitution of Illinois was amended, so as to authorize the legislature to provide for the construction of a deep waterway or canal, from the water-power plant of the Sanitary District of Chicago, at or near Lockport, to a

point on the Illinois River at or near Utica, and for the installation and maintenance of power plants, locks, bridges, dams and appliances sufficient for the development and utilization of the water-power of such waterway, it also being provided that all power so developed might be leased, in part or whole, as the legislature might authorize, the rental to be subject to a re-valuation every ten years and the income to be paid into the State treasury.

From the power-house the channel was extended to the upper basin at Joliet, about 11,000 feet, to provide for carrying away the outfall from the power-house and discharging it into the Des Plaines River. When the lock at the power-house was completed in 1910, through navigation to the Illinois River, by way of the drainage canal to Joliet, and by the Illinois and Michigan Canal to La Salle, was provided.

(*c*) The sewer system of Chicago, built and extended from time to time from 1856, is a combined system, carrying both storm water and sewage. It originally drained principally into the Chicago River and its branches. A considerable portion of the city sewers were emptied at different places directly into Lake Michigan. To obviate this separate intercepting sewer systems were constructed and by 1910 were fully installed. On the south side, the interceptors converged at 39th Street and the lake, intercepting the sewers discharging directly into the lake. At the point of convergence, a pumping station was constructed, together with a conduit from the lake to the South Fork of the South Branch of the Chicago River, from which the sewage, flushed with water from the lake, finds its way into the drainage canal. The North Side intercepting sewer system, serving a similar purpose, led to a pumping station at Lawrence Avenue and the lake, where the sewage, with water from the lake, was turned into the North Branch of the Chicago River, and thence into the main drainage canal. The intercepting sewers and pumping stations and conduit for the North and South Side systems were built

by the city of Chicago, and thereafter were turned over to the Sanitary District, and have since been operated by it.

(*d*) What is known as the North Shore channel, about eight miles long, with a depth of 13½ feet, a bottom width of 26 to 30 feet, and a surface width of about 80 feet, was constructed between 1907 and 1910, and was put into service in 1911. It starts from Lake Michigan at Wilmette, and connects with the North Branch of the Chicago River at or near Lawrence Avenue in Chicago. Connected with this channel is a sewer system, built between 1913 and 1916, intercepting the sewage of the North Shore towns which formerly dicharged their sewage into Lake Michigan. The Evanston interceptor, which diverts the sewage of Evanston from the lake, was built between 1916 and 1920. The full capacity of the North Shore channel is 1000 c. f. s., and the water is pumped into it from Lake Michigan by a pumping station at its northern terminus. It has a lock by which boats may pass into the lake.

(*e*) The Calumet Sag Channel extends from the Little Calumet River to the main channel, near Sag. It has a depth of about 20 feet, is 60 feet wide in the rock sections, and in the earth sections the width at the bottom is 36 feet and at the surface from 115 to 120 feet. It was begun in 1911, and put into service in 1923. The sewers south of 87th Street, in the city of Chicago, formerly drained into Lake Calumet and the Calumet River. The Calumet intercepting sewer system, with its pumping station and conduits, drains the sewage into the Calumet Sag Channel. The maximum capacity of the channel is 2,000 c. f. s.

(*f*) By the works thus described, all the sewage of the district is diverted from Lake Michigan. The construction cost of these works, as it appears on the books of the Sanitary District of Chicago, to December 31, 1926, amounted to $83,689,636.52, and, with the addition of administration, legal, clerical and incidental expenses, and interest on bonds for construction, to $109,021,613.21.

6. *Quantity of water taken from Lake Michigan.*—The quantities of water withdrawn from Lake Michigan and passed through the drainage canal, consist, (1) of the quantity taken directly from the lake by the Sanitary District through its various channels; and (2) of the amount pumped from the lake by the city of Chicago through its waterworks for the purpose of obtaining its water-supply. The mean annual quantities of water taken from Lake Michigan and passed through the Sanitary District canal, from the opening of the canal on January 17, 1900, to December 31, 1926, that is, the total flow at Lockport, embracing both the water diverted from the lake by the Sanitary District and the amount taken by means of the city of Chicago's intakes and pumping works, have been as follows:

Year	Total Flow at Lockport	Sewage Flow (Chicago Water Works Pumpage)	Water directly abstracted from Lake Michigan by Sanitary District
1900	2990 C.F.S.	449 C.F.S.	2541 C.F.S.
1901	4046 "	531 "	3515 "
1902	4302 "	554 "	3748 "
1903	4971 "	582 "	4389 "
1904	4793 "	618 "	4175 "
1900-04	4220 "	547 "	3673 "
1905	4480 "	636 "	3844 "
1906	4473 "	676 "	3797 "
1907	5116 "	704 "	4412 "
1908	6443 "	726 "	5717 "
1909	6495 "	744 "	5751 "
1905-09	5401 "	697 "	4707 "
1910	6833 "	803 "	6036 "
1911	6896 "	785 "	6111 "
1912	6938 "	853 "	6085 "
1913	7839 "	894 "	6945 "
1914	7815 "	949 "	6866 "
1910-14	7264 "	857 "	6407 "

Year	Total Flow at Lockport	Sewage Flow (Chicago Water Works Pumpage)	Water directly abstracted from Lake Michigan by Sanitary District
1915	7738 C.F.S.	939 C.F.S.	6799 C.S.F.
1916	8200 "	972 "	7228 "
1917	8726 "	993 "	7733 "
1918	8826 "	1018 "	7808 "
1919	8595 "	1106 "	7489 "
1915-19	8417 "	1006 "	7411 "
1920	8346 "	1176 "	7170 "
1921	8355 "	1199 "	7156 "
1922	8858 "	1216 "	7642 "
1923	8348 "	1220 "	7128 "
1924	9465 "	1274 "	8191 "
1920-24	8674 "	1217 "	7457 "
1925	8278 "	1338 "	6940 "
1926	8283 "	1395 "	6888 "

The mean monthly flow is calculated every month by the Sanitary District, and the annual flow as shown in the above table is the mean of the twelve monthly flows. The table also gives the average annual flow for the years 1900 to 1904; 1905 to 1909; 1910 to 1914; 1915 to 1919; and 1920 to 1924.

The above total flow of water through the drainage canal has passed into the Mississippi watershed and has been permanently lost to the Great Lakes-St. Lawrence system.

It has been computed that the mean annual run-off of the portion of the Chicago basin of the Great Lakes-St. Lawrence system which lies within the boundaries of Illinois, is 503 c. f. s., which, under natural conditions, would constitute the mean annual contribution of the territory within the State of Illinois to the water supply of that system. It also appears that the construction of the works above described of the Sanitary District has prevented any portion of the flood waters of the Des Plaines

River from flowing into the Chicago River basin, and thence into Lake Michigan.

7. *Power development.*—(*a*) Since 1907, power has been generated by the Sanitary District at the western terminus of its main channel, the actual output at the power-house being less than the theoretical capacity because of the present inefficiency of the installation. The following table shows the total quantity of electrical power actually generated from 1908 to 1926, that is, the average flow for each year, through the power-house, and the yearly average output of power:

Year	Flow Through Power House C. F. S.	Lockport Power House Output K W H[2]
1908	1640	21,000,000
1909	3399	50,534,040
1908-09	2520	35,767,020
1910	4262	72,861,101
1911	5287	83,663,000
1912	5580	88,908,800
1913	6195	98,208,590
1914	6672	106,764,600
1910-14	5599	90,077,618
1915	7047	109,631,300
1916	7387	112,326,700
1917	7454	119,374,900
1918	7511	120,201,000
1919	8030	126,375,200
1915-19	7486	117,581,820
1920	7910	120,581,400
1921	7657	117,875,300
1922	8178	122,551,800
1923	8031	124,135,700
1924	8938	126,572,600
1920-24	8142	122,343,360
1925	8032	117,747,200
1926	8245	118,196,700

[2]Kilowatt-Hours.

(*b*) The above table of flow does not show the entire flow through the channel; and the following table shows the total flow, the flow through the power-house, and the percentage of the total flow used for power:

Year	Total Flow	Flow Through Power House	Per Cent Used for Power
1908	6643	1640	25.4
1909	6495	3399	52.3
1910	6833	4262	62.5
1911	6896	5287	76.6
1912	6938	5580	80.5
1913	7839	6195	79.0
1914	7815	6672	85.3
1915	7738	7047	91.1
1916	8200	7387	90.0
1917	8726	7454	85.5
1918	8826	7511	85.1
1919	8595	8030	93.5
1920	8346	7910	94.8
1921	8355	7657	91.6
1922	8858	8178	92.2
1923	8348	8031	96.2
1924	9465	8938	94.4
1925	8278	8032	97.1
1926	8283	8045	97.2

(*c*) The power thus generated has been used in the works of the Sanitary District, and also for street and park lighting in the city of Chicago and other municipalities within the Sanitary District. A considerable portion of the power developed has been sold to commercial consumers. Both the commercial and the municipal load on the power plant increased from 1908 to about 1917, when the plant was carrying its limit. From that time, there has been a greater municipal demand; and as the Sanitary District's need for power has increased, the commercial consumers have been dropped. The mean annual power production for the period 1920 to 1924, inclusive, was 122,343,360 kilowatts, or about 18,721 horse-power. It cost

about $26.40 per horse-power to make the power. The Sanitary District has supplied the power at cost to the city of Chicago and other municipalities, and where power has been sold commercially the price has been about $55 per horse-power. It is estimated that when the plants, sewage treatment plants hereinafter described, which are now being built by the Sanitary District, are finished, the Sanitary District will need for these plants and its pumping stations, in 1945, annual power to the amount of about 200,000,000 kilowatt-hours.

Prior to 1925, the Sanitary District regulated the flow through the canal in accordance with the demands for power produced at Lockport. This resulted in a larger flow in the evening and during the night, when the power load was heaviest. In 1918, at the request of the United States Fuel Administrator, and in order to save fuel, an arrangement was made with the Commonwealth Edison Company for an exchange of power; and similar temporary agreements were made in later years. Since 1925, the power plant of the Sanitary District has been connected with the Commonwealth Edison Company, so as to permit a continuous and automatic exchange of power, as required, and to maintain a uniform flow. It does not appear that the mean monthly or mean daily flow at any time during the operation of the drainage canal exceeded the amount required by the State of Illinois, under the Act of 1889, as amended, for dilution purposes, that is, 20,000 cubic feet per minute for each 100,000 of population.

8. *Federal action prior to the permit of March 3, 1925.* (*a*) The attention of Congress had been called to the military and commercial importance of enlarging the Illinois and Michigan Canal, and improving the Illinois River, by President Lincoln. The Act of June 23, 1866 (14 Stat. 74), directed an examination or survey to be made of the Illinois River from its mouth to La Salle, and the Act of March 2, 1867 (14 Stat. 422), directed continuance of this work. Reports under these and later Acts emphasized the value of a

waterway from Lake Michigan to the Gulf of Mexico. By Act of Congress of August 11, 1888 (25 Stat. 419), for the stated purpose of securing a continuous navigable waterway between Lake Michigan and the Mississippi River, having capacity and facilities adequate for the passage of the largest Mississippi River steamboats, and of naval vessels suitable for defense in time of war, the Secretary of War was directed to cause to be made the proper surveys, plans and estimates for a channel improvement and locks and dams in the beds of the Illinois and Des Plaines Rivers, from La Salle to Lockport, so as to provide a navigable waterway not less than 160 feet wide and 14 feet deep, and also for a channel from Lockport to Lake Michigan, at or near Chicago. Pursuant to this provision, a report was made by Captain W. L. Marshall, then United States engineer at Chicago, which appears in the Report of the Chief of Engineers for the year 1889 (pp. 2122 *et seq.*). Annexed to this report was a copy of the act of Illinois of May 29, 1889, authorizing the construction of the Chicago Drainage Canal, and also a copy of the joint resolution of the legislature of Illinois, of May 28, 1889, above mentioned (*supra*, p. 16).

(*b*) In the Rivers and Harbors Act of September 19, 1890 (26 Stat. 454, 455) Congress provided as follows:

> "Sec. 7.—That it shall not be lawful to build any wharf, pier, dolphin, boom, dam, weir, breakwater, bulkhead, jetty, or structure of any kind outside of established harbor-lines, or in any navigable waters of the United States where no harbor-lines are or may be established, without the permission of the Secretary of War, in any port, roadstead, haven, harbor, navigable river, or other waters of the United States, in such manner as shall obstruct or impair navigation, commerce, or anchorage of said waters, and it shall not be lawful hereafter to commence the construction of any bridge, bridge-draw, bridge piers and abutments, causeway or other works over or in any port, road,

roadstead, haven, harbor, navigable river, or navigable waters of the United States, under any act of the legislative assembly of any State, until the location and plan of such bridge or other works shall have been submitted to and approved by the Secretary of War, or to excavate or fill, or in any manner to alter or modify the course, location, condition or capacity of the channel of said navigable water of the United States, unless approved and authorized by the Secretary of War: *Provided,* That this section shall not apply to any bridge, bridge-draw, bridge piers and abutments the construction of which has been heretofore duly authorized by law, or be so construed as to authorize the construction of any bridge, drawbridge, bridge piers and abutments, or other works, under an act of the legislature of any State, over or in any stream, port, roadstead, haven or harbor, or other navigable water not wholly within the limits of such State.

* * * * * *

"Sec. 10. That the creation of any obstruction, not affirmatively authorized by law, to the navigable capacity of any waters, in respect of which the United States has jurisdiction, is hereby prohibited. The continuance of any such obstruction, except bridges, piers, docks and wharves, and similar structures erected for business purposes, whether heretofore or hereafter created, shall constitute an offense and each week's continuance of any such obstruction shall be deemed a separate offense. Every person and every corporation which shall be guilty of creating or continuing any such unlawful obstruction in this act mentioned, or who shall violate the provisions of the last four preceding sections of this act, shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished by a fine not exceeding five thousand dollars, or by imprisonment (in the case of a natural person) not exceeding one year, or by both such punishments, in the discretion of the court. The creating or continuing of any unlawful obstruction in this act mentioned may be

prevented and such obstruction may be caused to be removed by the injunction of any circuit court exercising jurisdiction in any district in which such obstruction may be threatened or may exist; and proper proceedings in equity to this end may be instituted under the direction of the Attorney General of the United States."

(*c*) The annual report of the Chief of Engineers for 1890 (pp. 2419-2452, 2550-2574) included a further report of Captain Marshall, under date of February 28, 1890, upon a survey of a waterway from Lake Michigan to the Illinois River, which referred to the project of the Sanitary District; and to this report there were annexed not only the Illinois act and joint resolution of 1889, above mentioned, but also the report of the Drainage and Water Supply Commission of Chicago of 1887 and the communication of the Mayor to the City Council of Chicago which transmitted that report.

The Sanitary District of Chicago transmitted to the Secretary of War the resolution of its board of trustees of April 21, 1891, for the widening and deepening of the Chicago River, so as to provide a sufficient supply channel for the proposed drainage canal.

The Act of Congress of July 13, 1892 (27 Stat., 93) appropriated $72,000 for completing improvement of the harbor at Chicago, and the engineer in charge was directed to submit a report stating what improvement should be made by the Government in the Chicago River. The Report of the Chief of Engineers for 1892 (pp. 2255-2259) contained a report upon the improvement of the Illinois River and the action of the Sanitary District in constructing its main channel. On August 9, 1893, Captain Marshall made the report required by the Act of 1892, and recommended certain improvements in the Chicago River and its branches, in the course of which he said:

"The insufficient discharge of the pumps into the canal" (referring to the Illinois and Michigan Canal)

"results, in rainless weather, in a very feeble current from the lake toward the pumps at Bridgeport, and in an indescribable state of putridity and offensiveness in the Chicago River, due to domestic sewage and a discharge from manufacturing establishments through the sewers into the river. At ordinary rains, upon freshets in the Des Plaines or Chicago rivers drainage areas, great volumes of putrescent matter are disgorged into the lake through the mouth of the Chicago River, threatening the water supply of the city, which, in the main is taken through tunnels under the bed of the lake from two inlet cribs, situate, one north of and the other south of, and a few miles distant from the mouth of the river. To remedy the, at times, insupportable and disgusting condition of the river and its branches; to purify the river and to preserve the city water, relief is now sought under State laws by constructing a drainage canal from the South Branch of Chicago River to the Des Plaines River above Joliet, capable of discharging into the Illinois River Valley from 300,000 to 600,000 cubic feet of water per minute.

* * * * * *

"This channel has been located from the South Branch of the Chicago River to Lockport, and is under construction, but no provision has yet been made for channels of supply from Lake Michigan. Whatever the outcome or plans of the local officials having this work in charge may be, it can be said that the Chicago River and its branches cannot, in their present condition, supply materially more than from one-third to one-half of the minimum requirements of the law, without producing currents that will be prohibitory to navigation at some of the bridges and obstructions now existing. It is certainly evident, granting the proposition that effective channels for the purpose will be constructed, that if this method of solving the drainage problem is to be carried to conclusion there must be a complete remodeling of Chicago River throughout both its branches, and there must be also artificial channels of large capacity to furnish even approximately ef-

fective outfalls to the sewerage system of a great city founded on low lands extending some 22 miles along, and for miles back from the lake, as well as other large feeders connecting the lake with such channels.

"Without criticizing in any way the local measures taken for local relief, it may be said that the State laws, if effectively executed for the purposes specified, seemingly require changes in the capacity of Chicago River and its branches that may increase, may diminish, or may even entirely destroy their value for commercial purposes. In any case under existing laws, no alteration in the capacity of Chicago River can be made without the consent of the Secretary of War, or without full examination by agencies established by Congress, and the execution of the State laws are therefore limited by superior authority.

* * * * * *

"In the present condition of Chicago River no material widening or deepening of the channel can be effected without great expense. A large proportion of the docks or bulkheads must be reconstructed, and in some cases precautions are necessary to prevent damage to buildings if the water is materially deepened against their foundations.

"There should always be at least 2 feet of water between the bottoms of vessels and the crowns of tunnels to guard against damages to vessels by chance obstructions of small extent lodging temporarily over the rigid crowns. To secure 18 feet available water the three tunnels under the river should be lowered until there will be from 20 to 21 feet of water over their crowns. If the improvement be made on the basis of 18 feet and the use of Chicago River and its branches be conceded by the United States to the State of Illinois as a drainage channel, of the capacity indicated by the State law, the modifications therein must be radical and costly whether the expense thereof be borne by the United States or the City of Chicago.

* * * * * *

"It will soon be necessary for Congress to provide for the extension to Lake Michigan of the navigation

established on the Illinois River below La Salle, and to determine to what extent, if at all, it will utilize for navigation the great channel now being cut by local authorities in the rock divide separating Lake Michigan from the Mississippi Valley. The question is at hand and must be determined at some date not far in the future, whether the national highway will utilize this cut and Chicago River as part of this communication, or the Calumet River route in connection with this local channel, or otherwise. There are no other practicable routes.

* * * * * *

"It seems, therefore, that before making appropriations for the improvement of Chicago River, the question of the future uses of this stream should be settled, whether it shall continue to be as now simply a long slip or succession of private slips, docks and wharves, utilized, indeed, for interstate and foreign commerce, but mainly for private and corporate gain, and for the main sewer of a great urban community, or whether it shall constitute a connecting link under Federal control between the navigation of the Great Lakes and that of the Mississippi River and tributaries.

"This opinion is given as required by the law of July 13, 1892, but for the information of Congress the following is respectfully submitted:

"To reasonably accommodate existing commerce without extensive changes in the Chicago River and without reference to future developments, the following work would be in the interest of commerce and navigation:

"First: That the Chicago River from its mouth to the stock yards on the south branch and to Belmont avenue on the north branch as far as may be permitted by existing docks and wharves be dredged to admit passage by vessels drawing 16 feet of water.

"Second: All encroachments on the stream by docks within the original meandered lines of the streams obstructive to navigation, as it exists today, should be removed at the expense of the encroaching parties, and obstructive bridges be required altered or changed.

"To admit the passage of the largest lake vessels drawing not exceeding 16 feet of water at load draft, with no changes in the dock lines beyond the obstructive abutments of bridges and projecting obstructive angles of docks, will require 1,200,000 cubic yards of dredging, approximately, and 8,000 linear feet of docking, at an expense of about $700,000, first cost, with an annual charge for dredging of from $80,000 to $120,000 to maintain the channel.

"The cost of maintenance, for reasons stated above, should evidently be borne by the city of Chicago as long as sewage is emptied into the river, and the United States should be released from all damages to property by reason of the improvement in Chicago River, as required on the Calumet River.

"Should a discharge of 250,000 cubic feet per minute be required through the south branch and main river, wholesale modification of bridges, tunnels and docks, and a widening of the river at many points will be required, and deepening to at least 18 feet of water below Chicago city datum with a slope necessary for this discharge, will be required at an estimated cost of $6,000,000, primarily, not including consequential damages, and an annual expenditure for maintenance of from $60,000 to $75,000." (House Ex. Doc. 1, Part 2, 53d Cong., 2d Sess., 1893-94, vol. 6, pp. 2796-2801.)

By the Act of August 18, 1894 (28 Stat. 344), Congress appropriated $25,000 for the improvement of the Chicago River up to its forks. On August 16, 1895, a board of three engineers, which had been appointed by the Secretary of War, reported to him concerning the effect of a diversion of 10,000 c. f. s. through the Sanitary and Ship Canal. This report stated that the contemplated diversion would lower the levels of the Great Lakes (except Lake Superior) but the amount of such lowering could be determined only by actual measurements.

By Act of June 3, 1896 (29 Stat. 228), Congress made appropriation for the improvement of the Chicago River, which was to be dredged to admit passage by vessels draw-

ing 16 feet of water, according to the recommendation of Captain Marshall.

(*d*) *Permit of July 3, 1896.*—The first application by the Sanitary District of Chicago for a permit of the Secretary of War to authorize the enlargement of the cross-section of the Chicago River was made on June 16, 1896. In this application it was said that the work of the Sanitary District had progressed so far "that it is now necessary for us to enter upon that which must be done in the Chicago River to make available the artificial channel which we have under construction from Robey St., Chicago to Lockport in Will County, twenty-eight miles distant." A map was submitted, showing the plans for widening and deepening the river at the points indicated. It was desired "to so correct and regularize the cross-section of the river as to secure a flowage capacity of 300,000 cubic feet per minute, with a velocity of one and one-quarter miles per hour."

The Secretary of War granted a permit on July 3, 1896, in a communication to the president of the Sanitary District, as follows:

> "I have the honor to acknowledge the receipt of your letter of 16th ultimo, requesting permission to make certain changes in the capacity of the channel of the Chicago River, for drainage purposes, at points indicated on the map accompanying the application, and in reply beg to say that upon investigation it is found that the permission requested can be granted upon the following conditions:
>
> "1. That while the general plan is approved, the Sanitary District of Chicago, must furnish plans in triplicate on an enlarged scale showing each proposed new bridge, each by-pass, and each new dock or wharf, proposed to be built, in order that the Secretary of War may act intelligently in each case.
>
> "2. That this authority shall not be interpreted as approval of the plans of the Sanitary District of

Chicago to introduce a current into Chicago river. This latter proposition must be hereafter submitted for consideration.

"3. That it will not cover obstructions to navigation, by reason of this work while in progress, or when completed.

"4. That the United States shall not be put to expense by reason of this work.

"5. That this authority will expire by limitation in two years from date unless extended."

Other permits relating to the same subject were issued by the Secretary of War, November 16, 1897, for the construction of by-passes and docks; November 30, 1898, for a cofferdam; January 13, 1899, for a new bridge; May 12, 1899, for a cofferdam.

(*e*) The Act of Congress of June 3, 1896 (29 Stat. 236), had required the Secretary of War to cause a preliminary examination to be made of the upper Illinois River and lower Des Plaines River with a view to the extension of navigation from the Illinois River to Lake Michigan, at or near Chicago. In response, Captain Marshall made a report on January 27, 1897, transmitted to Congress on March 3, 1897 (House Doc. No. 333, 54th Cong., 2d Sess.), referring to the fact that the Sanitary District had nearly completed a canal for drainage purposes, from the Chicago River to Lockport, which could be made available as part of any enlarged waterway over the route in question, and was "of much greater dimensions than required by any commercial canal adapted for the conditions and requirements of present or prospective traffic by water between Lake Michigan and the region along the watercourses of the Mississippi Valley." Reference was also made to the Illinois statute, as to the amount of discharge "which at present requires more than 300,000 cubic feet" (per minute) "and in a few years will require the full 600,000 cubic feet" (per minute) "discharge through the canal." It was noted, as to the situation then existing, that the deep channel

abruptly terminated at Lockport, where it was proposed "to discharge the water through controlling gates into a non-navigable tail-race, down the slope to and through the city of Joliet, into the lower Des Plaines and Illinois Rivers."

By Acts of June 4, 1897, and July 1, 1898, Congress made further appropriations for the improvement of the Chicago River (30 Stat. 47; 632).

The Act of March 3, 1899 (30 Stat. 1146) directed the Secretary of War to appoint a board of three engineers, to make a survey and estimate of cost for the improvement of the upper Illinois River and lower Des Plaines River, with a view to the extension of navigation from the Illinois River to Lake Michigan, at or near Chicago, the estimate to be for a channel seven feet deep, and also for a channel eight feet deep, throughout the proposed route; and the survey and estimates were to be made according to the recommendations of Captain Marshall's report of January 27, 1897.

By the same Act (30 Stat. 1156), Congress directed the Secretary of War to cause a survey and estimate of cost to be made for deepening the Chicago River, as follows:

> "Improving Chicago River, in Illinois: Survey and estimate of cost for a channel twenty-one feet deep from its mouth to the stock yards on the South Branch, and to Belmont avenue, on the North Branch, so far as may be permitted by existing docks and wharves, exclusive of cost of removing or constructing bridges or piers or lowering tunnels; and the aforesaid depth of twenty-one feet is hereby adopted as the project depth for the improvement in lieu of that fixed by the Act of June third, eighteen hundred and ninety-six: *Provided,* That all the work of removing and reconstructing bridges and piers and lowering tunnels necessary to permit a practicable channel with said depth to be obtained shall be done, or caused to be done, by the city of Chicago without expense to the United States."

(*f*) The Act of March 3, 1899, also amplified the provisions of the earlier acts as to obstructions to navigation and alteration of navigable capacity, by enacting sections 9 and 10 (30 Stat. 1151, U. S. C., Tit. 33, Secs. 401, 403), as follows:

"Sec. 9.—That it shall not be lawful to construct or commence the construction of any bridge, dam, dike, or causeway over or in any port, roadstead, haven, harbor, canal, navigable river, or other navigable water of the United States until the consent of Congress to the building of such structures shall have been obtained and until the plans for the same shall have been submitted to and approved by the Chief of Engineers and by the Secretary of War: *Provided,* That such structures may be built under authority of the legislature of a State across rivers and other waterways the navigable portions of which lie wholly within the limits of a single State, provided the location and plans thereof are submitted to and approved by the Chief of Engineers and by the Secretary of War before construction is commenced: *And provided further,* That when plans for any bridge or other structure have been approved by the Chief of Engineers and by the Secretary of War, it shall not be lawful to deviate from such plans either before or after completion of the structure unless the modification of said plans has previously been submitted to and received the approval of the Chief of Engineers and of the Secretary of War.

"Sec. 10.—That the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is hereby prohibited; and it shall not be lawful to build, or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans

recommended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same."

(*g*) *Permit of May 8, 1899.*—In view of the completion of the main drainage canal, the Sanitary District applied to the Secretary of War for permission to divert the waters of the Chicago River and cause them to flow into the canal, and a permit was issued by the Secretary of War on May 8, 1899, as follows:

"Whereas, by section 10 of an act of Congress, approved March 3, 1899, entitled 'An act making appropriations for the construction, repair, and preservation of certain public works on the rivers and harbors, and for other purposes', it is provided that it shall not be lawful to alter or modify the course, location, condition, or capacity of the channel of any navigable water of the United States unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same; and

"Whereas the Sanitary District of Chicago, a municipal corporation organized under the laws of the State of Illinois, has constructed an artificial channel from Robey Street, Chicago, to Lockport, and has heretofore been granted permission by the Secretary of War to make certain improvements in the Chicago River for the purpose of correcting and regulating the cross section of the river so as to secure a flowage capacity of 300,000 cubic feet per minute with a velocity of 1¼ miles an hour, it being intended to connect the said artificial channel with the West Fork of the South

Branch of Chicago River at Robey Street in the city of Chicago; and

"Whereas the said Sanitary District of Chicago has now applied to the Secretary of War for permission to divert the waters of the said Chicago River and cause them to flow into the said artificial channel at Robey Street, as aforesaid; and

"Whereas the said Sanitary District of Chicago represents that such movable dams and sluice gates as are necessary to at all times secure absolute and complete control of the volume and velocity of flow through the Chicago River have been constructed:

"Now, therefore, the Chief of Engineers having consented thereto, this is to certify that the Secretary of War hereby gives permission to the said Sanitary District of Chicago to open the channel constructed and cause the waters of Chicago River to flow into the same, subject to the following conditions:

"1. That it be distinctly understood that it is the intention of the Secretary of War to submit the questions connected with the work of the Sanitary District of Chicago to Congress for consideration and final action, and that this permit shall be subject to such action as may be taken by Congress.

"2. That if, at any time, it become apparent that the current created by such drainage works in the South and main branches of Chicago River be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close said discharge through said channel or to modify it to such extent as may be demanded by navigation and property interests along said Chicago River and its South Branch.

"3. That the Sanitary District of Chicago must assume all responsibility for damage to property and navigation interests by reason of the introduction of a current in Chicago River."

(*h*) *Permits of July 11, 1900.*—In April, 1900, plans were adopted by the board of trustees of the Sanitary District

for the deepening and widening of the channels of the Chicago River; and application for permission to do so with respect to a part of the river was made to the Secretary of War on April 26, 1900. On June 7, 1900, a similar application was made with respect to another part of the river. The Secretary of War on July 11, 1900, granted two permits accordingly, with conditions identical with those of the permit of May 8, 1899. These permits contained this statement:

> "I beg to inform you that there is no objection on the part of the War Department to the prosecution of work of improvement of Chicago River specified in the above-mentioned letter and delineated on the maps which accompanied the same, it being understood that this statement as to the attitude of the War Department shall not be understood as involving the general government in any way with the expense incident to the carrying out of the project, and does not in any way invalidate, waive or affect the right of the Secretary of War to regulate or revoke the permit granted under date of May 8, 1899, to the Sanitary District of Chicago, to divert the waters of the Chicago River and cause them to flow into the artificial channel, such permission being subject to the following conditions" —the conditions of the former permit already quoted.

(*i*) The Board of Engineers appointed under the Act of Congress of March 3, 1899, made a preliminary report on March 17, 1900, and a final report on November 17, 1900 (House Doc. No. 112, 56th Cong., 2nd sess.). This final report, among other things, stated (*id.* p. 3):

> "The Board finds the most economic route for waterways of 7 feet and 8 feet depth to be from Utica to Marseilles in the bed of the river, 11.4 miles; thence around the Marseilles rapids by canal, 7.4 miles; thence in the bed of the river to near the mouth of Kankakee River, 21.2 miles; thence by enlarging the Illinois and Michigan Canal to the Joliet Basin, 18.3 miles; thence

by canal through Joliet Basin and along the east bank of the Des Plaines River, 4½ miles, connecting with the Sanitary Canal at Lockport, and thence through the Sanitary Canal and the Chicago River to Lake Michigan, thus complying with the terms of the act of March 3, 1899."

The Act of June 6, 1900 (31 Stat. 580) had authorized the same Board of Engineers to report the estimates of costs for channels 10 feet, 12 feet, and 14 feet deep, respectively, through the proposed route from Illinois River to Lake Michigan and directed that "the said estimates cover and include a proper connection at Lockport with the sanitary and ship canal which has been constructed by the sanitary district of Chicago." The report of the Board, under date of November 18, 1900, transmitted to Congress December 18, 1900 (House Doc. No. 220, 56th Cong., 2nd sess.), referred (*id.* p. 5) to the drainage canal as of "sufficient depth and width for any possible requirement of navigation", and pointed out that "from the west end of this canal the waters of Lake Michigan, in a steady flow amounting to from 5,000 to 10,000 cubic feet per second, are discharged into the bed of the Des Plaines River, and are carcied thence down through the Illinois to the Mississippi."

(*j*) *Permits of April 9, 1901 and July 23, 1901.*—While the application for the permits of 1900 were under consideration by the Secretary of War, the Lake Carriers' Association requested (May 16, 1900) action by the Secretary of War modifying the amount of discharge through the drainage canal, in order to avoid excessive current in the Chicago River; but the Chief of Engineers advised against the modification. On April 9, 1901, the Secretary of War, heeding the protests of commercial and navigation interests, directed the Sanitary District to regulate the discharge so that the maximum flow through the Chicago River and its South Branch should not exceed 200,000 cubic feet per minute. This was followed, on July 15, 1901, by a re-

quest from the Sanitary District for an increased flow, stating that the result of an observance of the restriction of the order of April 9, 1901, was "that the water in the Main Drainage Channel has become greatly polluted and very offensive both to sight and smell, and is working such hardship upon the valley communities as to evoke frequent protest from various cities and municipalities along the Des Plaines and Illinois Valleys." Thereupon, the Secretary of War made an order, on July 23, 1901, amending the former order so as to permit an increase in the flow into the canal to 300,000 cubic feet per minute between 4 p. m. and 12 midnight daily; it being the opinion of the Chief of Engineers that the request of the Sanitary District should be granted, subject to revocation in case the increase was found to be dangerous to navigation.

(*k*) *Permit of December 5, 1901.*—On a further application by the Sanitary District, the Secretary of War, on December 5, 1901, allowed a diversion of 250,000 cubic feet per minute during the entire day. This permit, omitting the recitals, was as follows:

> "Now, therefore, this is to certify that, in accordance with the recommendation of the Chief of Engineers, the Secretary of War hereby gives unto said Sanitary District of Chicago permission to regulate said discharge so that the maximum flow through the Chicago River shall not exceed 250,000 cubic feet per minute throughout the 24 hours of the day, upon the following conditions:
>
> "1. That this permission shall be in lieu of the present authorized rates of flow as stated above.
>
> "2. That the permission herein given shall be subject to such modification as in the opinion of the Secretary of War the public interests may from time to time require.
>
> "3. That said Sanitary District of Chicago shall be responsible for all the damage inflicted upon navigation interests by reason of the increase in flow herein authorized."

(*l*) On January 17, 1902, the Secretary of War approved plans for the improvement of the Chicago River, reserving full liberty of action as provided in the conditions of the permit of May 8, 1899. By the Act of June 13, 1902 (32 Stat. 363, 364), Congress appropriated about $300,000, for continuing the improvement of the Chicago River, and an additional $200,000 for a survey to determine the feasibility of, and to prepare and report plans and estimates of cost, for a navigable waterway 14 feet in depth, from Lockport, Illinois, by way of the Des Plaines and Illinois Rivers, to the mouth of said Illinois River and thence by way of the Mississippi River to St. Louis.

(*m*) *Permit of January 17, 1903.*—Another permit (subject, like the earlier permits, to modification) was issued by the Secretary of War on January 17, 1903, allowing a diversion of 350,000 cubic feet per minute until March 31, 1903, during the closed season of navigation, in order to carry off the accumulations of sewage deposit lining the shores along the city, with the provision that, after said date, the flow should be reduced to 250,000 cubic feet per minute, as required by the permit of December 5, 1901.

(*n*) Congress, by Joint Resolution of April 21, 1904 (33 Stat. 589), authorized the Secretary of War, with the concurrence of the Chief of Engineers, to permit the Sanitory District, at its expense, to lower the height of the Government dams in the Illinois River at Kampsville and Lagrange, Illinois, in accordance with such plans as he might prescribe and subject to such conditions as he might deem necessary to protect the interests of the United States.

(*o*) The report of the Board of Engineers required by the Act of June 13, 1902 (32 Stat. 364), was transmitted to Congress on December 18, 1905. (House Doc. 263, 59th Cong., 1st sess.) The Board gave the results of its surveys and examinations, with respect to the feasibility and cost of a waterway, as described, from Lockport to Grafton.

With respect to the Chicago drainage canal, the Board said (*id.*, pp. 10, 11):

> "The Chicago Drainage Canal was then constructed, and was brought into use in January, 1900. It has not yet been completed to its full capacity as designed. When fully completed, it will have a capacity of about 10,000 cubic feet per second, flowing at a low velocity. As now constructed, it has a depth of about 22 feet and a bottom width in different parts 110 feet, 160 feet, and 202 feet, respectively. It constitutes a navigable channel, able to accommodate the largest vessels now navigating the Great Lakes. This extends from the Chicago River to Lockport, where it discharges into the Des Plaines River * * * At present, it has no navigable connection with the streams below, but under State legislation a connection is to be made. It creates an important water power. Although the primary object of the Chicago drainage canal was the discharge of Chicago sewage, its function as a channel for navigation was kept in view from the beginning. All of the bridges over it are draw bridges, with ample openings.
> * * * * * *
>
> "The taking of large quantities of water from Lake Michigan for drainage purposes has not been authorized by Congress. It has been the policy of the War Department thus far to regulate the quantity of water which is admitted to the canal by the necessities of navigation in the Chicago River. The capacity of that stream at present is such that not more than about 4,200 cubic feet per second can pass without creating velocities which will unreasonably obstruct navigation. The quantity of water admitted to the canal is, for the present, limited to that amount, or, as expressed in the permit of the Secretary of War, to 250,000 cubic feet per minute. This is less than is required by the State law. It will no doubt be increased as the obstructions in the Chicago River are removed, and its discharging capacity increased, a work upon which the Sanitary District is now engaged. In preparing its estimates

the Board has assumed that the full discharge of 10,000 cubic feet per second contemplated in the plans of the Sanitary District will eventually be permitted by the Secretary of War."

The Board also stated (*id.*, p. 11), that "the effect upon the level of Lake Michigan of withdrawing 10,000 cubic feet per second for an indefinite period has been the subject of elaborate investigation under the office of the Lake Survey at Detroit, and the conclusion reached is that the final effect will be to lower the level about six inches."

(*p*) *Reports of International Waterways Commission and Niagara Falls Act.*—On March 15, 1906, Congress, by Joint Resolution (34 Stat. 824), directed the members representing the United States upon the International Waterways Commission, created pursuant to Act of Congress of June 13, 1902 (32 Stat. 373), to report to Congress what action, in their judgment, was necessary and desirable to prevent the further depletion of water flowing over Niagara Falls. The commission had been formed with three members from the United States and three from Canada. In the report of the United States members, made on March 19, 1906, it was recommended, as a step in the direction of obtaining mutual agreement between the two countries, that legislation be enacted containing, among others, the provision that the Secretary of War be authorized to grant permits for the diversion of 28,500 cubic feet per second, and no more, from the waters naturally tributary to Niagara Falls, distributed as follows:

	Cubic feet
"Niagara Falls Hydraulic Power & Manufacturing Co.	9,500
"Niagara Falls Power Company	8,600
"Erie Canal, or its tenants, (in addition to lock service)	400
"Chicago drainage canal	10,000".

In a report to their Government on April 25, 1906, the Canadian members of this Commission recommended that a treaty should be negotiated between the United States and Great Britain, and with respect to the diversions from the Niagara River, the Commission was of opinion that not more than 36,000 c. f. s. should be allowed on the Canadian side and on the American side to the extent of 18,500 c. f. s., exclusive of the amount required for domestic uses; and it was said that, while this would give an apparent advantage to Canadian interests, it was "more than counterbalanced by the complete diversion of 10,000 cubic feet by way of the Chicago Drainage Canal to the Mississippi River." The report stated that the Chicago diversion should be limited to that amount.

The Joint Commission, by its report of May 3, 1906, made the following recommendations to the two Governments:

> "3. The Commission, therefore, recommend that such diversions, exclusive of water required for domestic use or the service of locks in navigation canals, be limited on the Canadian side to 36,000 cubic feet per second, and on the United States side to 18,500 cubic feet per second, (and in addition thereto, a diversion for sanitary purposes not to exceed 10,000 cubic feet per second, be authorized for the Chicago drainage canal), and that a treaty or legislation be had limiting these diversions to the quantities mentioned."

Congress, on June 29, 1906, passed the Niagara Falls Act (34 Stat. 626), providing, in section 1, as follows:

> "That the diversion of water from Niagara River or its tributaries, in the State of New York, is hereby prohibited, except with the consent of the Secretary of War as hereinafter authorized in section two of this act: *Provided,* That this prohibition shall not be interpreted as forbidding the diversion of the waters of the Great Lakes or of Niagara River for sanitary or domestic purposes, or for navigation, the amount of

which may be fixed from time to time by the Congress of the United States or by the Secretary of War of the United States under its direction."

Section 2 of this Act authorized the Secretary of War to grant permits for power purposes, within certain limitations. By Section 4, the President was requested to open negotiations with Great Britain for the purpose of effectually providing by suitable treaty, for such regulation and control of the waters of Niagara River and its tributaries as should preserve the scenic grandeur of Niagara Falls and of the rapids. In view of the last-mentioned provision, an amendment of the bill, proposed by Senator Hopkins of Illinois, had been adopted in the Senate as follows (Cong. Rec., Vol. 40, Pt. 10, 59th Cong., 1st sess., pp. 9097, 9098):

"*Provided, however,* That nothing contained herein shall be construed to hold or concede that the waters of Lake Michigan shall be or are subject of international agreement."

The House of Representatives refused to concur in this amendment, as it might embarrass the President in conducting negotiations. The conference committee receded from the amendment. Senator Lodge, on reporting to the Senate the action of the conference committee and replying to Senator Hopkins, said:

"Mr. LODGE. Mr. President, I had supposed that the Senator from Illinois (Mr. HOPKINS) realises that the report of this bill in its present condition would not in any way endanger the rights of Chicago to have water from the lake. Certainly I should have adhered to the amendment if I had thought that the drainage canal of Chicago would have been in any way endangered by the Commission. The House would not accept this amendment. It is attached to a clause which requests the President to enter upon negotiations. It, of course, is merely advisory. * * * The result of putting

on this clause beforehand would have been to have made any negotiations impossible. No country would enter into negotiations with a limitation on the other side like that.

"The first section of the bill protects the rights of Chicago. No treaty would be made by our Commissioners which would impair or infringe those rights.

* * * * * *

"Every right is safeguarded. The conferees were as anxious as the Senator from Illinois could possibly be to protect the drainage canal at Chicago, but they did not feel warranted in allowing the whole legislation for such an important object to fail."

On January 4, 1907, the International Waterways Commission made a special report upon the Chicago Drainage Canal. This gave a full description of the canal. It concluded with the following recommendation:

"A careful consideration of all the circumstances leads us to the conclusion that the diversion of 10,000 cubic feet per second through the Chicago River will, with proper treatment of the sewage from areas now sparsely occupied, provide for all the population which will ever be tributary to that river, and that the amount named will therefore suffice for the sanitary purposes of the city for all time. Incidentally, it will provide for the largest navigable waterway from Lake Michigan to the Mississippi River which has been considered by Congress.

"We therefore recommend that the Government of the United States prohibit the diversion of more than 10,000 cubic feet per second for the Chicago Drainage Canal."

(*q*) *Application for Calumet Sag Channel denied March 14, 1907.*—The rock section of the drainage canal was designed for a maximum capacity of 10,000 c. f. s.; but its actual capacity was found to be 14,000 c. f. s. A plan was developed to build the Calumet Sag Channel to the Little

Calumet River, with a maximum capacity of 4,000 c. f. s., which would keep that river and the main Calumet River reversed practically at all times. Application was made by the Sanitary District for a permit to accomplish this purpose. On this application, the Chief of Engineers reported unfavorably, under date of February 23, 1907, as follows:

> "3. In my opinion, this abstraction will undoubtedly lower the levels of all the waters of the Great Lakes, except those of Lake Superior, and thus diminish the navigable capacity and depth of the various channels and harbors which have been deepened and improved under authority of Congress.
>
> "4. Leaving out Lake Superior, there are more than 100 works of river and harbor improvement on the Great Lakes and their connecting waters, for which appropriations aggregating more than 80 millions of dollars have been made. The application of this vast sum has resulted in securing and maintaining specified depths and widths of channel, which Congress has decided to be required for the accommodation of the traffic using these waters.
>
> "5. To diminish these depths, even to a slight extent, would not only prove a serious injury to the traffic, but would practically undo the work which has been accomplished by Congressional direction and necessitate the expenditure of further large sums of money for restoration. Any project that tends, in a measure, to annul or reverse the orders of Congress, as expressed in the various river and harbor acts appropriating funds for improving the harbors and channels connecting with the Great Lakes, should meet the disfavor of the Department, unless it has been sanctioned by that body. In my judgment, such a project is the one under consideration, and for this reason I am unable to recommend favorable action thereon, assuming that the Department is empowered to take such action, as is held by the Judge Advocate General."

On March 14, 1907, the Secretary of War accordingly denied the application of the Sanitary District. Referring

to the fact that the application was made under section 10 of the Act of March 3, 1899 (30 Stat. 1151), the Secretary of War stated that the Chief of Engineers was at first of opinion that such a change in the flow of the Calumet River was not within the power of the Chief of Engineers to recommend, or within the power of the Secretary of War to permit. The Judge Advocate General, however, to whom the question was submitted, held that section 10 applied to the case, and that it was one in which the work could be allowed under the recommendation of the Chief of Engineers and the permission of the Secretary of War. Upon this construction of the statute, the Secretary of War requested the Chief of Engineers to make his recommendation. After quoting the adverse decision of the Chief of Engineers, the Secretary concluded as follows:

> "It is quite evident from the reading of the statute, that Congress intended in this statute, as in many others, to give the Chief of Engineers authority, independent of the Secretary of War, in reaching a conclusion as to the wisdom and propriety of granting a permit under the section, and that unless the Chief of Engineers shall recommend the granting of the permit, the Secretary of War is without power to give the requisite authority. It follows, therefore, that the application must be denied, whatever my view of the case.
>
> "The decision of the Chief of Engineers and its final character has made it unnecessary for me to consider the merits of the question, but I may say this much, that the application for the change in the Calumet River is to be made the basis for the withdrawal of a large amount of water from Lake Michigan and that all interested in the enormous lake traffic view the settlement of the question with grave apprehension. Added to this, is the international complication which is likely to arise in the threatened lowering of the lake level in the ports and harbors and canals of Canada. On the other hand, it is maintained with great emphasis and elaboration of detail that the

change in the Calumet River is essential to the healthful sanitation of Chicago, and that the threatened injury to navigation is so small as to be negligible. Between two such great interests, the decision must be affected more or less by large public policy and expediency, and while I agree in the construction of the Judge Advocate General that the issue is left by statute to the recommendation of the Chief of Engineers and the concurrent decision of the Secretary of War, it may be fortunate that circumstances now require submission of this question of capital and national importance to the Congress of the United States."

(*r*) *Permit of September 11, 1907.*—A permit for the construction of the drainage channel known as the North Shore channel, from Lake Michigan at Wilmette to the North Branch of the Chicago River, was granted on September 11, 1907, by a communication from the Acting Secretary of War to the Sanitary District, as follows:

"Referring to your letter of 2d instant, in which you request approval of proposed drainage channel to connect Lake Michigan at Wilmette, Ill., with the North Branch of the Chicago River; also permission to construct a pile crib in Lake Michigan at mouth of same, and to deposit filling within the limits of such crib, I beg to inform you that the War Department will interpose no objection to the project as set forth in your letter and indicated on drawing submitted, provided the following conditions are complied with:

"1. That the pier construction, the filling behind the same, and the excavation of the proposed channel shall be done subject to the supervision and approval of the local officer of the Corps of Engineers, United States Army, at Chicago, so far as to see that the work authorized is not exceeded;

"2. That the total diversion of water from Lake Michigan through the Chicago River into the Illinois River shall be no greater than already authorized by past War Department permits;

"3. That the work shall be commenced before December 31, 1908, and completed within five years thereafter."

(*s*) *Suit by United States, 1908.*—As the Sanitary District apparently intended to proceed with the construction of the Calumet Sag Channel, the United States brought suit in 1908, in the Federal Circuit Court for the Northern District of Illinois, Eastern Division, to prevent the construction of such a canal and the diversion of any water in addition to that already permitted through the Chicago River, save upon the recommendation of the Chief of Engineers and the permission of the Secretary of War.

(*t*) *Canadian Boundary Waters Treaty.*—In 1909, the Canadian boundary waters treaty was signed, and was approved by the Senate. Ratifications were exchanged on May 5, 1910 (36 Stat. 2448). One of the main objects of this treaty was recited to be the prevention of "disputes regarding the use of boundary waters." A preliminary article defined "boundary waters" as follows:

"Preliminary Article.

"For the purposes of this treaty boundary waters are defined as the waters from main shore to main shore of the lakes and rivers and connecting waterways, or the portions thereof, along which the international boundary between the United States and the Dominion of Canada passes, including all bays, arms, and inlets thereof, but not including tributary waters which in their natural channels would flow into such lakes, rivers, and waterways, or waters flowing from such lakes, rivers, and waterways, or the waters of rivers flowing across the boundary."

After this definition, there were the following provisions:

"Article I. The High Contracting Parties agree that the navigation of all navigable boundary waters shall forever continue free and open for the purposes of

commerce to the inhabitants and to the ships, vessels, and boats of both countries equally, subject, however, to any laws and regulations of either country, within its own territory, not inconsistent with such privilege of free navigation and applying equally and without discrimination to the inhabitants, ships, vessels, and boats of both countries.

"It is further agreed that so long as this treaty shall remain in force, this same right of navigation shall extend to the waters of Lake Michigan and to all canals connecting boundary waters, and now existing or which may hereafter be constructed on either side of the line. Either of the High Contracting Parties may adopt rules and regulations governing the use of such canals within its own territory and may charge tolls for the use thereof, but all such rules and regulations and all tolls charged shall apply alike to the subjects or citizens of the High Contracting Parties and the ships, vessels, and boats of both of the High Contracting Parties, and they shall be placed on terms of equality in the use thereof.

"Article II. Each of the High Contracting Parties reserves to itself or to the several State Governments on the one side and the Dominion or Provincial Governments on the other as the case may be, subject to any treaty provisions now existing with respect thereto, the exclusive jurisdiction and control over the use and diversion, whether temporary or permanent, of all waters on its own side of the line which in their natural channels would flow across the boundary or into boundary waters; but it is agreed that any interference with or diversion from their natural channel of such waters on either side of the boundary, resulting in any injury on the other side of the boundary, shall give rise to the same rights and entitle the injured parties to the same legal remedies as if such injury took place in the country where such diversion or interference occurs; but this provision shall not apply to cases already existing or to cases expressly covered by special agreement between the parties hereto.

"It is understood, however, that neither of the High Contracting Parties intends by the foregoing provision to surrender any right, which it may have, to object to any intereference with or diversions of waters on the other side of the boundary the effect of which would be productive of material injury to the navigation interests on its own side of the boundary.

"Article III. It as agreed that, in addition to the uses, obstructions, and diversions heretofore permitted or hereafter provided for by special agreement between the Parties hereto, no further or other uses or obstructions or diversions, whether temporary or permanent, of boundary waters on either side of the line, affecting the natural level or flow of boundary waters on the other side of the line, shall be made except by authority of the United States or the Dominion of Canada within their respective jurisdictions and with the approval, as hereinafter provided, of a joint commission, to be known as the International Joint Commission.

"The foregoing provisions are not intended to limit or interfere with the existing rights of the Government of the United States on the one side and the Government of the Dominion of Canada on the other, to undertake and carry on governmental works in boundary waters for the deepening of channels, the construction of breakwaters, the improvement of harbors, and other governmental works for the benefit of commerce and navigation, provided that such works are wholly on its own side of the line and do not materially affect the level or flow of the boundary waters on the other, nor are such provisions intended to interfere with the ordinary use of such waters for domestic and sanitary purposes.

"Article IV. The High Contracting Parties agree that, except in cases provided for by special agreement between them, they will not permit the construction or maintenance on their respective sides of the boundary of any remedial or protective works or any dams or other obstructions in waters flowing from boundary waters or in waters at a lower level than the boundary

in rivers flowing across the boundary, the effect of which is to raise the natural level of waters on the other side of the boundary unless the construction or maintenance thereof is approved by the aforesaid International Joint Commission.

"It is further agreed that the waters herein defined as boundary waters and waters flowing across the boundary shall not be polluted on either side to the injury of health or property on the other."

The treaty provided that the United States might authorize the diversion within the State of New York of waters of the Niagara River above the Falls, for power purposes, not exceeding in the aggregate a daily diversion at the rate of 20,000 c. f. s., and that the United Kingdom, by the Dominion of Canada, or the Province of Ontario, might authorize a diversion of said waters, for power purposes, not exceeding a daily diversion at the rate of 36,000 c. f. s. (Art. V).

The International Joint Commission, under the treaty, is composed of six members, three appointed by each Government (Art. VII). It has jurisdiction over and passes upon all cases involving the use or obstruction or diversion of the waters with respect to which under Articles III and IV of the treaty the approval of the Commission is required. The Commission is to be governed by certain declared principles. Each of the High Contracting Parties, on its own side of the boundary, is to have "equal and similar rights in the use of the waters hereinbefore defined as boundary waters." With reference to the use of boundary waters, it was provided that the following order of precedence should be observed among the various uses enumerated in the treaty for these waters, to-wit: (1) uses for domestic and sanitary purposes; (2) uses for navigation, including the service of canals for the purposes of navigation; (3) uses for power and for irrigation purposes. These provisions were not to "apply to or disturb any existing uses of boundary waters on either side of the boundary" (Art. VIII).

It was agreed that any other questions or matters of difference arising between the High Contracting Parties involving the rights, obligations, or interests of either in relation to the other or to the inhabitants of the other, along the common frontier between the United States and the Dominion of Canada, should be referred from time to time to the International Joint Commission for examination and report, upon the request of either Government. In such cases the International Joint Commission was authorized to examine into and report upon the facts, with such conclusions and recommendations as might be appropriate, subject to the restrictions or exceptions which might be imposed by the terms of the reference. But such reports should not be regarded as decisions either on the facts or the law and should not have the character of an arbitral award (Art. IX). And it was further agreed that any questions or matters of difference arising between the High Contracting Parties involving rights, obligations, or interests of the United States or of the Dominion of Canada either in relation to each other or to their respective inhabitants, might be referred for decision to the International Joint Commission on the consent of both parties (Art. X).

The statement of the Secretary of State (Elihu Root) before the Foreign Relations Committee of the Senate when this treaty was under consideration shows that it was not intended to cover Lake Michigan as a boundary water or to affect the diversion through the drainage canal at Chicago. Among other things, Secretary Root said to the committee:

> "The treaty starts with defining the boundary waters as the waters from main shore to main shore of the lakes and rivers and connecting waterways, or the portions thereof along which the international boundary between the United States and the Dominion of Canada passes, including all bays, arms, and inlets thereof, but not including tributary waters which in their natural

channels would flow into such lakes, rivers, and waterways or waters flowing from such lakes, rivers, and waterways.

"I have very carefully guarded the terms of this treaty in order not to include Lake Michigan and in order not to involve Senator Cullom's constituents in the drainage canal in the treaty in any way.

"Then the treaty provides for what is now and what has been for our entire existence as a nation the free navigation by both countries of the boundary waters, with the provision that the same right of navigation shall extend to the waters of Lake Michigan, providing that so long as the present treaty remains in force the same right of navigation shall extend to the waters of Lake Michigan and to all canals connecting boundary waters and that the same rules and regulations and the same tolls shall apply to both the high contracting parties.

* * * * * *

"The great bulk of the water goes on the Canadian side, and the Waterways Commission that was appointed some time ago to deal with the question of the lake levels reports, I think, that 36,000 feet can be taken out on the Canadian side and 18,500 on the American side, without injury to the Falls. I thought it wise to follow the report of the Commission and I put in 1500 feet in addition to get round numbers, so our limit is higher than we want but their limit could not be cut down below what it is because there are three companies on the Canadian side who have the right and works there. * * * Then there is this further fact why we could not object to this 36,000 provision on the Canadian side. We are now taking 10,000 cubic feet a second out of Lake Michigan at Chicago, and I refused to permit them to say anything in the treaty about it.

* * * * * *

"The definition of boundary waters was carefully drawn in order to exclude Lake Michigan. * * *

"* * * In the third place" (referring to the reasons for allowing the United States to divert but

20,000 c. f. s., while Canada was allowed 36,000 c. f. s.) "they consented to leave out of this treaty any reference to the drainage canal, and we are now taking 10,000 cubic feet per second for the drainage canal which really comes out of this lake system"

(*u*) The work of the Sanitary District in deepening, to 26 feet, and widening to 200 feet, the channels of the Chicago River, South Branch and West Fork of the South Branch, under permits of the Secretary of War, was practically completed about 1910. The South Fork of the South Branch was improved by the Federal Government to a depth of about 20 feet. The North Branch of the Chicago River, to the terminus of the North Shore Channel of the Sanitary District, was deepened to about 21 feet by the Federal Government. In the improvement of the South Branch and West Fork of the South Branch of the Chicago River, the Sanitary District removed about twelve center-pier bridges and replaced them with bascule bridges, and it also substituted bascule bridges for two centre-pier bridges in the Chicago River proper. The Federal Government deepened the Chicago River proper to about 21 feet. The Act of Congress of June 25, 1910 (36 Stat. 659, 660), appropriated $1,000,000 for the construction of a waterway from Lockport, Illinois, to the mouth of the Illinois River, and provided for the appointment by the Secretary of War of a board of five members to report on the feasibility and advisable dimensions of such waterway, and also upon such measures as might be required properly to preserve the levels of the Great Lakes and to compensate, so far as practicable, for the diminished level in these lakes and connecting waters by reason of any diversion of water from Lake Michigan. (The report of this Board, dated August 15, 1913, was transmitted to Congress on February 18, 1914. See Finding 17, *infra,* p. 125.)

(*v*) *Permit of June 30, 1910.*—The Sanitary District had changed its plans for the Calumet Sag Channel, so that

the capacity of this channel was fixed at 2,000 c. f. s., and in 1910 an application was made to construct it, with the statement that the total amount to be taken from Lake Michigan through all the channels of the district was not to exceed 10,000 c. f. s. On June 30, 1910, the Acting Secretary of War gave a permit for the construction of this channel, but limited the entire withdrawal to 4,167 c. f. s. After reciting previous action, the permit stated:

"So long as the water flow remains unchanged there seems to be no special objection to its extension to both rivers instead of confining it to a single one, especially since if the new (Calumet) route be developed later to a navigable state the double route will be advantageous to navigation interests. Accordingly, in view of the favorable recommendation of the Chief of Engineers and of the consent thereto by the Attorney-General, under the conditions hereinafter prescribed, the department hereby modifies the existing permission so as to allow the division of the already permitted water flow in such a manner as to reach the sanitary district canal by way of the Calumet River, and a connecting channel, as well as by way of its present route through the Chicago River, subject to all pertinent conditions of the existing permissions and to other express conditions, as follows:

"(a) That it be distinctly understood that it is the intention of the Secretary of War to submit the questions connected with the work of the Sanitary District of Chicago to Congress for consideration and final action, and that this permit shall be subject to such action as may be taken by Congress.

"(b) That if at any time it becomes apparent that the current created by such drainage work in the Calumet as well as Chicago Rivers be unreasonably obstructive to navigation, or injurious to property, the Secretary of War reserves the right to close the discharge through said channels or rivers, or to modify it to such an extent as may be demanded by navigation and property interests along said rivers.

"(c) That the Sanitary District of Chicago must assume all responsibility for damages to property and navigation interests by reason of the introduction of a current in the Calumet as well as Chicago Rivers.

"(d) That the amount of water withdrawn from Lake Michigan, through the Chicago and Calumet Rivers together, shall not exceed the amount of 250,000 cubic feet per minute (4,167 cubic feet per second) already authorized to be withdrawn through the Chicago River alone.

"(e) That the permission herein given shall be subject to such modification as in the opinion of the Secretary of War the public interests may from time to time require.

"(f) That this permission shall in no wise affect or in any manner be used in the friendly suit now pending in the Circuit Court of the United States for the Northern District of Illinois, brought by the United States of America against the Sanitary District of Chicago, to determine the right of the said sanitary district to divert from Lake Michigan for sanitary purposes an amount of water in excess of that now being diverted without having first obtained a permit from the Secretary of War.

"(g) That the War Department shall have free access at all times to the water-flow records of the Sanitary District of Chicago, and free access also to the regulating works and all other parts of its canals for the purpose of checking records or making water-flow measurements.

"(h) That the plans for the proposed work shall be submitted to and approved by the Chief of Engineers and the Secretary of War.

"(i) That the work shall be subject to the supervision and approval of the Engineer officer of the United States Army in charge of the locality."

(*w*) *Refusal, January 8, 1913, of permit for increased diversion.*—On February 5, 1912, the Sanitary District applied for permission to withdraw 10,000 c. f. s. from Lake

Michigan, through the Chicago and Calumet Rivers. The needs of the city of Chicago, with a population at that time of 2,500,000, were set forth. The War Department gave the questions presented the most serious consideration. The Chief of Engineers advised (February 28, 1912) that a diversion of less than 1,000 c. f. s. from Lake Michigan would supply any reasonable demands of navigation from Lake Michigan to the Mississippi River, and that any greater diversion was a greater injury than benefit to navigation; that the works of the Sanitary District were found to be large enough for a total diversion of 14,000 c. f. s.; that the amount requested, while perhaps needed at the time, would not be necessary later, after the full installation of the more modern improved methods of treating sewage; that a diversion of the waters of the Great Lakes from their natural outlet, so far as desired merely for aid to power development, was of doubtful legality; and that great care should be taken not to authorize a diversion beyond the amount actually necessary for sanitation alone. Summarizing his conclusions, the Chief of Engineers pointed out the importance of maintaining the levels of the Great Lakes, and that every cubic foot per second of water from Lake Michigan in excess of its natural outflow through Lake Huron and the St. Clair River was a permanent loss to the water flow of the St. Lawrence Basin, and tended to injure navigation over the entire waterway from Lake Michigan to the Gulf of St. Lawrence; that the dumping of sewage into rivers was becoming yearly more objectionable; that it was to be expected that the provisions made elsewhere against sewage contamination would be duplicated in Illinois, after which there would be no reason for continuing the diversion of large quantities of Lake Michigan water, except for local benefit, as such diversion would no longer be necessary for sanitation and was not required for navigation between Lake Michigan and the Mississippi; that from the standpoint of conservation of water-power, diversion from Lake Michigan into the Illinois River was an economic loss; further, that, on the

assumption that the waterway to the Mississippi River should in the future provide for the passage of boats of over 20-foot draft, or any other greatest draft useful in the Great Lakes, such a navigation could be maintained with a diversion from Lake Michigan of less than one-fifth of that at present in progress, and less than one-fourteenth of that then desired by the State authorities. The later report of the district engineer at Chicago (March 11, 1912) expressed substantially the same views and stated, after raising the question of the authority of the Secretary of War, that the Sanitary District could not use 10,000 c. f. s. without creating a current in the Chicago River which would be injurious to navigation; that a diversion to that extent could only be used without injury to navigation after the Sag Channel and other works contemplated for the removal of sewage in the Calumet region, recently placed under construction, had been completed, which would not be for several years; that the current existing in the river was injurious to navigation, as shown by collisions between vessels and bridges and the difficulty of stemming the current; that the withrawal of water from Lake Michigan had undoubtedly resulted in a permanent lowering of the water surfaces of all the Great Lakes; and that the practical effect of withholding an increased allowance would be to force the Sanitary District and the city of Chicago to adopt another system of sewage disposal, or a combination of the present system with another system. It was further stated that the diversion, while beneficial, was not necessary for the improvement of navigation on the Illinois River or Lake Michigan.

On January 8, 1913, the Secretary of War rendered an elaborate opinion denying the application. In the course of this opinion the Secretary said:

> "In a word, every drop of water taken out at Chicago necessarily tends to nullify costly improvements made under direct authority of Congress throughout the Great Lakes, and a withdrawal of the amount now ap-

plied for would nullify such expenditures to the amount of many millions of dollars, as well as inflict an even greater loss upon the navigation interests using such waters.

"On the other hand, the demand for the diversion of this water at Chicago is based solely upon the needs of that city for sanitation. There is involved in this case no issue of conflicting claims of navigation. The Chief of Engineers reports that so far as the interests of navigation alone are concerned, even if we should eventually construct a deep waterway from the Great Lakes to the Mississippi over the route of the Sanitary Canal, the maximum amount of water to be diverted from Lake Michigan need actually be not over 1,000 feet per second, or less than a quarter of the amount already being used for sanitary purposes in the Canal. This estimate is confirmed by the report of the Special Board of Engineers on the deep waterway from Lockport, Illinois, to the mouth of the Illinois River, dated January 23, 1911. It is also confirmed by the practical experience of the great Manchester Ship Canal in England. From the standpoint of navigation alone in such a waterway, too great a diversion of water would be a distinct injury rather than a benefit. It would increase the velocity of the current and increase the danger of overflow and damage to adjacent lands.

"We have therefore presented in this case claims of entirely different characters and jurisdictions—the claim of sanitation on the one side and of navigation on the other; the vital interest of a single community on the one side and the broad interest of the commerce of the Nation on the other. The discretion given to the Secretary of War under Sections 9 and 10 of the Act of 1899 is very broad, but I have very grave doubts as to whether it was intended to authorize him to grant a permit which would inflict a substantial injury upon commerce in order to benefit sanitation. The entire purpose and scope of that legislation was to make him the guardian of the commercial interests of the Nation represented in their waterways. And while he some-

times under that statute must decide that the interests of one class of transportation are less important and must yield to the conflicting interests of another class, I have considerable doubt whether it was intended to give him authority to sacrifice substantial interests of navigation to entirely different claims over which he normally has no jurisdiction whatever.

"But however that may be, and without resting my decision upon the question of my legal authority, I am quite clear as a matter of discretion that under the facts presented by this case no further diversion of water should be permitted at Chicago without the direct sanction of the Congress of the United States.

* * * * * *

"It is therefore quite conceivable that compliance with their sanitary needs according to this method of sanitation may eventually materially change this great natural water-course now existing through the Lakes. The weighing of the sanitation and possibly the health of one locality over against the commerce of the rest of the Nation, and the consideration of our relations and obligations to Canada in respect to a great international waterway, are not matters of mere technical or scientific deduction. They are broad questions of national policy. They are quite different in character, for example, from the question of fixing the proper location of a pierhead line or the height or width of a drawbridge over a navigable stream—fair samples of the class of questions which come to the Secretary of War for decision under the above-mentioned Act of 1899. While the researches and opinions of experts in the respective fields are necessary and useful as an assistance towards reaching a fair and proper policy, the final determination of that policy should belong, not to an administrative officer, but rather to those bodies to whom we are accustomed to entrust the making of our laws and treaties.

* * * * * *

"I have carefully examined, however, the evidence which both sides have introduced bearing upon the sani-

tary needs of the city of Chicago, and my conclusion is in no way shaken. I am not persuaded that the amount of water applied for is necessary to a proper sanitation of the city of Chicago. The evidence indicates that at bottom the issue comes down to the question of cost. Other adequate systems of sewage disposal are possible and are in use throughout the world. The problem that confronts Chicago is not different in kind but simply larger and more pressing than that which confronts all of the other cities on the Great Lakes, in which nearly three millions of the people of this country are living. The urban population of those cities, like that of Chicago, is rapidly increasing, and a method of disposition of their sewage which will not injure the potable character of the water of the Lakes must sooner or later be found for them all. The evidence before me satisfies me that it would be possible in one of several ways to at least so purify the sewage of Chicago as to require very much less water for its dilution than is now required by it in its unpurified condition. A recent report of the Engineer of the Sanitary Commission (October 12, 1911) proposes eventually to use some such method but proposes to postpone its installation for a number of years to come, relying upon the present more wasteful method in the meanwhile. It is manifest that so long as the city is permitted to increase the amount of water which it may take from the Lakes, there will be a very strong temptation placed upon it to postpone a more scientific and possibly more expensive method of disposing of its sewage. This is particularly true in view of the fact that by so doing it may still further diminish its expenses by utilizing the water diverted from the Lakes for water power at Lockport. But it must be remembered that for every unit of horsepower realized by this water at Lockport, four units of similar horsepower would be produced at Niagara, where the natural conditions are so much more favorable. Without, therefore, going more into detail in a discussion of this question, I feel clear that no such case of necessity has been presented by the evidence before me

as would justify the proposed injury to the many varied interests in the great waterways of our lakes and their appurtenant rivers.

* * * * * *

"In short, after a careful consideration of all the facts presented, I have reached the following conclusions:

"1st. That the diversion of 10,000 cubic feet per second from Lake Michigan as applied for in this petition would substantially interfere with the navigable capacity of the navigable waters in the Great Lakes and their connecting rivers.

"2nd. That that being so, it would not be appropriate for me, without express Congressional sanction, to permit such a diversion, however clearly demanded by the local interest of the sanitation of Chicago.

"3rd. That on the facts here presented, no such case of local permanent necessity is made evident.

"4th. That the provisions of the Canadian treaty for a settlement by joint commission of 'questions or matters of difference' between the United States and Canada offer a further reason why no administrative officer should authorize a further diversion of water, manifestly so injurious to Canada, against Canadian protest."

This ruling left in effect the order limiting the diversion to 4,167 c. f. s.

(*x*) On June 30, 1917 (40 Stat. 241), Congress passed a joint resolution, requiring the Secretary of War to make a comprehensive and thorough investigation of the entire subject of water diversion from the Great Lakes and the Niagara River, including navigation, sanitary and power purposes. The report made pursuant to this joint resolution, by Colonel J. G. Warren, the division engineer of the Lakes diversion (called the Warren report), dated August 30, 1919, with its appendices, was a comprehensive presentation of the facts relating to the diversions from the Great Lakes and the effect of such diversions.

The Board of Engineers for Rivers and Harbors, to which the Warren report was submitted, made their report, under date of August 24, 1920, and both reports, with a memorandum of the Chief of Engineers, were transmitted to Congress by the Secretary of War on December 7, 1920. In reviewing the Warren report, the Board of Engineers for Rivers and Harbors said, with respect to the Chicago diversion (pp. 20-21):

"15. There can be no doubt that a real need existed at Chicago for a remedy for the polluted state of its water supply and of the various streams near by that discharged into Lake Michigan. At the time the main sanitary canal was projected the art of sewage purification was in its infancy and a project so extensive as that of treating all the sewage and trade wastes of a population of over a million people had nowhere been seriously considered.

"16. The remedy chosen by Chicago for the polluted state of its water supply and of its watercourses was, however, damaging to other interests. It is definitely known that the diversion of the amount of water authorized to be taken by the terms of the permit of 1903, namely, 4,167 cubic feet per second, at mean stages, would lower the level of Lakes Michigan and Huron about 0.2 foot, of Lakes Erie and Ontario about as much, and of the St. Lawrence River at Lock 25 about 0.28 foot. The average diversion for 1917, 8,800 cubic feet per second, being uncompensated, has lowered the level of Lakes Michigan and Huron about 0.43 foot, of Lakes Erie and Ontario about 0.41 foot, and of the St. Lawrence River at Lock 25 about 0.57 foot. Damage, varying in amount with the locality, extends from the lower miter sills of the locks at Saulte Ste. Marie through all the lakes and connecting channels to tide water in the lower St. Lawrence River, and its amount increases in the same proportion as the diversion at Chicago increases.

"17. The dilution plan of the Chicago Sanitary District has not completely protected its domestic

water supply. The uncertainty as to the quality of the water arises from the freshets of the Chicago and Calumet Rivers, which often exceed the volume of lake water diverted through the corresponding channels, the coincident temporary reversal of the currents of these rivers causing corresponding pollution of the lake. This condition is sure to increase with population and industrial activity unless the amount of the diversion is also largely increased, or unless steps are taken for the treatment of the sewage and trade wastes now finding their way into the two streams.

"18. The report emphasizes the harm done by the Chicago Sanitary Canal in lowering the levels and diminishing the depths available for navigation from the lower sills of the locks at Saulte Ste. Marie clear down to tidewater, but the division engineer feels forced to make some concession to the existing status of affairs, and he therefore, with evident reluctance, recommends that the Sanitary District of Chicago be authorized to divert not exceeding 10,000 cubic feet per second, conditioned upon supervision of the diversion by the Secretary of War at the expense of the sanitary district, and upon the further stipulations that no dangers to navigation shall be caused by the diversion, that the district assume responsibility for all damages incident to the diversion, that it pay its due share of the cost of necessary compensating works, that it agree not to request or make any greater diversion, that it pay to the United States a tax or fee dependent on the additional amount of power that the diverted water could develop in the Niagara and St. Lawrence Rivers, and that it secure authority from the State of Illinois for the provision of works for sewage disposal other than by dilution and then provide such facilities as needed to care for the growth of its population."

The Board recommended (*id.*, p. 60) that the maximum permitted for the Chicago diversion should be 6,800 c. f. s.; it regarded the provision suggested by the division engineer for exacting payment as inexpedient but otherwise agreed

with the division engineer's report as to Chicago. The Chief of Engineers concurred in the conclusions of the Board, except with respect to permitting the increase of the Chicago diversion (*id.*, pp. 13, 14), saying:

> "In respect to this, the trustees of the district have already been advised that the Chief of Engineers would not recommend to Congress any diversion greater than 250,000 cubic feet per minute, the limit set in the permit of the Secretary of War dated January 17, 1903, until the district had worked out and presented a suitable and comprehensive plan for treating its sewage so as to render it inoffensive and innocuous and at the same time reduce to a minimum the quantity of water necessary for its dilution and transportation. This office has been informed that the Sanitary District is now making the necessary studies and that plans based upon them will ultimately be presented for the approval of the War Department. Decision as to the diversion of the Chicago Sanitary Canal should therefore be deferred."

(*y*) On March 23, 1921, Colonel W. B. Judson, district engineer at Chicago and division engineer of the Northwestern Division, made a report which, with the report of October 18, 1921, of the Board of Engineers for Rivers and Harbors, was submitted to Congress on November 1, 1921 (H. R. Committee on Rivers and Harbors, Doc. No. 2, 67th Cong., 1st. sess.). These reports dealt, at the request of the committee on rivers and harbors of the House of Representatives, with the cost of a navigable channel 8 feet in depth in the Illinois River, between Utica and the mouth, and of a navigable channel 9 feet in depth from Utica to a connection with the 9-foot channel in the Mississippi River at or below Cairo, Illinois. In his report, Colonel Judson stated that "for a 9-foot channel, with an increment of 4,167 second-feet, the cost either with dams retained or removed appears almost prohibitive, and the probability that Congress will limit the increment to 4,167 second-feet is, in

my opinion, so remote that this hypothesis may be left out of consideration. With increments of 7,500 or 10,000 second-feet, the figures show conclusively the advisability of removing all dams." He concluded that, "to most reasonably conform to the probable conditions of the future, an 8-foot project should now be adopted, based on a 7,500 second-feet withdrawal for purposes of estimate and with all dams removed. Then should Congress place the limit of the amount of water to be withdrawn from Lake Michigan at 10,000 second-feet, which I deem probable and, under proper conditions, advisable, that increment would of itself increase the depth to 9 feet. The computations show that with all dams removed, an increment of 10,000 second-feet will increase the depth due to the increment of 7,500 second-feet by about 1.25 feet at Utica, about one foot at Peoria and Havana, and slightly less than one foot at the mouth" (*id.*, pp. 17-19).

The Board of Engineers for Rivers and Harbors, in commenting upon this estimate, stated:

> "It will be seen from the district engineer's report that the estimates for the Illinois River are largely influenced by the amount of water discharged into it through the Chicago Sanitary Canal. The present permit authorizes a withdrawal of 4,167 second-feet from Lake Michigan, but apparently the actual amount withdrawn is about 8,500 second-feet. Estimates are given for a flow of 4,167, 7,500 and 10,000 feet. The district engineer believes that the minimum that will be withdrawn from Lake Michigan is 7,500 second-feet and that it may eventually reach 10,000 second-feet. The effect of this additional volume of water will be readily understood when it is considered that the normal low-water flow in the Illinois River is only about 500 second-feet. The existing locks and dams were found necessary to secure the project depth of 7 feet when the normal flow only was available. With the increased volume of 4,167 feet, they are of doubtful necessity in connection with either an 8 or 9 foot chan-

nel, and with the probable minimum increment of 7,500 second-feet, or possibly 10,000 second-feet, the locks and dams become an obstruction to navigation rather than an aid and should be removed."

Before the diversion began in 1900, the official reference datum for Federal improvements and for obtaining and maintaining the established project depth in the Illinois River was the low water of 1879. Since then, this reference datum has been officially changed from time to time, so as to conform to existing low water as affected by the diversion.

(*z*) On February 2, 1922, the Secretary of War, in a communication to Congress concerning a pending bill (H. R. 9046, 67th Cong., 1st sess.), thus stated the policy of the Department:

"It is clear that, under the condition of affairs created by the Chicago Sanitary District, the diversion of a certain quantity of water is necessary at present for the proper protection of the health of the citizens of Chicago. It is by no means established, however, that the quantity required for that purpose, either now or in the future, is 10,000 cubic feet per second. I regard it as inadvisable to permit the diversions in that amount, or in any amount exceeding the amount now fixed by the Department, without full and complete information concerning the necessity therefor. It is my view that the quantity authorized should be limited to the lowest possible for sanitation, after the sewage has been purified to the utmost extent practicable before it is discharged into the sanitary canal. I regard it as extremely inadvisable to grant the city of Chicago, or any other agency, the right in perpetuity to take from the lake a definite quantity of water. It is not improbable that within a generation a method may be found to separate the valuable fertilizing elements from sewage, as a consequence of which the withdrawal of water from the lake to dilute the sewage will no longer

be necessary. In view of the substantial and widespread damage done to many activities throughout the United States by the diversion, damage which can be but partly compensated for by the construction of the works proposed in the bill, the diversion should not be continued beyond the time when its necessity ceases to exist."

On April 18, 1924, the Chief of Engineers transmitted to the Secretary of War a report made by Major Rufus W. Putnam, the district engineer at Chicago, which set forth a description of the existing and proposed works, including sewage treatment plants, of the Sanitary District, and included a study of sanitary conditions.

9. *The decree, January, 1925, in the suit of the United States against the Sanitary District.*—In October, 1913 the United States filed another bill in the same court in which the bill of 1908 had been filed, to enjoin the Sanitary District from diversion of more than 250,000 cubic feet per minute of water from Lake Michigan, the two suits were consolidated and heard as one. In June, 1920, Judge Landis gave an oral opinion in favor of the Government. Decree not having been entered before Judge Landis resigned, his successor, Judge Carpenter, heard argument and directed judgment for the relief demanded by the United States. From this decree, entered June 18, 1923, an appeal was taken to the Supreme Court, where the decree was affirmed in January, 1925. (*Sanitary District of Chicago* v. *United States,* 266 U. S. 405, 432.) The decree thus affirmed provided:

"That the defendant, the Sanitary District of Chicago, its Board of Trustees, officers, agents, attorneys, representatives, employees and servants, and all other persons acting or claiming or assuming to act under its authority, be, and they hereby are, and each of them hereby is, enjoined from diverting or abstracting any waters from Lake Michigan over and above or in excess of 250,000 cubic feet per minute."

The Supreme Court directed that the decree should

> "go into effect in sixty days—without prejudice to any permit that may be issued by the Secretary of War according to law."

10. *Permit of March 3, 1925.*—Immediately after the decision of the Supreme Court, the Sanitary District applied to the Secretary of War for permission to divert 10,000 c. f. s. The application and the accompanying papers set forth at length the sanitary conditions of the district and the existing exigency. Among other things, it was submitted that the population (3,284,000), and trade waste equivalent of population (1,580,000) of the Sanitary District made a total at that time of 4,864,000, and that it was estimated that in 1945 a corresponding total would amount to 6,785,000; that 10,000 c. f. s. of water from Lake Michigan was necessary not only for the purpose of eliminating offensive conditions along the Illinois River, but also to keep the Chicago River reversed at all times, so that even during storm periods it would not pour sewage into Lake Michigan; that the dry weather run-off of the Chicago River drainage area was 1,200 c. f. s., the maximum flood run-off of the same area being 10,000 c. f. s.; that the run-off from the drainage area of the Chicago River exceeded 4,167 c. f. s. from seven to eight times a year; that it exceeded 5,000 c. f. s. from five to six times a year; 7,500 c. f. s. from three to four times a year, and 9,500 c. f. s. about once a year; so that, if a flow of 4,167 c. f. s. were maintained at all times, Chicago sewage would flow into the lake about the number of times above mentioned for the different quantities stated; that a heavy storm could concentrate in six hours, discharging the flood run-off of 10,000 cubic feet per second, with its sewage and scourings of deposits from sewers; and that it would take more than twelve hours to effect any appreciable increase in the flow through the Chicago River by the manipulation of the controlling gates at Lockport; that since 1892, the Sanitary

District had expended in the construction of the Sanitary and Ship Canal, in widening, deepening and improving the Chicago River, construction of bridges, and other channels and appurtenances, and sewage disposal and treatment plant, approximately $130,000,000; that the operation of the Sanitary District's dilution works had practically eliminated all water-borne diseases from Chicago; that the death rate from typhoid fever had declined from a maximum of 174 per 100,000 of poulation in 1891, to 1.1 per 100,000 population at the time of the application; that from the year 1908, the Sanitary District had made extensive investigations of artificial sewage treatment; that construction of treatment plants, begun in 1914, was delayed by the world war and had rapidly progressed since 1920; that the Sanitary District had expended on sewage treatment projects, to the end of the year 1924, approximately $30,000,000; that the future sewage treatment program required the expenditure, between the years 1925 and 1945, of about $95,000,000, and that this program contemplated 85 per cent. treatment for a population of 1,917,000, 94 per cent. treatment for the equivalent of a population of 1,725,000, and 33 1/3 per cent, treatment for a population of 3,140,000, and that this would be equal to 100 per cent. treatment for a population of 4,300,000; and that this would leave in 1945 the untreated sewage of a population of 2,482,000 which, with a diversion of 10,000 c. f. s., would make for satisfactory conditions along the Illinois River. That, to provide for continued growth in population it would be necessary to supply complete treatment for a larger proportion of the sewage than was now projected, and that this would require the expenditure, between 1945 and 1955, of an additional $35,000,000.

The Sanitary District also set forth its financial resources, its bonding power, taxing power, income from all sources, and the amounts required to be expended for its various corporate purposes. The Sanitary District also submitted to the Secretary of War the findings of an En-

gineering Board of Review, consisting of engineers who had been invited to make an investigation and present a program of remedial measures.

The Acting Attorney General advised the Secretary of War (February 13, 1925) that the latter was authorized under Section 10 of the Act of March 3, 1899, to determine in his official discretion, after considering all the pertinent facts and the appropriate protection of the interests of navigation, whether the Sanitary District should be permitted to divert a greater or less quantity of water than that authorized by previous permits.

The Secretary of War held a public hearing, at which representatives of the parties interested in supporting or opposing the application submitted their views. The district engineer at Chicago recommended the granting of a permit for a period of five years, for an average annual diversion of 8,500 c. f. s., with an instantaneous maximum of 11,000 c. f. s., on certain conditions. He explained that by "diversion" he meant "the amount of water which is actually withdrawn from Lake Michigan by the Sanitary District of Chicago, through its main drainage canal and auxiliary channels, and is not inclusive of the amount flowing in the channels which come from the sewers of the locality"; in other words, "diversion" is taken "to be the gross flow at Lockport less the amount of water used by the city of Chicago for domestic purposes."

The Chief of Engineers, concurring in the recommendation of the district engineer, reported as follows:

> "3.—The first condition recommended by the district engineer provides for the adoption and execution of a program of construction of modern sewage disposal plants at such a rate as to provide before the end of five years for treatment of the sewage of a human population of 1,200,000. This figure is believed to be the maximum practicable under existing conditions, and the proposed construction is the first step in a program which will permit the ultimate reduc-

tion of the amount of water diverted, to 4,167 cubic feet per second, or lower, as treatment plants are installed.

"4.—The program of construction recommended is limited to five years, as it is not possible to predict what advances may be made in the science of sewage disposal during the next five years. It is entirely within the realms of possibility that, during that period, such advance may be made as to warrant the Department's insisting on an even more rapid rate of progress thereafter, should a renewal of this permit be sought. A shorter period for the permit is not believed advisable, as it would be difficult to prescribe sufficient progress in the way of construction of sewage treatment plants and require a substantial reduction in the diversion upon the renewal of the permit.

"5. It is estimated that the construction of sewage treatment plants for a population of 1,200,000 will permit a reduction in the necessary diversion from Lake Michigan of about 1,250 cubic feet per second. In other words, such construction would permit a reduction in the authorized diversion, by December 31, 1929, to about 7,250 cubic feet per second. As stated above (paragraph 4), it is probable that a still more rapid rate of reduction of diversion may be practicable thereafter.

"6. It is, of course, highly desirable that the excessive diversion of water from Lake Michigan be reduced to reasonable limits with the utmost despatch. For humanitarian reasons, it is impracticable to make the desired reduction instantaneously, and it is believed that the procedure proposed by the district engineer is the most reasonable and just to all concerned that can be adopted.

"7. As further means of relieving the present undesirable situation with respect to lake levels, the district engineer recommends, as conditions of the permit the prompt adoption and execution of a program for metering Chicago's water supply, the construction of controlling works to prevent the discharge of Chi-

cago River into Lake Michigan in times of heavy storms, and also that the Sanitary District be required to pay a share of the cost of such regulating or compensating works for restoring lake levels as may be constructed, posting a bond of $1,000,000 as a guarantee of their good faith in the matter.

"8. I concur in the views of the district engineer, and recommend the issuance of a permit in accordance with the draft herewith."

The Secretary of War, on March 3, 1925, accordingly issued a permit to the Sanitary District, as follows:

"War Department

"Note.—It is to be understood that this instrument does not give any property rights either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to private property or invasion of private rights, or any infringement of Federal, State, or local laws or regulations, nor does it obviate the necessity of obtaining *State assent* to the work authorized. IT MERELY EXPRESSES THE ASSENT OF THE FEDERAL GOVERNMENT SO FAR AS CONCERNS THE PUBLIC RIGHTS OF NAVIGATION. (See Cummings *v.* Chicago, 188 U. S. 410).

"Permit

"WHEREAS, By Section 10 of an act of Congress approved March 3, 1899, entitled 'An Act making appropriations for the construction, repair, and preservation of certain public works on rivers and harbors, and for other purposes,' it is provided that it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of

the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition or capacity of any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same;

"AND WHEREAS, Application has been made to the Secretary of War by The *SANITARY DISTRICT OF CHICAGO, ILLINOIS,* for authority to divert an annual average of 10,000 cubic feet of water per second from Lake Michigan through the channels of said Sanitary District;

"AND WHEREAS, In the judgment of the Secretary of War, an annual average diversion of more than 8,500 cubic feet per second should not now be permitted;

"NOW, THEREFORE, This is to certify that, upon the recommendation of the Chief of Engineers, the Secretary of War, under the provisions of the aforesaid statute, hereby authorizes the said Sanitary District of Chicago to divert from Lake Michigan, through its main drainage canal and auxiliary channels, an amount of water not to exceed an annual average of 8,500 cubic feet per second, the instantaneous maximum not to exceed 11,000 cubic feet per second, upon the following conditions:

"1. That there shall be no unreasonable interference with navigation by the work herein authorized.

"2. That if inspections or any other operations by the United States are necessary in the interests of navigation, all expenses connected therewith shall be borne by the permittee.

"3. That no attempt shall be made by the permittee or the owner to forbid the full and free use by

the public of any navigable waters of the United States.

"4. That the Sanitary District of Chicago shall carry out a program of sewage treatment by artificial processes which will provide the equivalent of the complete (100%) treatment of the sewage of a human population of at least 1,200,000 before the expiration of the permit.

"5. That the Sanitary District shall pay its share of the cost of regulating or compensating works to restore the levels or compensate for the lowering of the Great Lakes system, if and when constructed, and post a guarantee in the way of a bond or certified check in the amount of $1,000,000 as an evidence of its good faith in this matter.

"6. That the Sanitary District shall submit for the approval of the Chief of Engineers and the Secretary of War plans for controlling works to prevent the discharge of the Chicago River into Lake Michigan in times of heavy storms. These works shall be constructed in accordance with the approved plans and shall be completed and ready for operation by July 1, 1929.

"7. That the execution of the sewage treatment program and the diversion of water from Lake Michigan shall be under the supervision of the U. S. District Engineer at Chicago, and the diversion of water from Lake Michigan shall be under his direct control in times of flood on the Illinois and Des Plaines Rivers.

"8. That if, within six months after the issuance of this permit, the City of Chicago does not adopt a program for metering at least ninety per cent of its water service and provide for the execution of said program at the average rate of ten per cent per annum thereafter, this permit may be revoked without notice.

"9. That if, in the judgment of the Chief of Engineers and the Secretary of War, sufficient progress has not been made by the end of each calendar year in the program of sewage treatment prescribed herein so as to insure full compliance with the provisions of condition 4, this permit may be revoked without notice.

"10. That this permit is revocable at the will of the Secretary of War, and is subject to such action as may be taken by Congress.

"11. That this permit, if not previously revoked or specifically extended, shall cease and be null and void on December 31, 1929."

In transmitting the permit, the Secretary of War wrote to the Sanitary District, under date of March 3, 1925, saying:

"Your attention is invited to the conditions to which this authorization is subject, particularly those prescribing certain definite accomplishments on the part of your locality. This Department has always held and continues to hold that the taking of an excessive amount of water for sanitation at Chicago does affect navigation on the Great Lakes adversely, and that this diversion of water from Lake Michigan should be reduced to reasonable limits with utmost despatch. I appreciate that the desired reduction cannot be made instantaneously, but with the view of making a substantial reduction by the time this permit expires, the conditions require, among other things, the artificial treatment of the sewage of a large population, the construction of controlling works to prevent the discharge of the Chicago River into the lake, and the metering of the water service of the city of Chicago.

"I cannot emphasize too strongly the importance of diligent and prompt execution of the conditions imposed. If it is necessary to increase the bonding power of the Sanitary District from three to five per cent of the assessed valuation of the taxable property, or if increased taxing power is imperative, the requisite legislative permission should be obtained promptly. While it is not in my province to dictate, I sincerely urge the reduction of your expenses to the lowest possible requirements, and, further, that arrangements be made with the packers and the Corn Products interests to treat their waste before discharging it into the sewers.

"I believe that steps should be taken which will enable Chicago to complete the entire work within ten years."

It is under this permit that the Sanitary District is now withdrawing water from Lake Michigan. The amount mentioned in the permit is exclusive of the domestic pumpage in Chicago, which in 1924 amounted to 1,274 c. f. s., in 1925 to 1,338 c. f. s., and in 1926 to 1,395 c. f. s. In the report of the Board of Engineers for Rivers and Harbors, under date of March 23, 1926, in response to a resolution of the Committee on Rivers and Harbors of the House of Representatives, it was stated: "At present, the flow at Lockport might, so far as concerns the conditions of the permit of March 3, 1925, be as high as about 9,700 cubic feet per second annual average, and over 12,000 cubic feet instantaneous maximum." If the domestic pumpage of Chicago is estimated on the basis of 1926 (1,395 c. f. s.), the total withdrawal covering that pumpage and the diversion authorized by the permit of March 3, 1925 (8,500 c. f. s.) would amount to an annual average of about 9,900 c. f. s. As shown by the table of annual withdrawals (*supra*, p. 22) this total has not actually been reached, the highest annual total being 9,465 c. f. s. in the year 1924. The average of the totals for the years 1925 and 1926 is about 8,280 c. f. s.

11. *Compliance with conditions of permit of March 3, 1925.*—It appears from the evidence that, up to the time of the taking of the testimony herein, the Sanitary District had substantially complied with the conditions of the permit. This is shown by the testimony of Colonel Edward H. Schulz, district engineer of the United States Army at Chicago. With respect to the progress of the Sanitary District in carrying out the program of sewage treatment, Colonel Schulz said:

"In pursuance of carrying out this permit the drainage district is establishing a North Side treatment

plant; has begun work on a West Side treatment plant; has in operation a Des Plaines treatment plant and a Calumet treatment plant, and in connection with the Corn Products Company of Chicago, has rendered treatment of a certain part of the wastes of the Corn Products factory. The proportion down to the present time is fully up to the requirements of the permit for this period, the permit having run now about 22 months."

The Sanitary District has given a bond running to the United States, in the amount of $1,000,000, for the payment of its share of the cost of regulating or compensating works to restore the levels or compensate for the lowering of the Great Lakes system, if and when constructed.

With respect to plans for controlling works to prevent the discharge of the Chicago River into Lake Michigan in times of heavy storms, Colonel Schulz testified:

"In connection with these plans the Sanitary District has consulted the District Engineer Office several times during the past year, and tentative plans have been prepared with a view to placing caisson gates at the mouth of the river. The final plans have not yet been submitted to me, nor have I submitted them to the Secretary of War for approval, but I have no doubt that the work will be finished by about July 1, 1929."

As to the program for metering the water service of the City of Chicago, Colonel Schulz said:

"This provision of the permit has been carried out up to the present time, up to about 40 per cent of the average for the year. I have been in close touch with the city. It will be noted that this condition is carried out by the city of Chicago, and not by the Drainage District. The requirement involves some 36,000 meters to be placed each year for nine years, first, that they must adopt an ordinance in six months, which they

did, and within three months after that, last January, they appropriated $1,000,000 to begin this metering. There had been a good deal of trouble industrially to get the matter started and rapidly executed. The reading of the provision was that 40 per cent should be executed, and that would amount to 14,400 meters, and the average rate 10 per cent. It is evident that the average rate must increase beyond 10 per cent in the next few years to carry out that permit."

Colonel Schulz testified that there had been compliance with the other conditions of the permit. The permit has not been revoked.

12. *Diplomatic correspondence.*—It appears that, after the granting of the permit of March 3, 1925, and on May 7, 1925, the Government of Canada, through the British Embassy, asked the Secretary of State for information as follows:

"First.—What has been the actual average flow of the water passing Lockport during the year ending 3rd March, 1925;

"Second.—By what amount will this average flow of water passing Lockport be immediately reduced under the terms of the permit of 3rd of March;

"Third.—By what amount will this average flow be further reduced by 31st of December, 1929, the date upon which the new permit terminates."

In reply, the Secretary of State, under date of June 15, 1925, informed the British Chargé d'Affaires as follows:

"First: The actual average flow of the water passing Lockport during the year ending March 3, 1925, has been 9,700 cubic feet per second.

"Second: This average flow of water passing Lockport will not be immediately reduced by any amount under the terms of the permit issued by the Secretary of War on March 3, 1925.

"Third: This average flow may be reduced by December 31, 1929, by an amount varying from 1,750 to 3,000 cubic feet per second.

"By way of explanation of the wide range over which the amount of reduction by December 31, 1929, varies, it should be stated that the amount of reduction depends upon the decrease in the sewage load on the water in the Drainage Canal. The permit prescribes that a minimum population of 1,200,000 be provided with the equivalent of 100% treatment. The program of sewage treatment plant construction contemplates the completion of plants which will give 100% treatment to a population of slightly over 1,400,000. If this program is carried to completion a larger reduction may be made in the flow than if only the requirements of the permit are carried out.

"Furthermore, when the controlling works which are required to be placed in the Chicago River or Drainage Canal to prevent reversals into Lake Michigan in times of flood are completed and in operation it may be found practicable to make a much larger reduction in the flow of water with safety to the water supply of the City of Chicago during winter season, a time when the oxygen content of the diluting water is much higher than it is during the summer season.

"It is also expected that there will be a substantial reduction in the amount of water consumed in the locality for domestic purposes as the result of a requirement of the permit of March 3, 1925, which makes it necessary for the City of Chicago to adopt and carry into execution a program of metering its water supply. By December 31, 1929, this reduction will vary between 400 and 600 cubic feet per second.

"The net result of all these varying influences will be to make it possible to reduce the average flow by a minimum amount of 1,750 cubic feet per second, and possibly by the maximum amount of 3,000 cubic feet per second.

"To explain the apparent inconsistency between the amount of water specified in the permit (8,500 cubic

feet per second measured at the intakes) and the flow at Lockport (9,700 cubic feet per second) it might be stated that the difference represents the amount of domestic water consumption by the City of Chicago which could not be authorized or included properly in a permit issued to the Sanitary District of Chicago, a separate municipality, other than to make the permit nonoperative in case of failure on the part of the former agency to adopt certain measures of conservation which were specified. Condition 8 of the permit of March 3, 1925, looks to a substantial reduction of this portion of the flow in the Chicago Drainage Canal, at the same time condition 4 makes possible a reduction in the amount of water used for dilution of sewage."

13. *The Rivers and Harbors Act of January 21, 1927* (44 Stat, Pt. 2, 1010, 1013), directed a modification of the existing project on the Illinois River, so as to provide a channel with least dimensions of nine feet in depth and 200 feet in width, from the mouth to Utica, with provisos, as follows:

"Illinois River, Illinois: Modification of existing project so as to provide a channel with least dimensions of nine feet in depth and two hundred feet in width from the mouth to Utica: *Provided,* That the State of Illinois transfers to the United States without cost all rights and titles in the two State-owned dams on the Illinois River; and that local interests furnish the United States without cost all necessary areas for the economical disposal of material dredged in creating and maintaining the channel herein and hereby authorized: *Provided, further,* That nothing in this Act shall be construed as authorizing any diversion of water from Lake Michigan: *Provided, further,* That there is hereby authorized to be appropriated for this project a sum not to exceed $3,500,000."

14. *Effect of the Chicago Diversion on the Level of the Great Lakes.—*

(*a*) *Fluctuations in lake levels.*—The Great Lakes are essentially a series of natural reservoirs in which are stored large volumes of water collected from their respective drainage basins. The connecting and outflow rivers are the overflows for these reservoirs. The amounts of water in storage are dependent upon the differences between supply and overflow and are measured by the heights of water in the reservoirs. Variations in lake levels thus register the variable differences between net supply and discharge. When the rate of supply to a lake is greater than the discharge, the amount of storage increases and the stage of the lake rises, and when less the storage decreases and the lake falls.

The supply of water to the Great Lakes is furnished by the inflow of the many relatively small rivers of their drainage basins, increased by the rainfall on the lakes themselves and decreased by the evaporation from the lake surfaces. The total area of the drainage basins of the lakes is approximately 300,000 square miles, of which nearly one-third is occupied by lake surface. Computations show that the average supply received from the land areas about equals that received as rainfall on the lakes, but that roughly 40 per cent. of this total gross supply is lost by evaporation. The net supply varies widely. The records show rates of net supply to the whole lake system exceeding 800,000 c. f. s. for a month, and they also show months during which the evaporation from the lakes exceeded the water received from all sources, with a consequent negative net supply. The average monthly net supply for the months of April and May is at a rate exceeding 500,000 c. f. s, and the average net supply for the month of November is at a rate of less than 20,000 c. f. s. The lakes absorb the great variations in supply, because of the rise and fall of their levels. When the supply is high they rise and store water; when it is low they fall and deliver the stored water. The average annual rise and fall of the various lakes due to the seasonal variations in

supply is from 1¼ to 2 feet, but extreme variations in seasonal supply have caused fluctuations in lake levels ranging from 2.67 feet on Lake Superior to over 4 feet on Lake Ontario. Extreme high and low lake levels are reached at the ends of periods of excessive or deficient supply extending over several years. The period of low rainfall occurring during the past few years has brought down the levels of the lakes, and with other factors has produced record low levels on Lakes Michigan, Huron and Erie.

(*b*) *Mean levels.*—The monthly mean levels of the Great Lakes, and the mean levels for each year, are shown by the records of the United States Lake Survey, which is charged with the duty of charting the Great Lakes and recording their levels. The mean level of the Great Lakes is determined with reference to the mean level of tidewater at New York.

Lake Superior.—As Lake Superior is higher than Lake Michigan and Huron, it is not influenced by the conditions existing in the lower lakes. The extensive diversions of water for power development at St. Mary's Falls, amounting approximately to 50,000 c. f. s., has made necessary the installation of gates across the river at the head of the falls, to control the outflow and levels of Lake Superior. The gates are operated and the diversions are controlled by an international board of control, in accordance with conditions laid down by the International Joint Commission, May 26-27, 1914. Their operation substitutes artificial for natural control of the levels of Lake Superior, and has, in general, increased the levels of that lake at low water, and somewhat diminished those at high water.

Lakes Michigan and Huron.—The levels of these lakes are substantially the same. As the calculations of averages for periods of years depend upon the periods selected, the official records of the mean annual levels of Lake Michigan, that is, elevations above tidewater for all the years from 1860 to 1925 are set forth, as follows:

Mean Annual Levels of Lake Michigan Above Mean Tidewater at New York

Year	Feet	Year	Feet	Year	Feet
1860	582.68	1883	582.37	1905	580.98
1861	582.66	1884	582.47	1906	581.05
1862	582.62			1907	581.06
1863	582.15	1885	582.72	1908	580.99
1864	581.53	1886	582.96	1909	580.50
		1887	582.32		
1865	581.29	1888	581.71	1910	580.15
1866	580.96	1889	581.16	1911	579.60
1867	581.40			1912	580.07
1868	580.91	1890	581.05	1913	580.68
1869	581.03	1891	580.49	1914	580.24
		1892	580.38		
1870	581.94	1893	580.67	1915	579.73
1871	581.87	1894	580.78	1916	580.35
1872	580.59			1917	581.16
1873	581.24	1895	579.74	1918	581.40
1874	581.73	1896	579.47	1919	580.91
		1897	580.13		
1875	581.48	1898	580.31	1920	580.56
1876	582.61	1899	580.32	1921	580.10
1877	582.38			1922	579.98
1878	582.07	1900	580.28	1923	579.38
1879	581.15	1901	580.53	1924	579.09
		1902	580.21		
1880	581.27	1903	580.36	1925	578.24
1881	581.70	1904	580.86		
1882	582.19				

The record for the year 1926 is in evidence only to and including September, and shows a variation from 577.35 feet in January, to 578.60 feet in September.

It will be observed that the mean level above tidewater was as high as 582.68 feet in the year 1860; that, after a fall to as low as 580.59 in 1872, it returned to 582.61 in 1876; and after another fall, rose in 1886 to 582.96. It then fell so that, for the year 1899, the year before the opening of the drainage canal, the mean level was 580.32, or 2.36 feet, a little over 28 inches, lower than the mean level of 1860, and 2.64 feet, or over 31½ inches lower than the mean level for the year 1886.

In the years 1900 to 1905, the mean level was between 580 and 581, the lowest being 580.21 feet in 1902, and the

highest being 580.98 feet in 1905. Thus in 1905, the mean level of Lake Michigan was nearly 8 inches higher than for the year 1899.

After 1905, the mean level slightly rose, and then fell in 1909 to 580.50 feet, which was still about two inches higher than the level of 1899. There followed a lowering of the mean level to 580.15 in 1910, and to 579.60 in 1911, but this was restored to 580.68 in 1913, and after another fall, the level came back to 580.35 in 1916, approximately the same mean level as that of 1899. It then rose as high as 581.40 feet in 1918, falling to 580.56 in 1920, which was still higher than the mean level of 1899. Since then, there has been a decided drop; so that in 1924, the mean level was 579.09 feet and for 1925 it was 578.24, showing a fall in the mean level from 1920, to the end of 1925 of over 27 inches.

(c) The Monthly Weather Review of the United States Weather Bureau, Department of Agriculture, for March, 1926 (vol. 54, No. 3, pp. 98-100), in a statement by P. C. Day, in charge of climatological division, United States Weather Bureau, on the precipitation in the drainage area of the Great Lakes, 1875 to 1924, with discussion of the levels of the separate lakes and their relation to the annual precipitation, thus summarizes conditions, referring to the United States Lake Survey records:

> "*Lakes Huron and Michigan.*—As these lakes stand at practically the same elevation (average for the 50-year period, 580.9 feet above sea level), and their drainage areas receive usually similar amounts of precipitation, condition affecting the level of one will be reflected promptly in the other, and they may be considered as a single lake.
>
> "Like Superior, they were at high stages near the beginning of the period, the level in 1876, 582.61 feet, being within a few inches of that in 1886, 582.96, the highest in the 50-year period. The levels of these lakes also fell off rapidly, as did Superior, during the three years following 1876, due to diminishing precipitation,

but the fall was somewhat less rapid than was that of Superior, probably on account of continued excessive discharge from that lake.

"Under the influence of much the heaviest precipitation in the 50 years over the drainage basins of these lakes, from 1880 to 1885, supplemented by a nearly normal discharge from Lake Superior, they again rose steadily to a level of 582.96 feet by 1886, the highest, as previously stated, in the 50-year period and probably with one or two exceptions the highest since 1838, the year of maximum known stage, 584.34 feet.

"Beginning in 1886 there was a sharp decrease in precipitation, which, with slight recoveries in 1890, 1892 and 1893, continued until 1895, inclusive, the last-named year having the least of the 50 years. The lake levels fell off during this period, the decline being augmented by the low stages of Lake Superior, whose drainage area during a portion of the period was likewise experiencing an important reduction in precipitation with diminishing run-off.

"There was a sharp fall of slightly more than 1 foot in the levels of Lakes Huron and Michigan from 1894 to 1895, the drought years, the greatest change within 1 year for the entire 50 years, and a continued slight fall in 1896 brought the level of Lake Michigan to an elevation of 579.47 feet, 3.49 feet lower than in 1886, as quoted from the report of the Deep Waterways Commission noted above, and within 0.41 foot of the stage of 1924, 579.06 feet, the lowest of record for the 50-year period. The 1925 stage was only 578.21 or 0.85 foot lower still.

"With increasing precipitation over the basins during the 8 to 10 years following 1895, augmented by more than normal discharge from Lake Superior due to the same cause, the levels of these lakes gradually rose to slightly above normal stage of 580.90 feet, continuing steadily at 581 feet thereafter for several years.

"Since 1908 there have been several sharp increases and decreases due to changing precipitation in both the Huron-Michigan and Superior basins and to increasing or decreasing discharge from Lake Superior, the lakes rising in 1918 to the highest point since 1889.

"Since 1916, excepting 1921, the precipitation in the basin of these two lakes, as well as that of Lake Superior during the whole period, has been constantly below normal, the average deficiency for the 8-year period being 1.7 inches per year, or a total of 13.6 inches for the period. During the 9 years, 1893 to 1901, inclusive, the average precipitation was slightly less in this basin than indicated above, but in this period Lake Superior levels were high and the discharge probably was materially above normal, thus offsetting the effect of decreased precipitation in the Huron-Michigan basin.

"Since 1916, precipitation over the Lake Superior basin has been constantly below normal, the average yearly deficiency being 2.84 inches or a total of nearly 23 inches for the 8-year period. As a result, the water level of Superior has been greatly reduced, despite the presence of regulatory works at the Soo, and Lakes Huron and Michigan are now receiving far less discharge from Superior than usual.

"The prompt rise of these lakes in 1917 and 1918 in response to the moderately heavy precipitation over their drainage areas in 1916, with nearly normal discharge from Lake Superior, shows that with an average annual precipitation of slightly more than 32 inches, the normal for the basin, and with the usual discharge from Lake Superior, these lakes will maintain their normal level.

"In connection with the 1924 levels of these lakes, it is interesting to note that in their early history they showed fluctuation as great or possibly greater than any in recent years.

"The report of the Board of Engineers on Deep Waterways (4) gives numerous references to the early levels of the Great Lakes, and shows that the extreme high water to which all levels concerning Lake Michigan are referred, occurred in 1838, when the elevation stood at 584.3 feet, 3.4 feet above the normal. It was nearly as high in 1858-1859.

* * * * * *

"*Lake Erie.*—On account of the smaller area of the drainage basin, and its lower elevation, the levels of

this lake are governed largely by the discharge from the higher lakes of the chain.

"In general, the responses to variations in precipitation are more prompt here than in the larger lakes, though, as might be expected, they are less in degree, due to the steadying effects of the discharge from the other lakes.

"Like the lakes previously discussed, Erie was at high stages near the beginning of the period, reaching a maximum in 1876 of 573.7 feet, the normal for the 50-year period being 572.4. The heavy precipitation in the early eighties over most of the Great Lakes was less pronounced in the Lake Erie basin, and the corresponding water levels did not reach the extreme high points shown by Huron-Michigan, though they continued high for a longer period.

"Beginning with 1891 the Lake Erie levels fell off, due to decreasing precipitation over the whole region, and reached the lowest stage of the 50-year period, 571.2 in 1895. This, however, was not so low as in 1925, 570.9, the lowest since 1860.

"Precipitation continued generally less than normal for a number of years following 1895, and the lake level remained at low stages until 1902, following which there were several sharp rises and falls, also shown by the other lakes, Erie reaching comparatively high levels in 1913 and again in 1917 and 1919. Since that time the lake level has been below normal, reaching a low point of 571.4 in 1923, only silghtly higher than the lowest preceding record, 571.2 in 1895, and slightly lower than in 1901 and 1911. Contrary to the case of the lakes discussed previously, Lake Erie showed a slight rise from 1923 to 1924, due evidently to increased precipitation over its watershed; but, as stated above, its stage again fell during 1925.

"*Lake Ontario.*—This lake has an average elevation of 246 feet above sea level, or 326.4 feet lower than Lake Erie. It has generally wider fluctuations than Erie, but they are mainly similar.

"Like the other lakes it was high in 1876, but reached its peak in 1886, 247.6 feet, though it was nearly as

high in 1908 and again in 1913. As in the case of Erie it reached its lowest level for the 50-year period, 244.8 feet, in 1895." [The Lake Survey record shows 244.29 feet in 1895.]

"With the other lakes, Ontario has been more or less below its usual level for several years, though the fall has not been so uniform or so extreme. Like Erie it rose slightly during 1924, following a considerable increase in precipitation over its basin, but fell with the other lakes in 1925, despite a continued increase in the precipitation over the drainage area, though in 1925 it did not reach the low average level of 1895 by more than half a foot."

(*d*) *Effect of diversions on lake levels.*—Except when obstructed by ice, the outflow or discharge through the natural outlet increases or decreases with the head or stage of water in the lake and with the slope of the outflowing stream. Under these natural laws there is a constant tendency toward equalization of supply and discharge. For instance, if the supply, which is usually variable from month to month and from year to year, should become constant the stage of water in the lake would soon reach and remain at a height whereby the discharge would exactly equal the supply. If the supply should be increased or decreased by a constant amount, the level of the lake would gradually change until a new level was reached where the supply and discharge would again be equal. There is the same natural tendency toward equalization when through natural or artificial agencies the capacity of the outlet or outlets is changed. Assuming that the stage of a lake is at a height where the supply and discharge are equal, if the outlet is enlarged or an additional outlet is created, the discharge must necessarily be increased for a time, and as the supply is unaffected, the storage is diminished and the stage of water falls. With the falling stage the discharge decreases until the rates of supply and discharge become equal. With a variable supply the effect is fundamentally the same, although it may be masked by the changes in level caused by the change in supply. For instance, if when the outlet is

enlarged, the supply happens to increase by a greater amount or faster than the simultaneous increase in capacity of discharge, the result is an increasing stage. However, the increase in stage in such case is less than it would have been without the change in outflow conditions and the lowering effect is real although not apparent.

When water is diverted from the outlet, the lake levels will be steadily lowered, with respect to their natural levels, until the discharge capacity of the outlet has been reduced by an amount corresponding to the diversion, after which the effect of the diversion on lake levels ceases to increase. The time required for the decreasing outflow to reach an equilibrium with the decreased supply due to a diversion depends on the area of the lake in relation to its outlet capacity. Theoretically, the complete effect of a diversion is never shown; that is, a mathematical formula would require infinity. But within practical limits, under present conditions, approximate equilibrium is reached on Lakes Erie and Ontario in about a year, and about five years are necessary to give about 90 per cent. of the full effect of the diversion on the combined areas of Lakes Michigan and Huron.

It appears that the levels of the Great Lakes have been affected by the following artificial factors: the regulating works, already mentioned, in the St. Marys River at the outlet of Lake Superior; the diversion of the Chicago Sanitary District from Lake Michigan; diversions from Lake Erie, for power and navigation, through the Welland Canal, and from the Niagara River; and changes in the discharge capacity of the St. Clair River at the outlet of Lake Huron, and of the St. Lawrence River, affecting Lake Ontario.

(*e*) *The Chicago diversion.*—As the Chicago drainage canal created a new outlet for the water of Lake Michigan, it is not open to dispute that this diversion has operated to reduce the levels of the Great Lakes (other than Lake Superior) below the levels which otherwise would have

existed. The fact that the lake levels have fluctuated does not affect this conclusion. After the introduction of an additional artificial outlet, the surface of the lake will continue to fluctuate in the same manner that it fluctuated before the lowering caused by the diversion took place; but the high water and low water of the lake after the cutting of the artificial outlet will be lower than they would have been had the diversion not been made.

The complainant States contend that the abstraction by the Sanitary District has lowered Lakes Michigan and Huron and the lower St. Marys River six inches at mean lake levels; Lake Erie, five inches; Lake Ontario, five inches; and the St. Lawrence River from over five inches in its upper reaches to 4½ inches at Montreal. It is further contended by the complainants that the abstraction under the permit of March 3, 1925, of 8,500 c. f. s., plus the pumpage at Chicago for its water supply, taken at the amount of that pumpage for 1926 (1395 c. f. s.), or a total of about 9,900 c. f. s., would produce a lowering of an additional inch at mean stages.

The defendants insist that the lowering caused by the diversion probably does not exceed four inches on Lake Michigan, and 3.3 inches on Lake Erie. The Sanitary District also contends that it is chargeable only for its own withdrawal, and not for withdrawals by Chicago for domestic pumpage, pointing out that the city of Chicago is not a party to this suit. But, whatever might be said on the question of remedy, the entire amount withdrawn should be considered for the purpose of determining the effect on lake levels of the withdrawal of water from Lake Michigan through the reversal of the flow of the Chicago River; the domestic pumpage of Chicago is taken from the lake, and, instead of being returned to the lake, goes into the channels of the Sanitary District.

Report of International Waterways Commission.—The International Waterways Commission, in its joint report under date of January 4, 1907, on the Chicago diversion, concluded as follows:

"The diversion of 10,000 cubic feet per second will lower the levels of Lake Michigan-Huron, Lake St. Clair, Lake Erie, Lake Ontario, and the St. Lawrence River, besides the important connecting channels, the Detroit and St. Clair Rivers, by amounts varying from 4¼ to 6¼ inches for the different waters, and the diversion of 14,000 cubic feet will lower them from 6 to 8½ inches." It was also stated that "the length of time to produce this effect is about five years; about half of it will be produced at the end of 18 months."

Report of Board of Engineers for Rivers and Harbors.—The report of the Board of Engineers for Rivers and Harbors of August 24, 1920, on this point has already been quoted (*supra,* p. 67).

Report of Joint Board of Engineers, United States and Canada.—On March 14, 1924, the President of the United States appointed a commission of nine members, called the "St. Lawrence Commission of the United States", with Herbert Hoover, Secretary of Commerce, as chairman, to act as an advisory committee to the Government on all questions that might arise in consideration of the project for the improvement of the St. Lawrence River. The Government of Canada, on May 7, 1924, appointed a national advisory committee of nine members, having as its chairman George Perry Graham, Minister of Railways and Canals, to advise the government on the matters relating to the project. Following the recommendation of the International Joint Commission (established under the Treaty of 1909), it was agreed by the Governments of the United States and Canada that a Joint Board of Engineers, consisting of three members from each country, should be constituted to review the plans formulated, and to report on additional related matters. The United States Government designated as members of the United States section of the board, and as advisers to the St. Lawrence Commission, Major General Edgar Jadwin, Chief of Engineers,

Colonel William Kelley, Corps of Engineers, and Lieutenant Colonel George B. Pillsbury, Corps of Engineers; and the Canadian Government appointed, on recommendation of the Privy Council, Duncan W. McLachlan, of the Department of Railways and Canals, Olivier O. Lefebvre, Chief Engineer, Quebec Streams Commission, and Brigadier General Charles Hamilton Mitchell. The report of this Joint Board of Engineers was made on November 16, 1926. This report (p. 14) gives the following:

"*Summary of effects of divisions and outlet changes.*—Omitting the small and varying changes resulting from the regulation of Lake Superior, the effect of the various diversions and outlet changes is found to be as follows. The minus sign indicates a lowering of lake levels and the plus sign a raising of lake levels.

"Cause	Amount of Diversion	Effect, in feet, on levels of Lakes—		
		Michigan and Huron	Erie	Ontario
	Cubic feet per second			
Authorized diversions:				
Chicago Sanitary District	8,500	—0.5	—0.4	—0.4
Power diversions, Welland Canal	2,050	—0.25	—0.1	0
All present diversions and outlet changes:				
Chicago Sanitary District	8,660	—0.5	—0.4	—0.4
Welland Canal	3,100	—0.04	—0.15	0
Black Rock Canal	1,000	—0.01	—0.05	0
Changes in St. Clair River Outlet—				
Prior to 1908	....	—0.3	....	....
Subsequent to 1908	....	—0.3	....	....
Gut Dam	....	....	....	(1) 0.4
Total	....	—1.15	(1)—0.6	0.0

"(1) Upon the opening of the new Welland Ship Canal the lowering of the level of Lake Erie will be increased to 0.7 foot."

The instructions given to the Joint Board of Engineers, to which the two Governments agreed by an exchange of notes dated February 4 and March 17, 1925, included the following (*id.* p. 42):

> "*Question 6* (*A*).—To what extent and in what manner are the natural water levels in the St. Lawrence River and on the Lakes affected by diversions authorized by license by either Canada or the United States from or in the St. Lawrence River watershed?"

The Joint Board made specific answer to this question, with respect to the Chicago diversion, as follows (*id.*):

> "*Answer.*—The diversion by the Chicago Sanitary District of 8,500 cubic feet per second from the lake basin through the Chicago Drainage Canal, authorized by license by the United States, lowers the water levels on the Great Lakes and the St. Lawrence River as follows:

	Foot
Lakes Michigan and Huron	0.5
Lake Erie	.4
Lake Ontario	.4
St. Lawrence River between Lake Ontario and Montreal:	
At Prescott	.4
At Lock 25 (Iroquois)	.6
At Lock 23 (Morrisburg)	.5
At Lock 21 (Dickinsons Landing)	.4
At Lock 15 (Cornwall)	.3
Lake St. Francis	.2
Lake St. Louis	.3
St. Lawrence River at and below Montreal:	
At Montreal Harbor	.37
At Varennes	.35
At Sorel	.28
At Batiscan	.24
At Lotbiniere	.24
At Platon	.17
At Quebec	.03".

Colonel Pillsbury's testimony.—In support of their contention, the complainants called as a witness Lieutenant Colonel George B. Pillsbury, who was one of the Joint Board of Engineers whose report has been quoted. Colonel Pillsbury has been an officer of the Corps of Engineers of the U. S. Army since 1910. At various times, he has been in charge of river and harbor districts, on military duty, and associate professor of mathematics at the United States Military Academy. Since August, 1924, he has been in charge of the United States Lake Survey. Colonel Pillsbury testified that the United States Lake Survey was charged with the duty of measuring the outflow of the rivers connecting with the Great Lakes, as well as determining the lake levels, and in the course of its investigations the Lake Survey had made numerous careful measurement of the flow of these rivers, and that from these measurements there has been derived the relationship between the levels of the lakes and the flows of the rivers. Colonel Pillsbury testified that the method adopted was as follows:

> "A cross-section of the river was accurately measured, and with current meters the velocity of the stream is measured at frequent intervals across that section. The weighted average of these current measurements gives the mean velocity of the river which, applied to the cross-section, gives the mean discharge, or gives *the* discharge."

From the observation of flows certain formulae had been arrived at for determining the discharge of the St. Clair River for given elevations of Lake Huron and of Lake Erie, and also for ascertaining the lowering of Lakes Michigan and Huron at any particular stage of the lakes for a given diversion. Given an ascertained increment of the outlet river, and the amount of the diversion, the effect of the diversion is obtained. It appears from the testimony of Colonel Pillsbury, and also from that of Mr. Williams,

defendants' expert, that by increment is meant that quantity of water which is added to or subtracted from the flow of the outlet stream in consequence of a change of one foot in the elevation of the governing lake. When water is subtracted from the flow of the outlet stream it is called a negative increment. The increment is thus the effect on the flow caused by a change of elevation of one foot, either up or down. When the increment of the outflow river is ascertained, the effect of a given diversion can be determined by dividing the amount of the diversion by the amount of the increment. Colonel Pillsbury gave the result of the computation as to the amount of the lowering of Lakes Michigan and Huron caused by a diversion of 8,500 c. f. s. from Lake Michigan was as follows:

> "When Lake Huron is at an elevation of 581.0 and Lake Erie is at 572.5, we find that a diversion of 8,500 cubic feet per second will result in the lowering of the level of Lakes Michigan and Huron by .488 feet. When Lake Huron is at an elevation of 578, and Lake Erie is at an elevation of 570.25, we find that a diversion of 8,500 cubic feet per second will result in the lowering of the lake by .562 feet. Having regard to the inherent inaccuracies of the data, it is my conclusion that a diversion of 8,500 cubic feet per second would lower the levels of Lakes Michigan and Huron by .5 of one foot."

Colonel Pillsbury also stated that the lowering which he had said would take place in Lakes Michigan and Huron would also take place in all the bays, inlets, rivers and harbor mouths in, or connecting with these lakes which are at the same level, and that when a harbor or port had been dredged at the river mouth the lowering would be felt in that dredged portion of the harbor. He also testified that the effect upon Lake Huron would be felt on the lower St. Marys River by a slightly decreased amount as one proceeds up stream as far as the floor of the locks of the Saulte Ste. Marie. It would also be felt in the St. Clair River and in the Detroit River.

Colonel Pillsbury gave determinations of the increments of the Niagara and St. Lawrence Rivers as well as of the St. Clair River. He testified with respect to the effect on Lake Erie of a given diversion from Lakes Michigan and Huron as follows:

> "I find that when Lake Erie is at an elevation of 572.5, the effect of a diversion of 8,500 cubic second-feet is .386. When Lake Erie is at an elevation of 570.25, the effect of a diversion of 8,500 cubic second-feet is .421. Having regard to the inaccuracies of the lake determinations, it is my conclusion that the effect of the diversion of 8,500 cubic feet per second from Lakes Michigan and Huron lowers the level of Lake Erie by .4 of a foot."

He added that this would be the case—

> "at any lake stage. That within the range of stages actually occurring, the greatest accuracy warranted is the statement that it would lower the level of that lake by .4 of a foot. It would lower it somewhat more at low stages than at high, but the difference is small."

Colonel Pillsbury further testified that, with respect to the effect upon Lake Ontario of a diversion from Lakes Michigan and Huron, he had verified the Warren report and reached the conclusion that the effect was a lowering of .4 of a foot for an abstraction of 8,500 c. f. s. The effect of the abstraction from Lake Michigan would be felt on the St. Lawrence as far as Quebec. (Particular determinations in official reports as to the effect on the levels below Lake Ontario appear to have been taken from reports received from the Canadian Government.)

It was also the testimony of Colonel Pillsbury that for an abstraction of any other amount than 8,500 c. f. s. the extent of the lowering of the lakes would be directly proportional to the effect of the abstraction of 8,500 c. f. s. Thus, for 1,000 c. f. s., the extent of the lowering could

be determined by dividing by 8.5 the lowering caused by 8,500 c. f. s. When asked what he meant by "inaccuracies" of the Lake Survey determinations, he said that they "were errors that are necessarily present in any determination of stream flow." Colonel Pillsbury testified that, in his opinion, the method of taking observations and measurements, the instruments and equipment used, and the method of computation employed in arriving at the conclusions he had stated, were regarded as of particular precision; by which he meant that, "on account of the depths of the rivers, the large volume of flow, and the steadiness of the flow, the discharge measurements on the channels connecting the Great Lakes could be carried out to a much higher degree of precision than is possible in the ordinary stream."

Referring to other diversions Colonel Pillsbury stated that a study of the gauge records made by the Lake Survey indicated that, since 1910, the discharge capacity of the St. Clair River had increased by .38 of a foot of stage, and that would be equivalent, until the lakes adjusted themselves to the new discharge capacity, to between 4,000 and 5,000 c. f. s. Colonel Pillsbury further testified that, if the Chicago outlet should be closed up, the result would be to raise the surface of Lakes Michigan and Huron by six inches above the level they would have, had diversion continued, but would not restore the condition in levels that existed before the diversion commenced; it would fail to do so by the amount that the discharge capacity of the St. Clair River had been enlarged.

Testimony for Defendants.—The defendants point out the abtruse character of the calculations to determine increments and the uncertainty of the methods employed, and subject the observations and measurements of the Lake Survey to a critical analysis. They say that diversion tends to lower the lakes, but that no one can tell how much. They presented the testimony of Gardner Stewart Williams, who was civil engineer to the board of water commissioners of Detroit from 1893 to 1898; professor

of experimental hydraulics and engineering, in charge of the hydraulic laboratory of Cornell University from 1898 to 1904; professor of civil, hydraulic and sanitary engineering in the University of Michigan from 1904 to 1911, and has later been in professional practice, and is the author of technical publications on hydraulics. He regarded the Lake Survey observations as defective, and the measurements of increment as affording an insufficient basis for a definite opinion. He made his own computation upon selected data of the Lake Survey which he believed would give a more accurate result. Upon his calculations, and taking into consideration the increases in discharge and increment which have occurred since the taking of the measurements upon which the calculations were based, he gave it as his opinion that the present increment of the Niagara River was about, but probably above, 33,000 c. f. s., and of the St. Clair River about 27,000 c. f. s. Assuming an increment on the St. Clair River of 27,000 c. f. s., he testified that the effect of the Chicago diversion of 8,500 c. f. s. upon the levels of Lakes Michigan and Huron would be to lower them a little over 3¾ inches. Assuming the increment of the Niagara River to be 33,000 c. f. s., it was his opinion that a diversion of 8,500 c. f. s. at Chicago would produce a lowering of the level of Lake Erie a little over three inches. If the diversion ceased, assuming that other diversions remained the same, the effect would be to raise the level of the lakes, respectively, to the same extent as they had been lowered by the diversion.

The most favorable view that could be taken of the testimony offered by the defendants would be that the lowering of the levels of Lakes Michigan and Huron, by a diversion of 8,500 c. f. s. at Chicago, would be about 3¾ inches. The evidence offered by the complainants would not support a conclusion that the effect of the diversion of 8,500 c. f. s. at Chicago would lower the levels of Lake Michigan and Huron more than six inches. The controversy, in substance, lies

between about four inches and about six inches. In view of the nature of the problem involved in the determination, the necessity for the calculation of increments, the observations and measurements which underlie such a calculation, it is manifest that there are great difficulties in obtaining an exact result. The conclusion must inevitably be an approximation, although a close one. On examining the testimony, I am not satisfied with the range of the data selected by Mr. Williams, and I am of the opinion that no sufficient ground has been shown for rejecting the conclusions reached by the Lake Survey as approximately accurate. These conclusions are based on observations which have been made for many years, by competent persons, in the course of official duty which admittedly had high standards of precision in performance. The officials of the Lake Survey have been entirely disinterested and have had no relation to the contentions of the parties in the present suit. They represent as painstaking an endeavor to ascertain the fact as could be had. While exactitude would seem to be impossible, and some measure of inaccuracy always creeps into observations and calculations of such a nature, the degree of certainty obtained is a matter of expert opinion and I accept the testimony of Colonel Pillsbury as to the conclusions to be drawn from the data of the Lake Survey.

I find that the full effect of a diversion of 8,500 c. f. s. of water from Lake Michigan at Chicago through the drainage canal of the Sanitary District would be to lower the levels of Lakes Michigan and Huron approximately six inches at mean lake levels; the levels of Lakes Erie and Ontario, approximately five inches at mean lake levels; and the levels of the connecting rivers, bays and harbors, so far as they have the same mean levels as the above-mentioned lakes, to the same extent, respectively.

By reference to the tabulation of flow in the Chicago Drainage Canal (*supra,* p. 22), it will be observed that the total flow at Lockport did not exceed 8,000 cubic second-feet until 1916, when it was 8,200 c. f. s., and from that time it exceeded 8,500 c. f. s. until 1920, when the total

flow amounted to 8,346 c. f. s., and that the average from 1920 to 1924 was 8,674 c. f. s., and for the years 1925 and 1926 about 8,280 c. f. s. I find that the diversion which has taken place through the Chicago drainage canal has been substantially equivalent to a diversion of about 8,500 c. f. s. for a period of time sufficient to cause, and has caused, the lowering of the mean levels of the lakes and the connecting waterways practically to the extent above stated.

I find, further, that an increase of the diversion at Chicago above 8,500 c. f. s. would cause an additional lowering of the levels of the lakes and their connecting waterways in proportion to the amounts above stated. Thus a diversion of an additional 1,500 c. f. s. or a total diversion of 10,000 c. f. s. would cause an additional lowering in Lakes Michigan and Huron of about one inch, and in Lakes Erie and Ontario a little less than one inch, with a corresponding additional lowering in the connecting waterways having the same levels as the lakes respectively.

I also find that if the diversion at Chicago were ended, assuming that other diversions remained the same, the mean levels of the lakes and rivers affected by the Chicago diversion would be raised in the course of several years (about five years in the case of Lakes Michigan and Huron and about one year in the case of Lakes Erie and Ontario) to the same extent as they had been lowered, respectively, by that diversion.

15. *Damage to the Complainants caused by the Chicago diversion.*—The evidence on the question of damage due to the diversion at Chicago relates to navigation and commercial interests, to structures, to agriculture, to the conveniences of summer resorts, to fishing and hunting grounds, to public parks and other enterprises, and to riparian property generally.

Navigation and Commercial interests. — Upon this branch of the case, the evidence has taken a wide range.

Complainant States border on the Great Lakes, and embrace large areas of these lakes within their boundaries. Thus the evidence shows that Minnesota has within her boundaries 2,514 square miles of Lake Superior; Wisconsin has 2,378 square miles of Lake Superior and 7,500 square miles of Lake Michigan; Michigan has 16,653 square miles of Lake Superior, 12,922 square miles of Lake Michigan, 9,925 square miles of Lake Huron, and 460 square miles of Lake St. Clair and Erie; Ohio has 3,443 square miles of Lake Erie; Pennsylvania, 891 square miles of Lake Erie; and New York, 3,140 square miles of Lakes Ontario and Erie.

By the Transportation Act, 1920, sec. 500 (41 Stat. 499), Congress made it the duty of the Secretary of War to investigate the existing status of water transportation on the inland waterways of the country and any other matter that might tend to promote and encourage inland water transportation, and also to compile and publish such useful statistics and information concerning transportation on inland waterways as he might deem to be of value to commercial interests. "Inland waterways" as used in this provision was explicitly stated to include the Great Lakes. By the Merchant Marine Act of June 5, 1920, sec. 8 (41 Stat. 992), it was made the duty of the United States Shipping Board to make similar investigations in cooperation with the Secretary of War. Accordingly, an extensive report relating to the commerce of the Great Lakes was prepared (under date of June 17, 1925,) by the Board of Engineers for Rivers and Harbors of the War Department in cooperation with the United States Shipping Board, and published in 1926, under the title, "Transportation on the Great Lakes." In April, 1926, the United States Lake Survey office published a Survey of Northern and Northwestern Lakes (Bulletin No. 35), with detailed description of the lakes, connecting channels and Federal improvements. The above-mentioned report and survey, with other reports, have been introduced in evidence, and testimony has also been received with respect to the volume and character of

traffic and conditions pertaining to navigation, on the Great Lakes and connecting waterways. It is deemed to be sufficient for the present purpose to state a few of the leading facts thus established.

The Great Lakes and their connecting channels form a natural highway for transportation having a water surface of over 95,000 square miles and a shore line of 8,300 miles, extending from Duluth-Superior, and from Chicago and Gary, to Montreal, at the head of deep-draft ocean navigation on the St. Lawrence. There are approximately 400 harbors on the Great Lakes and connecting channels, of which about 100 have been improved by the Federal Government. The Federal improvements in the case of harbors as a rule consist of the excavation and maintenance of channels from deep water in the lakes to the harbor entrance. Inner or local harbors are located inside of the Federal channels, and the depths in the inner harbors have been obtained and are maintained at local expense. For example, the inner harbor at the city of Milwaukee consists of three rivers which have been improved and maintained at local expense for a distance of eight miles. Inner harbors are necessary to afford practical navigation. Extensive and expensive loading, unloading and other terminal facilities have been constructed in these various ports within the territory of the complainant States, on the Great Lakes, at local expense. The water levels in the inner harbors and channels maintained at local expense and connecting with Federal channels and with the Great Lakes are ordinarily identical with and directly dependent upon the levels of the lakes with which they connect, except that in time of flood there might be some slight slope created at the mouth of the connecting river.

The volume and importance of the commerce of the Great Lakes is shown by the following extract from the official report above mentioned, entitled "Transportation on the Great Lakes" (pp. 420-426):

"Eliminating all known duplications, the recorded traffic of American ports during that year" (1923) "amounted to 125,517,551 tons, valued at $1,383,903,309. * * * Among the ports, Duluth-Superior led with a total of more than 59,000,000 tons of traffic received and shipped in 1923, while Buffalo ranked second with nearly 19,000,000 tons. Other important ports in the order of their rank are Ashtabula, Cleveland, Chicago (including Calumet), Conneaut, Toledo, Lorain, Ashland, Calcite, Escanaba, Milwaukee, Gary, and Indiana Harbor. From the standpoint of commodities, iron ore ranked first, coal second, grain third, and limestone fourth.

"The territory tributary to the Great Lakes is the most important grain producing district in the world. Not only does it include the more important surplus grain producing States in this country, but it includes nearly all of the grain territory of Canada. * * * The importance of the grain territory tributary to the Great Lakes is shown by the fact that during the 10-year period ending with 1923, the States in this territory produced 71.8 per cent of the wheat, 78.7 per cent of the oats, 66.8 per cent of the corn, 73.1 per cent of the barley and 83.2 per cent of the rye of the United States. * * *

"The enormous volume of grain flowing eastward over the Great Lakes to many foreign and domestic destinations, is practically all shipped from four ports, Port Arthur-Fort William, Ontario, Duluth-Superior, Minn., and Wis., Milwaukee, Wis., and Chicago, Ill.

"Information is not available regarding the origin of all grain received at United States upper lake ports, but it has been possible in this report to show the origin by States of over 350,000,000 bushels arriving at those ports in 1923. Of this amount, Iowa supplied 41.9 per cent, Illinois 25.7 per cent, North Dakota 10 per cent, Minnesota 6.8 per cent, South Dakota 5.3 per cent, Montana 2.1 per cent, and smaller quantities came from other States.

"* * * The figures furnish no warrant for the belief, sometimes expressed that the grain traffic of

the Great Lakes is declining. The tables of shipments from upper lake ports for each year show a consistent increase from 48,585,000 bushels in 1868 to 501,741,000 bushels in 1922. During the four-period 1920-1923, 62.3 per cent of the grain was of American origin and 37.7 per cent of Canadian origin. The proportion of Canadian grain is steadily increasing, however, and during 1923 amounted to 46.3 per cent of the total. American grain is shipped out by way of Canadian as well as domestic ports, and much Canadian grain moves through American ports. * * *

"A flow chart contained in this report shows that the total movement of grain on the Lakes during the year 1923 was 409,849,000 bushels, of which Lake Superior ports supplied 369,700,000 bushels, or 90.2 per cent of the total. The shipments from Fort William-Port Arthur alone amounted to 73.1 per cent of the total grain moved on the Great Lakes during that year. * * * * * *

"From the standpoint of volume, iron ore is the most important commodity moving on the Great Lakes. In 1923 ore shipments constituted nearly 50 per cent of the total lake traffic. The six ranges in the Lake Superior region during that year shipped 80 per cent of the total ore moving from domestic mines. * * *

"The ore moving on the Great Lakes is shipped from the five ports of Duluth-Superior, Two Harbors, Ashland, Marquette, and Escanaba. In 1923, Duluth-Superior shipped nearly 38,000,000 long tons. The ore was received at 14 ports on Lake Michigan and Lake Erie. Ashtabula was the leading port of receipt with 10,499,325 long tons, followed in the order named by Cleveland, Conneaut, South Chicago, Buffalo, Gary, and Lorain. Smaller amounts went to other ports. Of the total receipts at Lake Erie ports, amounting in 1923 to 43,678,000 tons, 9,300,000 tons were consumed at the ports and 34,378,000 tons were forwarded to smelters in the States of New York, Pennsylvania, Ohio, West Virginia, and Maryland. Pittsburg received 14,602,000 tons, Youngstown 7,413,000, Johns-

town 2,000,000, Sharon 1,800,000, Steubenville, 1,700,000, and Wheeling 1,310,000.

* * * * * *

"By means of the navigable channels of the Great Lakes and connecting waterways, large quantities of coal from Ohio, Pennsylvania, Virginia, West Virginia, Tennessee, and Kentucky reach consuming markets in the Northwestern States and in the Provinces of Canada. The movement of coal from mines to ports of loading on Lake Erie and Lake Ontario during 1923 amounted to 34,293,373 tons, consisting of 30,760,487 tons of bituminous and 3,532,886 tons of anthracite. Lake Erie ports received 32,866,138 tons, while Lake Ontario ports received 1,427,235 tons. Toledo was the leading shipping port for bituminous coal with a total of 9,100,341 tons, followed by Ashtabula with 5,526,974 and Lorain with 3,608,025 tons. The anthracite coal moved chiefly from Buffalo, with smaller amounts from Charlotte and Sodus Point on Lake Ontario. Of the cargo coal shipped from lower lake ports, Lake Superior received 16,099,000 tons, Lake Michigan 8,087,000, St. Marys River, 1,509,000, Detroit and St. Clair Rivers 1,344,000, Georgian Bay 972,000, and Lake Huron 318,000 tons. Duluth-Superior led all ports with total receipts of 10,897,746 tons.

"Large amounts of coal shipped by lake were consumed at the upper lake ports. During 1923 the rail movement of coal from upper lake ports to northwest territory amounted to 8,621,337 tons. Of this total, 6,548,618 tons moved from the ports of Duluth-Superior and Washburn-Ashland on Lake Superior, and 2,072,719 tons from ports on Lake Michigan. The Lake Superior ports shipped 4,927,594 tons to points in Minnesota, 639,746 tons to Wisconsin, 401,921 tons to North Dakota, 277,119 tons to South Dakota and lesser amounts to Canada, Iowa, upper Michigan, Illinois and other states. From the Lake Michigan ports, a total of 1,191,944 tons were shipped to points in Wisconsin, 556,284 tons to Michigan, 164,276 tons to Iowa, and lesser amounts to the Dakotas, Minnesota, Illinois and Nebraska.

"In addition to iron ore, coal, and grain, the bulk commodities of importance carried on the Great Lakes include stone, sand and gravel, lumber, and petroleum. Of these, stone, consisting principally of limestone, is the most important in tonnage. Together these commodities comprised about 12 per cent of the lake traffic in 1923.

"With the exception of about 700,000 tons, the stone shipped on the Lakes in 1923 originated in the upper peninsula of Michigan. Calcite was the principal shipping point with 7,502,000 tons, while Rockport shipped 865,000 and Alpena 654,000 tons. Other shipping ports were Kelley's Island, Ohio, Sturgen Bay, Wis., and Toledo, Ohio. Calumet (South Chicago) received 1,884,876 tons, leading all ports of receipt, while Buffalo, N. Y., and Gary, Ind., were second and third, respectively. Other important receiving ports were Cleveland, Lorain, and Fairport, Ohio, Duluth-Superior, Minn., and Wis., and Indiana Harbor, Ind.

"The traffic in forest products on the Great Lakes has declined steadily since 1902, when 2,182,942 tons moved through the St. Marys Falls Canal. In 1923 the movement amounted to 378,674 tons. The merchantable lumber of the lake region has been largely exhausted and this territory has changed from an exporting to an importing status.

"Petroleum products are carried in tankers from refineries at Indiana Harbor to various ports on Lake Superior and Lake Michigan, and also to Detroit and Toledo, where they are stored in tanks for local distribution. The movement in 1923 amounted to 1,577,518 tons.

"The movement of sand and gravel is of a local nature, the hauls generally being short. Frequently only the receipts are of record. In 1923 the imports from Canada amounted to 686,130 tons and the domestic receipts to 3,771,160 tons.

"The history of the package freight trade on the Great Lakes discloses a condition wholly dissimilar to that attending the development of important bulk freight. While the population, commerce, and industry

of the Lakes region as a whole has been increasing steadily, and the tonnage of rail carriers serving this district shows an important development of high-class traffic, the business of this character on the Great Lakes has experienced a steady decline in recent years, and in 1923 amounted to only 3,000,000 tons, or about 2.5 per cent of the total lake trade.

* * * * * *

"The car-ferry business of the Great Lakes has grown to considerable proportions and special types of carriers have been developed for this purpose. The modern car ferries are constructed of steel and are 360 to 370 feet long. The car ferries across Lake Michigan save considerable time by avoiding passage through the congested Chicago district. The improvements provided by the United States at the lake harbors have permitted the successful development of the car-ferry routes.

"The importance of the water-borne traffic on the Great Lakes will be evident from the following summary of the ton-miles of water haul of the principal bulk commodities during 1923:

	Ton-miles
Iron ore	47,043,965,000
Wheat	7,265,271,000
Oats	569,672,000
Corn	426,348,000
Barley	383,416,000
Rye	637,826,000
Coal	21,579,493,000
Stone	3,560,911,000
Total	81,466,902,000."

The interest of the complainant States and of their people, by reason of their ports on the Great Lakes, in this commerce is manifest, and it is not deemed to be necessary to set forth further statistics with respect to particular places and commodities. The question is with respect to the effect on navigation and commercial interests of the

lowering of the Great Lakes caused by the Chicago diversion.

In the report of Colonel E. M. Markham, district engineer at Detroit (May 19, 1925), which, with reports of the Board of Engineers for Rivers and Harbors (January 26, 1926) and of the Chief of Engineers (March 10, 1926), was transmitted to Congress March 11, 1926, pursuant to Act of March 3, 1925, 43 Stat. 1196 (House Doc. 270, 69th Cong., 1st sess.), it is said (*id.*, p. 26): "Accordingly, throughout such channels" (referring to channels improved by the Federal Government between Lake Superior and Lake Erie) "the average depth over project width is generally somewhat over 21 feet below improvement planes as at present authorized." These improvement planes were fixed in 1916 for the several lakes at levels deemed to be representative of lowest probable water, as follows (*id.*, p. 19):

"Lake Superior	601.6
Lake Huron-Michigan	579.6
Lake St. Clair	573.8
Lake Erie	570.8."

In the case of Lake Michigan the actual mean level for 1925 was 578.24, or about one foot and four inches lower than the reference plane, and there were lower monthly mean levels than this mean level for the year.

The amount of permissible draft of vessels carrying the greater portion of the freight traffic between Lake Superior and Lake Erie has been increasingly important.

Colonel Markham, who served as district engineer at Detroit for six years, from 1919 to 1925, states in his report as to capacity of vessels carrying this traffic (*id.*, p.23):

> "By or before 1902, the prospect was observable of materially larger ships and of a greater expansion of tonnage, and was arranged for in 1906 by authorization for a third lock at St. Marys Falls, 80 by 1350 feet, with sills set at a depth of 24½ feet, thus providing at that

time for future ship drafts consistent with the adopted sill depths. Meantime the business of the lakes has continued to be done upon the presumption that channel depths and widths would be suitable for at least a 20-foot draft. It should be observed in this connection, however, that all freighters constructed since about 1906 have been designed upon a draft theory of 23 to 24 feet, with commensurate length and beam. Practically, even a 20-foot draft through the complete navigation season has rarely been provided for."

Colonel Markham states that the percentage of the season when less than 20-foot drafts were employed through St. Marys River was as follow: 1921, 45 per cent.; 1922, 85 per cent.; 1923, 82 per cent.; 1924, 100 per cent.

The effect of a deprivation of six inches of draft is thus stated in Colonel Markham's report (*id.*, pp. 24, 25):

"The extent of the adverse consequences to lake shipping due to receding levels below St. Marys Falls is apparent from an analysis of the 1923 Lake Superior trade, for which the very complete records of Sault lockages have been utilized. The year's business was done on the following drafts: from May 1 to 31, 19 feet; May 31 to July 19, 19 feet 6 inches; July 19 to August 28, 20 feet; August 28 to December 17, 19 feet 6 inches.

"Consideration of individual loaded boats and of their respective dimensions shows that, if water had been available for an additional six inches of draft, the fleet could have handled for the year 3,346,000 tons more than was actually transported, or, to put the matter in another light, the season's business could have been done with the elimination from service of about 30 freighters of the 2,000-3,000-ton class. It should be emphasized that the reference is to Lake Superior trade alone. It is estimated that the lost tonnage of the total through business of the Lakes for 1923, incident to a 6-inch deficiency of draft, exceeded 4,000,000 tons. The average water-haul rate for the year was 88 cents per ton.

"For the year just closed" (1924) "shipping was done on a draft throughout of 19 feet, with occasional exceptions up to 19 feet 6 inches. The year's 'tonnage loss' applicable to the total lake trade, reckoned from a base draft of 20 feet, was probably in excess of seven millions. For the season of 1925, shipping has opened at a draft of 18 feet 6 inches, with the unlikelihood that the best water of the year will permit a safe draft in excess of 19 feet.

"From the above outline of lake commerce, and of the number, dimensions and capacity of the lake freighters doing its bulk business, two facts become evident: First, that the existing fleet could carry seasonally, on drafts for which designed, something like twenty-five to thirty million tons in excess of the cargo possible of transport by the same boats over the channel depths now available; second, that the loss of inches in channel depth due to receding levels or otherwise is a matter of large import with respect to shipping efficiency and to the transportation charges of the bulk commodities concerned."

Colonel Markham, called as a witness for the complainants, gave testimony in support of his report.

The Joint Board of Engineers, United States and Canada, in their report above-mentioned (November 16, 1926) stated (p. 4) that "in the latter part of the navigation season of 1925, the depth available was 18 feet, and at no time during that year did the maximum draft that could be carried from Lake Superior to Lake Erie exceed 19 feet."

In the above mentioned report entitled "Transportation on the Great Lakes" (p. 36) it is said: "With the loss of every inch of draft below 20 feet, the modern lake bulk freighter suffers a loss of from 90 to 100 tons in cargo capacity. It will gain a corresponding amount for every inch of draft in excess of 20 feet." There are critical points of navigation, e. g., in the St. Mary's River, the St. Clair River, Lake St. Clair, and the Detroit River and vessels

are loaded with respect to available depths at such points. While there are quite definitely established routes or lanes for vessels plying between the various ports on the Great Lakes, vessels deviate from such courses in bad weather, both because of the difficulty of maintaining the course with precision under such conditions, and because of the necessity of seeking protection under weather shores. At such times, when the vessel is of necessity off the regular steamer track, a lowering of the level of the lakes increases the hazards and dangers of navigation, contributing to groundings or strandings.

The defendants point to other diversions and artificial changes in the Great Lakes and connecting channels, which have contributed to this total lowering of levels. It is evident, however, that during a period in which the level of the Great Lakes is being lowered, an additional lowering, even of six inches, would be even more serious in its consequence than if it occurred at a time when other causes did not operate to lower the levels of the lakes or operated to raise them.

These are not actions for damages, and it is not necessary to attempt to estimate with precision the extent of the damage caused by a lowering of six inches in lake levels. The defendants have introduced evidence for the purpose of showing that the claims of damage have been exaggerated, but after considering the testimony and critical analyses presented by the defendants, I am satisfied that the evidence requires the finding that the lowering of lake levels of approximately six inches has had a substantial and injurious effect upon the carrying capacity of vessels, and has deprived navigation and commercial interests of the facilities which otherwise they would have enjoyed in commerce on the Great Lakes.

With respect to the other items of damage alleged by the complainant States, similar considerations are deemed to be controlling. The witnesses naturally observe the total lowering of lake levels, and much of the testimony permits no satisfactory conclusion as to the damage that can be at-

tributed exclusively to the Chicago diversion accounting for only six inches of the total reduction. But there is sufficient evidence to require the finding that a lowering of six inches has been a substantial contribution to the injury caused by the total reduction, in connection with fishing and hunting grounds, the availability and conveniences of beaches at summer resorts, and public parks.

Evidence was introduced by the complainants to show an injury to agricultural and horticultural interests by the lowering of the level of Lakes Michigan and Huron by reason of the consequent recession of the ground water table, or the level at which hydrostatic or free water is found beneath the soil. The evidence relates particularly to places along the shores in the States of Michigan and Wisconsin, where it is urged that the utility of the land for agricultural and horticultural purposes has been seriously impaired. Considering this evidence, and that introduced by the defendants which included the testimony of Mr. Oscar E. Meinzer, geologist in charge of the Division of Ground Water, United States Geological Survey, I am unable to conclude that the injury alleged to have been sustained in relation to agriculture and horticulture has been sufficiently shown to warrant its consideration in determining the effect of a reduction of approximately six inches in lake levels, due to the Chicago diversion.

Complaint is also made, particularly in the case of Milwaukee, as to the effect of the lowering of the level of Lake Michigan upon the pile foundations of structures. Structures resting upon such foundations are numerous, and it is well established that the piles must be kept submerged, to an extent which will admit, through capillarity, adequate moisture to their tops, in order to avoid decay. Instances of such decay have been given, and the damaging effect at Milwaukee of the lowering of the level of the adjacent waters has been shown. But the extent to which the six-inch reduction in that level has contributed to this injury does not clearly appear.

My conclusion on this branch of the case is that, while the damage proved to have been sustained by the complainants has been due to the combination of causes which have brought about the total lowering of the levels of the lakes and connecting waters, the contribution made by the diversion of the water of Lake Michigan through the Chicago drainage canal must be regarded as substantial, although the proportion of the damage caused by the reduction of approximately six inches is not susceptible of exact computation.

I therefore find that the complainants have established that the diversion through the Chicago drainage canal has caused substantial damage to their navigation, commercial and other interests as above stated.

16. *Effect of the Chicago diversion on the Illinois and Mississippi Rivers.*—The defendants, and especially the intervening defendants, the Mississippi Valley States, have stressed the great importance of the development of the Lakes-to-the-Gulf Waterway. It is urged that the Panama Canal has proved a serious handicap to the industrial development of the Mississippi Valley; that by opening a short all-water route, forcing down rail rates, it has provided cheap transportation from our eastern seaboard to the western coast of both continents, and to the Orient; that this benefit does not appear to be enjoyed by the States of the Mississippi Basin, and that the average cost of the transportation of food products to European markets is injurious to the agricultural interests of these States.

It has not been regarded as being within the scope of the reference to the Special Master that he should attempt to determine the relative values to commerce of the Great Lakes-St. Lawrence Waterway, and the Lakes-to-the-Gulf Waterway, or that he should enter upon the great variety of collateral inquiries necessary to estimate the benefits to particular districts, or the particular advantages as to rates or commodities which might result from the develop-

ment and maintenance of navigation from Lake Michigan to the Mississippi River and the Gulf of Mexico. These are matters to which Congress has given elaborate consideration. For the purpose of the proper determination of the issues in the present suits, it has been thought that it could be assumed that the commerce of the Mississippi Valley and the improvement of navigation on the Illinois and Mississippi Rivers, were matters of national concern, and that the people of the Mississippi Valley States, and, indeed, other States, would be benefited by improvements in the facilities of transportation. The precise question which may be deemed to be relevant in this controversy is, whether the diversion at Chicago can be regarded as an aid to navigation on the Illinois and Mississippi Rivers, and if so, to what extent, and what would be the effect of cutting off or limiting that diversion.

(*a*) *Illinois River.*—The present commerce on the Illinois River is small. It appears that in 1925, the total commercial freight, both ways, was 96,080 tons. In the same year, the total freight traffic over the Chicago Drainage Canal was 688,295 tons, 97 per cent. of which consisted of stone, largely removed from the spoil banks along the canal.

Illinois Waterway.—Plans for what is called the Illinois waterway, which is under improvement by the State of Illinois, that is, on the upper Illinois River, from Lockport to Utica, about 61 miles, are based on a diversion from Lake Michigan of at least 4,167 c. f. s. The depth designed with such diversion is eight feet, with fourteen feet over the mitre sills of locks, for future improvement. With present diversion, the depth will be about nine feet. If the diversion were reduced materially below 4,167 c. f. s., it would necessitate radical changes in the design and location of the locks, three of which are already either constructed or under construction, and increased outlays. Illinois has authorized the expenditure of $20,000,000 for the completion of the waterway, of which between $5,000,000

and $6,000,000 has been expended, or is payable under contracts. The Illinois waterway as planned will have a capacity of about 60,000,000 tons per annum. There is no adequate water supply for lockage, except by diversion from Lake Michigan. Other plans would involve prohibitive expense.

The Chief of Engineers and the Secretary of War, in approving the plans for the waterway in 1920, stated that it was not to be understood as authorizing the diversion of water from Lake Michigan, but merely expressed approval so far as concerned the public right of navigation, and that the provision was without prejudice to the use by Illinois of such flow as might be existing in the Illinois and Des Plaines Rivers. The profile map accompanying the plans contains a notation that the water services shown were "based on an assumed flow of 4,167 c. f. s., already approved, as a diversion from Lake Michigan, plus the normal flow from other sources in various pools"; that is, the assumption was of 6,000 c. f. s. flow, made up of 500 c. f. s. as an actual low water flow, 4,167 c. f. s. from Lake Michigan, and 1,395 c. f. s., as averaging the amount of Chicago's pumpage.

Lower Illinois River.—The lower Illinois River, from Utica, to Grafton on the Mississippi (230 miles) is a shallow, sluggish stream, carrying from 500 to 1,000 c. f. s. of natural low water flow. In its natural state, it is inadequate for modern river navigation. The Federal project depth has been seven feet; but this could not have been maintained without at least 8,500 c. f. s. from Lake Michigan, which gives, in the lower Illinois, about four feet of the low water depth of seven feet. The Chicago diversion has increased the navigable capacity of the river. This stretch of the river is adaptable to improvement as an open channel, but if there were no diversion at Chicago, a large amount of improvements and several locks and dams would have to be provided. The question appears to be largely one of cost.

Reference has already been made to the Report of Colonel Judson of March, 1921 (*supra,* p. 69), and that of the Board of Engineers for Rivers and Harbors of October, 1921 (*supra,* p. 70), with respect to the effect of various amounts of diversion on the navigable capacity of the Illinois River and the plans for its improvement. It will be observed that Colonel Judson stated that "for a 9-foot channel, with an increment of 4,167 second-feet, the cost either with dams retained or removed appears almost prohibitive," and his recommendation was for the adoption of an 8-foot project, "based on a 7,500 second-feet withdrawal for purposes of estimate and with all dams removed." He added that with the withdrawal of 10,000 c. f. s from Lake Michigan that increment would of itself increase the depth to nine feet.

In the Report of Major Putnam of April, 1924 (*supra,* p. 72), it is said:

> "There is no doubt but what navigation conditions have been improved by the diversion of water from Lake Michigan. Originally the low-water discharge at La Salle was in the neighborhood of 500 cubic feet per second, while at Grafton it was near 1,000 second-feet. The addition of over 8,000 cubic feet per second, while increasing the slope and the velocity slightly, produced a discharge of about 8500 cubic feet per second at La Salle and about 9,000 at Grafton. Depths throughout the entire stream were increased substantially as may be seen from the following table and as indicated by comparing the profiles in Plate VII:

Miles above Grafton	Name of Place	Increased depth with 8,000 cubic feet per second diversion
223.2	La Salle.....	5.0
88.6	Beardstown	2.2
0.0	Grafton	1.2

* * * * * *

"* * * Assuming that the existing 7-foot project based on a flow from Lake Michigan of 4,167 second-feet is completed, it will cost about $2,400,000 to pro-

vide a 9-foot channel between La Salle and Grafton with a flow of 5,000 cubic feet per second, or about $800,000 with a flow of 8,000 cubic feet per second. If the flow were increased to 10,000 second-feet the cost would be about $400,000."

By the Act of January 21, 1927, 44 Stat., Pt. 2, 1013, Congress provided for the modification of the existing project for the Illinois River so as to provide a channel with least dimensions of nine feet in depth and 200 feet in width from the mouth to Utica.

The complainants contend that if the water for lockage and navigation purposes of this waterway from Lake Michigan to the mouth of the Illinois River is or should be taken from the Great Lakes-St. Lawrence watershed, a diversion of less than 1,000 c. f. s. of water is sufficient to supply all the needs of navigation. I am unable so to find. The needs of navigation on that waterway will depend upon the carrying out of plans already adopted and upon the ultimate decision of Congress with respect to water communication between Lake Michigan and the Mississippi River, the extent to which locks and dams are to be used or installed, that is, the character of the improvements and the amount which it is determined to expend.

(*b*) *Mississippi River.*—The defendants introduced evidence to show that the effect of 10,000 c. f. s. diverted from Lake Michigan to the Mississippi River would be to raise the stage of that river at Grafton, from two feet at low water, to 1.2 feet at mean stage; at St. Louis, from one foot at low water, to six inches at mean stage; at Columbus, Ky., from seven inches to three and one-half inches; and at Vicksburg, from six inches to a little over two inches. The Government reports state that the effect of the diversion of 10,000 c. f. s. at Chicago is to raise the mean stage of the Mississippi River one foot at St. Louis.

Whether, and to what extent, this increment is an aid to navigation on the Mississippi River is disputed. The

controversy arises from the peculiar characteristics of the stream. In time of floods or high water, in the absence of appropriate regulation, the increment, instead of being a benefit to navigation, would increase its hazards and might, indeed, be the added flow that would cause serious injury. But the chief difficulties to navigation are usually found in the period of low water. The volume of the Mississippi River above St. Louis is increased by various tributaries, the Illinois, the Missouri, the Ohio, and many important lower streams. The contributions from these tributaries are not always the same, and do not always occur at the same time during each year; so that the records of stage show considerable variations during each year. Beginning with extreme low water at the time of ice formation in the upper river, the volume of water increases, through a period of gradual rise, until the month of July, and from July until the end of the navigation season at St. Louis, usually about the middle of December, the high water of the early part of the year gradually decreases down to extreme low stages. Variations occur in this process. The Missouri pours into the Mississippi a large amount of silt, that moves downstream with the current, and is increased by bank erosions. When there is a decrease in current, any obstruction in the bed of the stream will serve to accumulate a large amount of the water-borne silt. Navigation on the river is conducted through a series of pools, separated by bars, and it is the depths over the bars that limits the depth which tows and barges may draw.

The complainants insist, and they are supported by the testimony of Brigadier General W. H. Bixby former Chief of Engineers, that the increment due to the diversion of water from Lake Michigan does not appreciably aid navigation, for the reason that, as the stage of the river rises, the bars also rise, and as these bars furnish the critical points in the periods of low water, there is no addition, by reason of the Lake Michigan increment, to the available depths for navigation over the bars. This view is set forth in Government reports.

On the other hand, Major John C. Gotwals, United States district engineer at St. Louis, in charge of the Mississippi River between the mouths of the Missouri and the Ohio, and other engineers, testified, in substance, that as the plane of the surface of the river rises, the channel depths over the bars also increase, but not to the same amount in feet or inches as the increase in stage. According to their testimony, the silt accretions to the bars cause them to rise to some extent and under some conditions, but the rise in bars is not so great as the rise in stage, and hence an increase in stage does produce a substantial effect upon navigable depths over bars. Major Gotwals testified, in substance, that the rise of bars as related to rise in stage was, broadly speaking, about one-half.

My conclusion is that the diversion from Lake Michigan through the drainage canal increases to some extent during low water the navigable depths over bars on the Mississippi River, but that the extent of this increase is not the subject of sufficiently accurate determination to warrant a finding. Upon all the facts, it was permissible for the Secretary of War to reach the conclusion that the diversion from Lake Michigan of 8,500 c. f. s., was to some extent, an aid to the navigation of the Mississippi River in time of low water.

The defendants introduced evidence as to the amount expended by the Federal Government in the improvement of the Mississippi, and that since 1918 the United States has itself been conducting a common carrier barge-line transportation on the Mississippi River, between St. Louis and New Orleans. This is said to be an example of the policy of the United States in creating and fostering inland water transportation. It is shown that the towboats and barges of the Inland Waterways Corporation, nationally owned and operated under the control of the Secretary of War, require a channel not less than nine feet deep and 250 feet wide. The difficulties of maintaining such a channel and the delays and consequent losses due to lack of water at critical points, have been set forth.

This evidence simply serves to show the national interest in the navigation of the Mississippi River, and this may well be taken for granted; but the question here is considered to be one with respect to the effect of the Chicago diversion in giving an improved depth of channel. It is not controverted that the Secretary of War had these considerations before him, on the application and hearing which resulted in the permit of March 3, 1925.

17. *Feasibility of remedial works to offset the effect of the Chicago diversion.*—One of the conditions of the permit of March 3, 1925, was that the Sanitary District should pay its share of regulating or compensating works, to restore the levels, or compensate for the lowering of the levels of the Great Lakes system, if and when constructed, and post a guaranty in the way of a bond or certified check, in the amount of $1,000,000, as an evidence of its good faith. From an engineering standpoint, the evidence shows it to be practicable to provide such works. This question has been the subject of inquiry by Congress, and of reports pursuant to its direction (Report of Board of Engineers on Deep Waterways, June 30, 1900; House Doc. 149, 56th Cong., 3nd sess.; International Waterways Commission, 1907, House Doc. 779, 61st Cong., 2nd sess.).

The Act of Congress of June 25, 1910, provided for a special board of engineers, to report upon a waterway from Utica, Ill., to the mouth of the Illinois River, and upon such measures as might be required to compensate for diminished level, by means of any diversion of water from Lake Michigan for the maintenance of the proposed waterway, or diversion for any other purpose. The report (August 15, 1913) of this Board, with the report of the Board of Engineers for Rivers and Harbors (December 16, 1913), was transmitted to Congress on February 18, 1914 (House Doc. 762, 63d Cong., 2nd sess.). The special board reported as follows (*id.*, pp. 11, *et seq.*):

> "To restore the diminished levels in the Lakes by constructing contracting works in their outlets does not,

however, present any serious difficulties. A careful discussion of the proper locations and dimensions of such works is also given in Appendix A.

"At the foot of Lake Ontario, the closure of the Gut channel of the Galops Rapids by the Canadian Government has had the effect of raising the level of Lake Ontario an amount nearly equal to the computed lowering of the Lake by a diversion of 10,000 second-feet at Chicago, and no compensation is at present deemed necessary to restore former conditions in this Lake.

"In Appendix A, it is proposed to diminish the outflow of Lake Erie, by the construction of three submerged weirs in the Niagara River in the vicinity of Squaw Island, which would average about 4.2 feet in height, and would contain about 15,000 cubic yards of masonry. The estimate cost is $150,000.

"To raise the level of Lakes Michigan and Huron, submerged weirs are proposed in St. Clair River, covering three miles of river below the mouth of Black River, at Port Huron. The weirs as suggested in Appendix A have a height of from five to six feet above the river bed, contain about 65,000 cubic yards of material, and their estimated cost is $325,000. It is computed that these weirs will increase the velocity of the water flowing over them slightly (from a mean of 3.28 feet to 3.89 feet per second) but on the other hand, above the mouth of Black River, the river slopes and velocities which are now excessive, will be diminished and navigation on the whole will be considerably benefited.

"The Chicago diversion has no effect on Lake Superior.

"Compensation for the loss of elevation on Lakes Michigan, Huron and Erie, and their connecting waters, due to an assumed diversion from Lake Michigan of 10,000 second-feet, will, by the plan above outlined, involve an expenditure of about $475,000, to which should be added an amount for the maintenance of the weirs, estimated at about $15,000 per year, the total cost being much less than the cost of restoration of

depths by dredging. It is the opinion of the board that while other plans have been proposed, compensation by fixed contraction works, similar in general to those above described affords the cheapest and most satisfactory method of preserving the levels of the Great Lakes."

The Warren report (*supra,* p. 66) recommended a system of submerged weirs to repair the damage caused to Lake St. Clair, the St. Clair River, and Lakes Huron and Michigan through the lowering of the levels of these waters. Colonel Warren stated (p. 90):

"128. There are three general methods by which a restoration of depths on the lakes may be sought—first, the deepening of all harbors and channels affected by the artificial lowering of water levels; second, the construtcion of regulating works in the outlets of the lakes to raise the levels of the lakes and to control their elevations within fixed limits; third, the contraction of the outlets by means of fixed obstructions which will raise the levels of the lakes without greatly affecting their natural fluctuations.

"129. The first method is considered altogether too expensive, and has other unsatisfactory features. It is recommended only for a few special cases. The second has frequently been proposed, but upon investigation it is found to be less simple than it appears. It involves obstructions to navigation and difficulties with ice. Moreover, it has been shown that efficient regulation of one lake tends to aggravate the fluctuations of those below it. This system has been adopted at the Soo, where circumstances are particularly favorable to it, but its suitability for the lower lakes is problematical. The third method is the cheapest and simplest, and is considered the most desirable. It is already operating successfully in the case of the Gut Dam.

"130. In section G 7 of Appendix E the works needed at various places to compensate for the effects of all

diversions, present or prospective, are considered in some detail. It is concluded that the project is entirely feasible and that the expense will not be excessive in view of the benefits received. The works involved include wing walls or other methods of narrowing the channels at the head of each of the St. Lawrence Rapids, a long submerged rock weir about the rapids at Niagara Falls, and a series of such weirs near the head of the Niagara River and in the upper reaches of the St. Clair River. To effect the required deepening in Lake St. Clair and at the head of the Detroit River it was thought that dredging would be most satisfactory."

The Board of Engineers for Rivers and Harbors, commenting upon this recommendation of Colonel Warren, said (*id.*, p. 44):

"The division engineer rejects the first and third plans for restoring levels and proposes to restore the levels of Lakes Erie, Huron, and Michigan by the construction of two sets of submerged weirs. One set of five would be at the head of the Niagara River abreast of Squaw Island, cost about $2,000,000, and raise Lake Erie 1.27 feet, Lake St. Clair about 0.55 foot, and Lakes Huron and Michigan about 0.16 foot, leaving 0.28 foot to be compensated by dredging in Lake St. Clair. The second set of about 11 weirs, spaced about one-third mile apart in the St. Clair River, would cost $1,500,000 and would raise Lakes Huron and Michigan 0.60 foot more. The levels of these three lakes and the connecting rivers between them would, at a total cost of about $3,660,000, be not only fully restored, but provision made for the lowering that would be caused by some additional diversion, the margin on Lake Erie being 0.51 foot and on Lakes Huron and Michigan 0.29 foot.

"85. These submerged weirs would leave the natural oscillation of Lakes Erie and Huron undisturbed. They would reduce the discharge capacity of the St. Clair and Niagara Rivers to what it was before any diversions or other artificial changes were made and

permit the lakes to fluctuate between such levels as would have resulted from purely natural causes, such as changes in precipitation, evaporation, etc. To design the weirs correctly, proper model experiments would be desirable and also prolonged gauge observation. In other respects, the weirs are a sound and workable solution of the problem of improving navigable depths, in some respects preferable at the time they were recommended to any other plan."

The Joint Board of Engineers, United States and Canada, in its report of November 16, 1926 (*supra*, p. 96), stated (pp. 14, 17):

"78. The levels of the Great Lakes can be raised by works in their outlet rivers, which may be wholly in the form of fixed weirs and contractions, or may be provided with sluice gates. The first of these have come to be termed 'compensating works,' while the second are termed 'regulating works.'

"79. The effect of compensating works is to raise both the high and low lake levels in substantially the same degree, the fluctuation of levels remaining unchanged. After the lake levels have adjusted themselves to the new regimen of the outlet, the outflow from the lake will likewise be substantially the same as if the compensating works had not been built. By operating the gates of regulating works the discharge from a lake, and consequently the levels of the lake, can be controlled within limits to be discussed later.

* * * * * *

"95. The investigations made by the Board show that it is advisable to construct compensating works in the Niagara and St. Clair Rivers to counteract the effect of all diversions and outlet enlargements on the levels of Lakes Michigan, Huron and Erie."

The Board then describes the works proposed in the Niagara River and St. Clair River. The cost of the works proposed on the Niagara River is estimated at about

$700,000, and on the St. Clair River, $2,700,000. The report then continues (*id.*, pp. 17, 18):

"98. This form of compensating works is selected primarily for the reason that the sills will not reduce the navigable width of this important waterway" (St. Clair River) "nor will they increase the cost of providing a channel depth of 30 feet. While these works once built cannot be altered readily to meet a future reduction in the amount of the Chicago diversion, yet on account of the commercial value of the gravel in the river bed it would not be costly to again enlarge the capacity of the river to meet such a reduction.

"99. *Construction periods.*—To avoid an unwarranted reduction in the flow of the Niagara and St. Lawrence Rivers while the Lakes are being raised by the compensating works, the construction on the Niagara River should be spread over two years and on the St. Clair River over four years time, and the prosecution of the latter should be suspended during any extreme low water periods that may occur at the time they are undertaken.

"100. *Compensation for authorized diversions only.*—The proposed compensating works will counteract not only the effect of diversions authorized by license in the United States and Canada but also the effect of outlet enlargements, diversions for navigation, and diversions not covered by license. The lake levels could be restored by similar but less extensive works to the extent that they have been reduced by diversions authorized by license in the two countries. The cost of such works would be nearly proportional to the amount of compensation of level affected, and is estimated as follows:

Diversion compensated for	Cost of works in Niagara River	Cost of works in St. Clair River
Chicago Sanitary District.....	$400,000	$1,350,000
Power diversions, Welland Canal	100,000	.....”

By the instructions given to the Joint Board of Engineers by the Governments of the United States and Canada, the Board was directed to answer the following questions (*id.*, p. 43):

"*Question 6 (B).*—By what measures could the water levels of navigable depths affected by the diversions referred to in Section 6 (A)" (which included diversion at Chicago of 8,500 c. f. s. through the drainage canal) "be restored, and what would be the cost thereof?"

The Joint Board answered as follows:

"240. *Answer.*—The water levels of Lakes Michigan, Huron, and Erie can be restored most advantageously by compensating works in the St. Clair and Niagara Rivers, which should, however, be so designed as to offset all existing diversions and outlet enlargements, as well as the diversions authorized by license. The total cost of these works is estimated at $3,400,000. The cost of similar but less extensive works, designed to restore the effect of authorized diversions only, is estimated as follows:

Diversion compensated for	Cost of works
Chicago diversion	$1,750,000
Power diversions, Welland Canal	100,000

"241. The effect of the diversions on the levels of Lake Ontario and of the St. Lawrence River above Montreal, will be removed by the works provided for the improvement of this part of the St. Lawrence.

"242. The effect of the authorized diversions on the levels of the St. Lawrence River at and below Montreal can be restored by dredging and accessory works at estimated costs as follows:

Dredging Montreal Harbor	$654,000
Reconstruction of dock walls, Montreal Harbor	1,800,000
Dredging below Montreal	2,154,000
Total	$4,608,000"

18. *Works and plans for treatment of sewage and industrial wastes within the territory of the Sanitary District of Chicago.*—On the opening of the drainage canal, the sewage flowed through the Chicago River into the canal without treatment, save by the dilution effected through the water withdrawn from Lake Michigan. The dilution method of dealing with sewage was at that time the method commonly used. But this method proved to be inadequate. The Sanitary District, beginning about the year 1908, carried on experiments in other methods of sewage treatment. Under pressure of the apparent necessity, and of the insistence of the War Department, a program for the construction and extension of treatment works was laid down. On August 7, 1919, the Board of Trustees of the Sanitary District adopted a program for purifying works, "at such a rate as continuously after the lapse of four years to diminish the amount of sewage including all wastes passing into the Des Plaines river by way of the Main Channel of the Sanitary District, so that within the period of twenty-five years such purification works shall be constructed and in operation, that the amount of raw sewage and wastes so passing into the Des Plaines river shall be at least fifty per cent less than that passing now." The cost was roughly estimated at $140,000,000. About the year 1920, a general program covering the following projects for artificial sewage disposal works was laid out, to-wit: (1) Des Plaines River sewage treatment works; (2) Calumet sewage treatment works; (3) North Side sewage treatment works; (4) industrial wastes treatment works, embracing Corn Products treatment plant and Stock Yards and Packing Town treatment plant; (5) West Side sewage treatment works; (6) South West Side sewage treatment works; (7) miscellaneous sewage treatment plants and sewers; (8) additional works required in connection with existing structures.

The Des Plaines River project covers the towns in the Des Plaines valley, from 12th street north to North avenue,

such as Broadview, Bellwood, Maywood, Melrose Park, Elmwood Park, River Forest, Forest Park, and about one-fourth of Oak Park. The present population is over 50,000. The plant was completed in August, 1922, costing with the intercepting sewers, about $3,500,000. It was designed as an experimental plant on a large scale.

The Calumet project covers all the area south of 87th street, and north of the Little Calumet River, but does not include the towns of Harvey, South Holland, and Phoenix. The treatment plant was finished in September, 1922. It is a sedimentation plant, designed to serve a population of about 225,000. There is room for the construction of additional sedimentation tanks and filters, to serve an ultimate population of 450,000 to 500,000. The project including sewers, cost about $19,000,000.

The North Side project covers all the area north of Fullerton avenue, Chicago, to the north line of Cook County. The area is about 62 square miles, and the population served about 800,000. The site was bought in 1921, the sewers were started in 1922, and the construction of the treatment plant was begun in 1923. It is an activated sludge plant. It will serve a population estimated at 830,000. There has been expended on this plant, approximately $25,000,000. It will be completed about 1928, and will cost, including sewers and pumping stations, about $31,000,000.

The industrial wastes project covers the Stock Yards and Packing Town, and the Corn Products Refining Company at Argo. The question whether the packers will bear any part of the burden is in the courts. It has recently been planned to take care of the Packing Town wastes at the Southwest Side plant. Beginning about 1920, the Sanitary District carried on experimental work to determine the best means of dealing with the Corn Products wastes and recently a plan has been worked out by which these wastes will be taken care of by the Company by a process of elimination.

The West Side project covers all the area south of Fullerton avenue, as far as 22nd street, including the Loop district and the West Side, west of the Chicago River and

north of the Sanitary and Ship Canal; also towns in the Des Plaines Valley, such as Western Springs, La Grange, Brookville, Lyons and Riverside. Recently, 500 acres of land have been acquired at 39th street and 52nd avenue, as a site for this plant. The population served will be 1,750,000. The first two contracts for construction were let in October, 1926. Another contract was advertised, and plans are being drawn for others. It is estimated that the project will cost about $40,000,000.

The Southwest Side plant covers the region between the West Side project and the Calumet project, the population being about 900,000. No definite plans have yet been drawn for that plant, but studies have been made for it.

Miscellaneous projects cover treatment plants for small towns and villages not covered by the main projects.

In September, 1924, the Sanitary District employed twenty-eight engineers, known as the "Engineering Board of Review", to make a comprehensive examination and report. The board embraced sanitary and hydraulic engineers from various parts of the United States. They made a preliminary report in December, 1924, approving in a general way the plans of the Sanitary District. Later, they made a report on the technical bases of their recommendations. These two reports were made part of the application of the Sanitary District to the Secretary of War for the permit of March 3, 1925, the recommendations of the board having been adopted by the board of trustees of the Sanitary District as the policy of the latter. The Board of Engineering Review recommended that the District proceed, as rapidly as was consistent with sound finance, to carry out the progressive program which substantially conformed to the district's plan above outlined, it being estimated that this program would involve an expenditure of about $125,000,000. These works, the Board stated, provide for complete treatment at the Des Plaines, Calumet, North Side, and at both industrial waste plants, and for partial treatment at the West Side and Southwest

Side treatment works. The Board said that this program should be completed by 1945, or earlier if practicable, including the necessary extensions of these plants to that date. Following the consummation of this program, the Board recommended that supplementary works for the complete treatment of the dry weather sewage and a small fraction of the storm flow be built as may be required to maintain satisfactory conditions in the canal and rivers, and that the District adopt the policy of providing these works, as storm overflows cannot be treated; that the District formally request the city of Chicago to put into effect without delay a practicable program of water waste prevention, including a water waste survey, and the progressive installation of meters; that the District continue to cooperate with all authorities interested in forwarding the Lakes-to-the-Gulf waterway, and that a fair settlement of all damages caused in the Illinois River Valley by the diversion at Chicago, for which the Sanitary District is responsible, should be made promptly; that the District offer to contribute its proper share of the cost of lake regulating works, to be installed in such manner as approved by the War Department; and that the District apply to the Federal authorities for permission to divert from Lake Michigan an annual average of 10,000 c. f. s. of water as measured at Lockport, for sanitary and navigation purposes, until such time as a reappraisal shall indicate that the most beneficial use of the waters of the Great Lakes requires a reconsideration of the amount of such diversion. The Board set forth its findings and conclusions on which its recommendations were based.

The conditions of the Secretary of War's permit of March 3, 1925, changed the program for sewage treatment, by requiring a more rapid rate of construction; and in order to meet that condition, the Illinois legislature amended the Sanitary District Act so as to permit the issue of bonds, to the extent of four per cent. of the assessed valuation, instead of three per cent. The United States engineer

at Chicago approved a schedule of design and construction for the period 1925 to 1929, and the Sanitary District is carrying out that program.

Much expert testimony has been given on both sides with respect to the feasibility of sewage treatment works adequate to permit of a large reduction, or a complete cessation, of the diversion of water from Lake Michigan, while at the same time safeguarding the water supply which the lake affords. The position of the complainants is that reducing the abstraction of water through the drainage canal to zero, or to 1,000 c. f. s., will not injure or impair the health of the city of Chicago, provided proper works are constructed for the disposal of sewage and protection of the water supply. The complainants point to conditions in other cities on the Great Lakes which take their water from the adjacent lake, into which also their sewage enters with a certain amount of treatment. These cities do not have the advantage of drawing off their sewage through a canal into another watershed. Thus, Milwaukee, Detroit, Toledo, Cleveland, and other communities must take their water supply from the adjacent waters, and at the same time use these waters as a receptacle for their sewage, partially treated. Complainants also insist that the works necessary to protect the public water supply, so as to provide at Chicago a supply equal or superior to the one now existing, could be constructed in from five to ten years.

The defendants introduced testimony to combat these contentions. They say that the experience of the complainants' witnesses has been limited to problems on a smaller scale than the one presented by the Sanitary District of Chicago; that Chcago now has an uncontaminated water supply and bathing beaches protected from pollution; that sewage treatment works which would not entail a prohibitive cost would not give complete protection; that to have complete processes of sewage treatment and the establishment of new tunnels and intakes for water supply far out into Lake Michigan, with a reconstruction of the sewer

systems of the District thus required, would entail an expenditure beyond their means, and would still leave a margin of risk of contamination. It should be added that, while it is apparent that the permit of the Secretary of War of March 3, 1925, was granted with a view to the reduction of the amount of the diversion from Lake Michigan, the defendants take the position that, even after the Sanitary District's program of sewage treatment has been carried out, a diversion of 10,000 c. f. s. will still be necessary for complete protection to the health of the city.

The death rate from typhoid fever per 100,000 of population in cities on the Great Lakes having over 100,000 inhabitants, is shown by the following table, in five-year averages:

TYPHOID FEVER DEATH RATE PER 100,000 POPULATION
CITIES OF OVER 100,000 POPULATION IN GREAT LAKES REGION
FIVE-YEAR PERIOD AVERAGES

	Chicago	Milwaukee	Detroit	Cleveland	Buffalo	Rochester	Hamilton	Toronto
1880-1884..	67.8	34.4	54.0(1)	67.2	53.0(2)	34.0		65.0
1885-1889..	57.8	31.8	46.0	52.6	28.8	33.0	39.4	52.8
1890-1894..	96.4	32.8	43.4	51.8	44.2	34.6	24.6	62.2
1895-1899..	37.6	18.0	19.4	33.4	23.4	20.2	18.2	21.6
1900-1904..	29.2	17.4	22.0	56.8	29.4	15.2	15.4	19.6
1905-1909..	16.6	23.0	21.6	15.2	24.4	12.4	19.4	23.0
1910-1914..	10.1	22.0	18.2	12.1	17.0	10.6	14.08	21.4
1915-1919..	2.9	7.48	11.3	5.6	9.0	3.76	4.52	3.7
1920-1925..	1.36	1.81	6.10	2.17	4.05	1.93	4.06(3)	2.02(3)

(1)Years 1880 and 1881 not included.
(2)Year 1880 not included.
(3)Year 1925 not included.

It will be observed that the highest rate was at Chicago, in the years 1890 to 1894, being 96.4. This was a time of a serious epidemic. This rate had been reduced, prior to the opening of the drainage canal in 1900, to an average of 37.6, for the years 1895 to 1899. The rate was further and greatly reduced until, in the years 1920 to 1925, it was 1.36 per hundred thousand, the lowest of the rates of the lake cities. The other lake cities, however, by the aid of

their sewage disposal works had cut down their rate, so that, in the years 1920 to 1925, it was 1.81 at Milwaukee 6.10 at Detroit; 2.17 at Cleveland; 4.05 at Buffalo; and 1.93 at Rochester.

It is evident that the questions presented by the expert testimony on sewage disposal are appropriate for determination by competent administrative authority. They relate to a subject still one of experimentation, requiring constant consideration and progressive adjustments in the light of advancing knowledge. On the question as to the character and extent of the sewage treatment works which would be needed under the conditions at Chicago, the percentage of adequacy obtainable, and the cost involved in construction and operation, in view of the conflict of testimony and the factors of uncertainty, it would be extremely difficult to make precise findings, and in my judgment, such findings are not necessary for the disposition of these suits. It is believed to be sufficient for the present purpose to state the general conclusions warranted by the evidence.

It is plain that the present flow from Lake Michigan through the drainage canal could not be immediately cut off, or reduced to 1,000 c. f. s., and in consequence the sewage of the Sanitary District in its present condition turned into Lake Michigan, without exposing the inhabitants of the District to grave risk of water-borne diseases, by contamination of the water supply taken from the lake. The Chicago River and the waters of the lake about the city would be filthy and noisome, with serious injury to the commerce of Chicago harbor. It appears from the testimony that it would take several years, not less than five years and perhaps ten years, or even more, before the sewage of the district, with such treatment as is practicable, could be turned into the lake and the diversion from the lake stopped or greatly reduced, without serious risk to the health of the people of Chicago. If the work of sewage treatment is efficiently carried on, and is extended by the most approved methods,

and additional and appropriate measures are taken for water purification, it appears to be possible largely to reduce or altogether to terminate the diversion from Lake Michigan, and still to give the city of Chicago a reasonable measure of immunity from disease through pollution of its water supply. Within what time this result could be achieved cannot now be definitely determined.

To secure the utmost practicable treatment of the sewage of the Sanitary District, and to reduce as rapidly as possible the diversion of water from Lake Michigan, without creating conditions which would seriously menace the health of Chicago, will require constant and expert administrative supervision, the continuous checking up of the results obtained by the installation of treatment works, and the insistence on such improved methods as from time to time will be available. Apart from the question of authority, which will be considered later, I find upon the facts here shown that the recommendation of the Chief of Engineers, above set forth (*supra*, p. 75) on the application for the permit of March 3, 1925, which underlay the conditions of that permit, was a reasonable one with respect to the measures immediately practicable.

The complainants have recognized the impracticability of ordering an immediate cessation of the diversion, and the suggestion made in the closing argument on their behalf before the Special Master was that the Court should determine the rights of the parties, and direct a discontinuance of the diversion, but should suspend the operation of the decree and hold it in the Court with requirements from time to time as to the action, and the time, that should be taken to bring about a condition which would permit of the decree becoming effective.

Questions of Law.

The questions of law are:

(1) Whether the complainants present a justiciable controversy and have the requisite interest to entitle them to invoke the jurisdiction of the Court; and if so,

(2) Whether the State of Illinois had the right, as against the complainants, to divert the waters of Lake Michigan in the manner and for the purposes shown, without the consent of the United States; and, if not,

(3) Whether Congress has the authority to control the diversion, that is, in its regulation to determine whether and to what extent the diversion should be permitted; and if so,

(4) Whether Congress has given the permission; and, if it has not directly,

(5) Whether the Secretary of War had authority under the Act of March 3, 1899, to regulate the diversion; and if so,

(6) Whether the permit of March 3, 1925, and its conditions, are valid; and, finally,

(7) As to the provisions of the decree which should be entered, in the light of the determination of these questions.

First. *Justiciable controversy.*—In *Cohens* v. *Virginia*, 6 Wheat. 264, 378, Chief Justice Marshall observed that in the case of "controversies between two or more States, between a State and citizens of another State", and "between a State and foreign states, citizens or subjects", the jurisdiction depended "entirely on the character of the parties." "If these be the parties, it is entirely unimportant what may be the subject of the controversy. Be it what it may, these parties have a constitutional right to come into the courts of the Union." But this broad statement has been modified (*Missouri* v. *Illinois*, 180 U. S. 208, 240), and it is recognized that, to give the Court jurisdiction of a controversy between States, it must be of a nature appropriate to the exercise of the judicial power. Chief

Justice Fuller, speaking for the Court in *Louisiana* v. *Texas,* 176 U. S. 1, 15, observed that it was not contemplated that the jurisdiction would be exercised, save where the matter itself was "properly justiciable." "Undoubtedly", said Chief Justice Fuller, "as remarked by Mr Justice Bradley in *Hans* v. *Louisiana,* 134 U. S. 1, 15, the Constitution made some things justiciable which were not known as such at the common law; such, for example, as controversies between States as to boundary lines, and other questions admitting of judicial solution * * * The establishment of this new branch of jurisprudence seemed to be necessary, for the extinguishment of diplomatic relations between the States. Of other controversies between a State and another State, or its citizens, which on the settled principles of public law are not subjects of of judicial cognizance, this Court has often declined to take jurisdiction."

The defendants earnestly contend that the present controversy is of the latter sort. Without attempting to draw a line between what may be regarded as justiciable and non-justiciable (a line which is not to be established by a rigid initial definition, but must be pricked out in the course of the consideration and decision of questions as they arise), there are certain analogies which are persuasive in the instant case.

The Court has repeatedly taken jurisdiction in controversies between States in relation to the diminution of the flow and the pollution of interstate waters. In *Missouri* v. *Illinois and the Sanitary District of Chicago,* 180 U. S. 208, it was alleged that the turning of Chicago's sewage into the Sanitary District's drainage canal polluted the Mississippi River and created a continuing nuisance, dangerous to the health of the people of Missouri. The Court took jurisdiction. In *Kansas* v. *Colorado,* 185 U. S. 125, Kansas filed her bill, on behalf of her citizens as well as in vindication of her rights as an individual owner, seeking relief from being deprived of the waters of the Arkansas

River accustomed to flow through the State. The State of Colorado contended that, as a sovereign State, she was justified, if her geographical situation and material welfare demanded it in her judgment, in consuming for beneficial purposes all the waters of the river within her boundaries, and that as the sources of the river were in Colorado she might wholly deprive Kansas of any use or share in its waters. "Comity", said the Court, "demanded that navigable rivers should be free, and therefore, the freedom of the Mississippi, the Rhine, the Scheldt, the Danube, the St. Lawrence, the Amazon, and other rivers has been at different times secured by treaty; but if a State of this Union deprives another State of its rights in a navigable stream, and Congress has not regulated the subject, as no treaty can be made between them, how is the matter to be adjusted?" While in that case, the bill was ultimately dismissed, without prejudice (206 U. S. 46), as had also been the result in *Missouri* v. *Illinois,* 200 U. S. 496, the Court found no difficulty in sustaining its jurisdiction to determine the merits of the controversy.

In *New York* v. *New Jersey,* 256 U. S. 296, New York sought an injunction against the discharge of a large volume of sewage into that part of New York Harbor known as the Upper Bay, as constituting a serious injury to the health, prosperity and commercial welfare of the people of the State and city of New York. The Court took jurisdiction, but, finding the proofs inadequate, dismissed the bill, but without prejudice to the institution of another suit, if the proposed sewer in operation should prove to be sufficiently injurious to lead New York to believe that she needed the interposition of the Court.

The controversy in *Wyoming* v. *Colorado,* 259 U. S. 419, related to a proposed diversion in Colorado of the waters of the Laramie River, an interstate stream. Wyoming sought to prevent the diversion on two grounds: one, that, without her sanction, the waters of the interstate stream could not rightfully be taken from its watershed and carried into

another, where she never could receive any benefit from them; and the other, that, through many appropriations made at great cost, which were prior in time and superior in right to the proposed Colorado diversion, Wyoming and her citizens had become entitled to use a large portion of the waters of the river in the irrigation of lands in that State, and that the proposed diversion would seriously interfere with these prior appropriations. Colorado asserted her right to use the waters within her borders, and further, that in any event she was entitled to an equitable division of the waters of the river in question. The Court took jurisdiction, and finding that each State applied the doctrine of priority of appropriation in her own territory, determined the controversy by applying this doctrine and enjoined the defendants from diverting more than a specified quantity of water from the Laramie River.

In *North Dakota* v. *Minnesota,* 263 U. S. 365, it was decided that, when a State, by changing the method of draining surface waters within her borders, increases the flow of an interstate stream greatly beyond its natural flow, so that the water is thrown upon farms in another State, the latter State could properly resort to the original jurisdiction of the Court for relief. The relief was denied on the facts, but the jurisdiction to determine the merits was sustained.

I am unable to conclude that the rights of the complainant States with respect to the diversion at Chicago of the waters of Lake Michigan, directly resulting in an appreciable diminution of the waters of the Great Lakes and connecting channels, to the alleged injury of the commercial and navigation interests of these States and their people, are any the less susceptible of judicial determination than the rights of Kansas, Wyoming and North Dakota with respect to the waters of interstate streams. The circumstance that the waters are those of lakes, and not of rivers, furnishes no ground for holding that the controversy is justiciable in the one case and not justiciable in the other.

Pennsylvania v. *West Virginia* (262 U. S. 553, 623; 263 U. S. 350), presented the issue whether one State may withdraw a natural product (natural gas), a common subject of commercial dealings, from an established current of commerce moving into the territory of another State. The complainant State asserted that such a withdrawal was an interference with interstate commerce, forbidden by the Constitution. "This", said the Court, "is essentially a judicial question. It concededly is so in suits between private parties and of course its character is not different in a suit between States."

The question of the right of Illinois to provide for the diversion of the waters of Lake Michigan, on the scale, in the manner and with the results described, without the consent of the United States, and the question of the power of Congress to control such a diversion; the question what action has been taken by Congress and its legal effect; the question as to the construction of the Act of 1899, and the validity and effect of the permits of the Secretary of War, are questions of the construction and application of the Constitution of the United States, and of acts of Congress, all of which are appropriate for judicial determination. The contention of the defendants that the Secretary of War acted under the authority of Congress, and thus that the action of the political department of the Government is involved, goes not to the jurisdiction, but to the merits, as the contention proceeds on the assumption of the validity of the acts which the complainant States call into question.

On this question of jurisdiction, I find no difficulty, so far as the interest of the complainant States is concerned. If Missouri and New York could maintain suits to prevent the pollution of their adjacent waters; if Kansas, Wyoming and North Dakota were entitled to invoke the jurisdiction with respect to their rights in interstate streams; if Georgia could bring suit to prevent injury caused by the discharge of noxious gases by a Tennessee corporation across the border and into her territory, on the ground of

injuries to the interests of the State and her people; it would seem that the complainant States in this case have similar interests and enjoy the same right. In *Missouri* v. *Illinois,* 180 U. S. 241, the Court said that suits brought by individuals, each for personal injuries threatened or received, would be a wholly inadequate remedy. Substantial impairment of the health and prosperity of the towns and cities of the States situated on the Mississippi River, including its commercial metropolis, would seriously affect the entire State. In *Georgia* v. *Tennessee Copper Company,* 206 U. S. p. 237, it was said that the suit was "by a State for an injury to it in its capacity of quasi-sovereign. In that capacity, the State has an interest independent of and behind the title of its citizens, in all the earth and air within its domain." I should say the same as to water.

In *Pennsylvania* v. *West Virginia,* 262 U. S. p. 592, it was said that the withdrawal of the natural gas from the interstate stream was "a matter of grave public concern in which the State, as the representative of the public, has an interest apart from that of the individuals affected."

Finally, it is urged that, in the present condition of affairs, in view of the exigency at Chicago, the problem presented is not such as to admit of judicial solution. If, however, a suit had been brought at the outset, when the diversion began or was planned and threatened, the practical difficulties would have been less grave and would not have stood, it would seem, in the way of a judicial determination of the questions presented. A judicial solution would have been no more difficult than in the suit instituted by Missouri, relating to the same drainage canal. The question must be whether the controversy, in its nature, is such as to be susceptible of judicial determination; and such, I believe, it must be found to be. The difficulties arising from a lapse of time, the growth of population, the establishment of extensive works involving large expenditures, the adjustment of local interests to present methods, the length of time needed for new measures, are considerations going to

the nature and extent of the remedy, if the diversion were found to be unauthorized and unlawful, rather than to the jurisdiction of the Court. The fact that the problem as now presented would seem to be one appropriate for administrative consideration and solution, if such could lawfully be had, does not defeat the jurisdiction to determine whether the administrative action hitherto taken has been valid. The questions whether the diversion is unauthorized and unlawful in the absence of competent federal action, as to the extent of the power, and the exercise of the power, of Congress, and the validity of the action of the Secretary of War, are deemed to be appropriately presented for the decision of the Court.

Second. *The necessity of obtaining the consent of the United States in order to justify the diversion.*—The Sanitary District of Chicago, after stating that the Illinois Act of 1889 requires the diversion of about 9876 c. f. s. of water from Lake Michigan, avers in its answer (paragraph 14) that this defendant "cannot divert said quantity of water, and does not intend to divert said quantity of water or any other quantity, except by and with the authority of the United States according to law." The State of Illinois adopted as its own the answer of the Sanitary District, with this averment.

That it was necessary to obtain the consent of the United States, in order to justify the diversion, is deemed to have been determined by this Court in *Sanitary District of Chicago* v. *United States,* 266 U. S. 405. In giving judgment for the United States enjoining the diversion of a greater quantity of water than that then authorized by the permit of the Secretary of War, the Court said (*id.*, p. 426):

> "The main ground is the authority of the United States to remove obstructions to interstate and foreign commerce. There is no question that this power is superior to that of the states to provide for the welfare or necessities of their inhabitants. In matters where

> the States may act, the action of Congress overrides what they have done. *Monongahela Bridge Co.* v. *United States,* 216 U. S. 177. *Second Employers' Liability Cases,* 223 U. S. 1, 53. But in matters where the national importance is imminent and direct even where Congress has been silent the States may not act at all. *Kansas City Southern Ry. Co.* v. *Kaw Valley Drainage District,* 233 U. S. 75, 79. Evidence is sufficient, if evidence is necessary, to show that a withdrawal of water on the scale directed by the statute of Illinois threatens and will affect the level of the Lakes, and that is a matter which cannot be done without the consent of the United States, even were there no internationad covenant in the case."

Moreover, it is unnecessary to consider what right the State of Illinois would have had to create the diversion in the absence of prohibition by Congress, for if Congress has the power to prohibit, it has effectively prohibited action of this sort save on compliance with specified requirements. By the Act of September 19, 1890, 26 Stat. 454, 455, Congress inaugurated a new policy of general, direct control over the navigable waters of the United States. Section 7 of this Act made it unlawful "to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of the channel of said navigable water of the United States, unless approved and authorized by the Secretary of War." "By this legislation," said this Court in *Southern Pacific Company* v. *Olympian Dredging Company,* 260 U. S. 205, 208, referring to the above-quoted and other provisions of the Act of 1890, "Congress assumed jurisdiction of the subject of obstructions to navigation and committed to the Secretary of War administrative power in so far as administration was necessary." Section 10 of the same Act prohibited "the creation of any obstruction, not affirmatively authorized by law, to the navigable capacity of any waters, in respect of which the United States has jurisdiction." The words "affirmatively authorized by

law" in this section, were held to be satisfied with regard to a boom across a river by authority from a State. *United States* v. *Bellingham Bay Boom Co.,* 176 U. S. 211. The prohibitions of Sections 7 and 10 of the Act of 1890 were extended by Sections 9 and 10 of the Act of March 3, 1899, 30 Stat. 1151, U. S. C., Tit. 33, Secs. 401, 403. For the words "not affirmatively authorized by law" Congress substituted the words "not affirmatively authorized by Congress," in prohibiting the creation of any obstruction to navigable capacity, and amplified the provision as to excavating, filling, or altering or modifying the course, location, condition or capacity, without the authority of the Secretary of War.

There is no room for doubt that Section 10 of the Act of 1899, the construction of which will be considered later (*infra,* p. 176), applies to the diversion in question. This Court has characterized that section as "a broad expression of policy in unmistakable terms" and has said that there "is neither reason nor opportunity for a construction that would not cover the present case," that is, the diversion through the Chicago Drainage Canal. *Sanitary District* v. *United States,* 266 U. S. 405, 429.

The diversion had not yet been effected when the Act of March 3, 1899, was passed and, in any event, this action of Congress rendered nugatory any conflicting authorization either State or Federal. *Union Bridge Co.* v. *United States,* 204 U. S. 364; *Monongahela Bridge Co.* v. *United States,* 216 U. S. 177; *Louisville Bridge Co.* v. *United States,* 242 U. S. 409.

My conclusion is that the action of Illinois in diverting water from Lake Michigan through the drainage canal of the Sanitary District was, and is, unlawful unless validly permitted by Congress either directly or through the action of the Secretary of War.

Third. *The power of Congress to control the diversion, that is, in its regulation to determine whether any diversion*

of the water of Lake Michigan should be permitted, and, if so, to what extent.

Complainant States challenge the power of Congress to permit the diversion in question, either directly or through authority conferred on the Secretary of War, upon the grounds, (1) that the diversion constitutes a taking of complainants' property without due process of law and without just compensation in violation of the Fifth Amendment; (2) that Congress could not authorize the diversion from the Great Lakes-St. Lawrence watershed to the Mississippi watershed; (3) that the authorization of the diversion would constitute a preference of the ports of one State over those of another in violation of Article I, Section 9, Clause 6, of the Constitution; (4) that the power of Congress extends to the protection and improvement of navigation but not to its destruction or to the creation of obstructions to navigable capacity; and (5) that the diversion is for purposes of sanitation and development of power rather than of navigation and hence is outside the authority of Congress under the commerce clause.

1. The general principles governing the rights of the complainant States and the authority of Congress with respect to the waters of the Great Lakes are well established. The States have sovereign and proprietary rights over the navigable waters, and the lands underlying them, within their boundaries subject to the powers surrendered to the national government. *Port of Seattle* v. *Oregon & Washington R. Co.*, 255 U. S. 56, 63; *United States* v. *Holt State Bank*, 270 U. S. 49, 54; *Appleby* v. *New York*, 271 U. S. 364, 381. Those of the complainants which were not among the original thirteen States were admitted to the Union on an equality with the latter, and they have the same rights as the other States with respect to navigable waters, and the land under such waters, within their respective jurisdictions. *Shively* v. *Bowlby*, 152 U. S. 1. The States have authority to determine for themselves

such rules of property as they may deem expedient with respect to the waters within their borders, both navigable and non-navigable, and the ownership of the lands forming their beds and banks. *United States* v. *Cress,* 243 U. S. 316, 319; *Barney* v. *Keokuk,* 94 U. S. 324. But the rights of all States in navigable waters are subject to the paramount power of Congress in the regulation of interstate and foreign commerce. The provision of Article IV of the Ordinance of July 13, 1787, for the government of the Northwest Territory (1 Stat. 51, 52) that "The navigable waters leading into the Mississippi and Saint Lawrence, and the carrying places between the same, shall be common highways, and forever free", while not subject to repeal by one of the States in relation to the public rights of highway on navigable waters, does not derogate from the power of Congress under the commerce clause. *Economy Light & Power Co.* v. *United States,* 256 U. S. 113, 120, 121. Commerce includes navigation and the power to regulate commerce comprehends control of navigable waters for that purpose. *Gibbons* v. *Ogden,* 9 Wheat. 1, 189, 190, 197. The power of Congress is complete in itself and may be exercised to the utmost extent, and acknowledges no limitations other than are prescribed in the Constitution. *Gibbons* v. *Ogden,* 9 Wheat. 1, 196. Such a limitation is found in the Fifth Amendment, that private property shall not be taken for public use without just compensation (*Monongahela Navigation Co.* v. *United States,* 148 U. S. 312, 333) and, aside from actual expropriation, there may be such a direct invasion of private property as to constitute a "taking" in the constitutional sense. Thus where, under the authority of Congress, dams have been constructed in navigable waters so as to raise their levels and subject private lands to constant or frequent overflows, it has been held that property has been taken within the meaning of the Fifth Amendment. *United States* v. *Lynah,* 188 U. S. 445; *United States* v. *Cress,* 243 U. S. 316. In such a case, it must appear that there has been "an actual, permanent invasion

of the land, amounting to an appropriation of, and not merely an injury to the property". *Sanguinetti* v. *United States,* 264 U. S. 146, 149.

The causing of incidental damage through the exercise of the constitutional authority of Congress does not constitute a taking of property for public use. In the discretion of Congress, and through administrative action which Congress authorizes, structures may be erected in the beds of navigable waters, jetties may be constructed, channels may be altered, navigators may be required to pass within a prescribed channel and other channels may be closed, dikes may be built which interfere with, or cut off, accessibility to navigable waters, harbor lines may be laid down and regulating works constructed which preclude uses and improvements of property, otherwise possible and valuable, and riparian proprietors have no ground for complaint by reason of the actual, but incidental, damage thus sustained, for the reason that their ownership is subject to the servitude of the exercise of the governmental power. It is a case of *damnum absque injuria. South Carolina* v. *Georgia,* 93 U. S. 4; *Gibson* v. *United States,* 166 U. S. 269; *Scranton* v. *Wheeler,* 179 U. S. 141; *Chicago, Burlington & Quincy Railway Co.* v. *Drainage Commissioners,* 200 U. S. 561; *West Chicago R. R. Co.* v. *Chicago,* 201 U. S. 506; *Union Bridge Co.* v. *United States,* 204 U. S. 364; *Philadelphia Co.* v. *Stimson,* 223 U. S. 605; *United States* v. *Chandler-Dunbar Co.,* 229 U. S. 53; *Jackson* v. *United States,* 230 U. S. 1; *Greenleaf Johnson Co.* v. *Garrison,* 237 U. S. 251; *Willink* v. *United States,* 240 U. S. 572; *John Horstmann Co.* v. *United States,* 257 U. S. 138; *United States* v. *River Rouge Improvement Co.,* 269 U. S. 411, 419.

In *Gibson* v. *United States, supra,* the construction of a dike in the Ohio River under authority of the Secretary of War had substantially destroyed the landing on and in front of Mrs. Gibson's farm by preventing free access to the navigable channel. It was held that this damage was but an incidental consequence of the lawful exercise of

governmental power and that the Government's action was not a taking of property for which compensation should be made. On the same principle, when Congress determined that the entire St. Marys River between the American bank and the international line, as well as all of the upland north of the existing ship canal, throughout its entire length, was necessary for the purposes of the navigation of these waters, and the waters connected therewith, it was decided that while compensation must be made for the upland actually taken, it was not necessary to compensate a riparian owner for the depreciation of the opportunity to use the rapids and falls of the river, although the complaining corporation had title to the bed of the stream up to the international boundary, two-thirds of the volume of the water flowed over its submerged lands, and under revocable permits of the Secretary of War it had established structures in the rapids for developing power. *Chandler-Dunbar Co.* v. *United States, supra.*

The decisions which have been cited, and the principle they apply, seem to me to dispose of the contention that, in this instance, if it be assumed that the diversion has been authorized under action of Congress, otherwise competent, the property of the complainant States has been taken in violation of the Fifth Amendment. Where, pursuant to governmental authorization otherwise valid, there is an abstraction of water from navigable lakes and rivers and a consequent lowering of levels by enlarging or opening outlets, the incidental damage to riparian owners affords no ground for asserting the constitutional invalidity of that action. Great States as riparian owners, as well as individuals, are subject to the authority of Congress, and they have no ownership in navigable waters which they can assert in opposition to the exercise of that authority.

2. It is contended that it is beyond the power of Congress to authorize the transfer of water of Lake Michigan from the Great Lakes-St. Lawrence watershed to the Mississippi watershed.

There is no such limitation in the grant to Congress to regulate interstate and foreign commerce. The power to control navigation, comprehended within that commerce, is a national power, and for the purposes of this control navigable waters are the public property of the nation (*Gilman* v. *Philadelphia,* 3 Wall. 713, 725) and subject to such restraint as Congress may deem expedient from a national point of view, not limited by the interests of any particular port, harbor, State or States, watershed, or any territorial division within the national jurisdiction. As Chief Justice Marshall said in *Gibbons* v. *Ogden,* 9 Wheat. 1, 197: "If, as has always been understood, the sovereignty of Congress, though limited to specified objects, is plenary as to those objects, the power over commerce with foreign nations, and among the several States, is vested in Congress as absolutely as it would be in a single government, having in its constitution the same restrictions on the exercise of the power as are found in the Constitution of the United States. The wisdom and the discretion of Congress, their identity with the people, and the influence which their constituents possess at elections, are, in this, as in many other instances, as that, for example, of declaring war, the sole restraints on which they have relied, to secure them from its abuse. They are the restraints on which the people must often rely solely, in all representative governments."

In *South Carolina* v. *Georgia,* 93 U. S. 4, it appeared that by a compact made in 1787 the boundary between the two States was defined as the most northern branch or stream of the Savannah River and it was provided that the navigation of the river along a specified channel should be equally free to the citizens of both States. The Secretary of War, acting under the authority of Congress, undertook to improve another channel which navigators were consequently compelled to use, at the expense of the one described in the compact. In deciding that South Carolina had no ground for complaint, the Court thus expressed its

opinion as to the scope of the power granted to Congress (*id.*, p. 12):

> "It" (Congress) "may require all navigators to pass along a prescribed channel, and may close any other channel to their passage. If, as we have said, the United States have succeeded to the power and rights of the several States, so far as control over interstate and foreign commerce is concerned, this is not to be doubted. Might not the States of South Carolina and Georgia, by mutual agreement, have constructed a dam across the cross-tides between Hutchinson and Argyle Islands, and thus have confined the navigation of the Savannah River to the southern channel? Might they not have done this before they surrendered to the Federal government a portion of their sovereignty? Might they not have constructed jetties, or manipulated the river, so that commerce could have been carried on exclusively through the southern channel, on the south side of Hutchinson's Island? It is not thought that these questions can be answered in the negative. Then why may not Congress, succeeding, as it has done, to the authority of the States, do the same thing? Why may it not confine the navigation of the river to the channel south of Hutchinson's Island; and why is this not a regulation of commerce, if commerce includes navigation? We think it is such a regulation."

If Congress decided that it was in the interest of the country as a whole to open and improve a waterway from Lake Michigan to the Mississippi River and the Gulf of Mexico, and for that purpose diverted water from Lake Michigan to the Mississippi watershed, there would seem to be no constitutional difficulty so far as the diversion is concerned. Its practicability, its amount, the effect on the Great Lakes-St. Lawrence watershed, and on the States bordering on the Great Lakes, the question where the balance of national interest lay after appropriate appraisal of all local interests and of international relations, would

be matters for the consideration of Congress exercising the sovereign power of the nation in determining national policy.

The case of *Hudson Co. Water Company* v. *McCarter,* 209 U. S. 349, cited by the complainants, related to the authority of the State to prevent one of its corporations from diverting the water from one of its streams into another State, and the question of the authority of Congress in dealing with navigable waters was not involved. In *Missouri* v. *Illinois,* 200 U. S. 496, 526, in speaking of the diversion now in question, the Court noted that "some stress was laid on the proposition that Chicago is not on the natural watershed of the Mississippi, because of a rise of a few feet between the Desplaines and the Chicago Rivers." The Court observed that the "natural features relied upon are of the smallest." The historic route from Lake Michigan to the Mississippi was the subject of consideration by the Court in *Economy Light & Power Company* v. *United States,* 256 U. S. 113, where the United States obtained an injunction against the construction of a dam in the Des Plaines River without the consent of Congress. It had been found in the District Court that there was no evidence of actual navigation at that point within the memory of living men and that there would be no present interference with navigation by the building of the proposed dam. The Circuit Court of Appeals did not disturb this finding. But both courts found that in its natural state the river was navigable in fact, and that it was actually used for the purposes of navigation and trading in the early manner down to the end of the first quarter of the nineteenth century. Describing the natural conditions, the Court said (*id.,* pp. 117, 118):

> "Suffice it to say that there was a well-known route by water, called the Chicago-Desplaines-Illinois route, running up the Chicago River from its mouth on Lake Michigan to a point on the west fork of the south branch; thence westerly by water or portage, accord-

ing to the season, to Mud Lake, about 2 miles; thence to the Desplaines near Riverside, 2 miles; thence down the Desplaines to the confluence of that river with the Kankakee, where they form the Illinois River; thence down the Illinois to its junction with the Mississippi. During the period mentioned the fur trade was a leading branch of commerce in the western territory, and it was regularly conducted upon the Desplaines River. Supplies in large quantity and variety, needed by the early settlers, also were transported over this route between Chicago and St. Louis and other points. Canoes and other boats of various kinds were employed, having light draft but capable of carrying several tons each, and manned by crews of six or eight men. The route was navigated by the American Fur Company regularly during a period of years down to about 1825, after which it was disused because the trade had receded to interior portions of Illinois that could be reached more conveniently with horses. Later, changes occurred in the river, due to the drainage of a swamp in the region of the portage, the clearing away of forests affecting the rainfall and the distribution of the run-off, and thus shortening the duration of the higher stages of water; the construction (under state authority) of the Illinois and Michigan Canal in 1848 and its deepening in 1866 to 1871, which diverted a part of the hill drainage towards the Chicago River; and the construction of the Sanitary and Ship Canal in 1892 to 1894.

"But, in spite of these changes, the Circuit Court of Appeals finds (256 Fed. Rep. 804) that the Desplaines River is a continuous stretch of water from Riverside (at the Chicago divide) to its mouth; and although there is a rapid, and in places shallow water, with boulders and obstructions, yet these things do not affect its navigable capacity; that the same is true of the upper part of the Illinois River above the head of steamboat navigation; and that both streams are navigable and are within the Act of 1899."

The Court then considered the public interest in navigable streams of this character in Illinois and neighboring States as evidenced by the Ordinance of July 13, 1787, for the government of the Northwest Territory, and by various acts of Congress, and found it to be beyond doubt "that the waters of the Chicago-Desplaines-Illinois route 'and the carrying places between the same' constituted one of the routes of commerce intended by the Ordinance, and the subsequent acts referred to, to be maintained as common highways" (*id.*, p. 120), and the Court concluded as follows (*id.*, p. 124):

> "The Desplaines River, after being of practical service as a highway of commerce for a century and a half, fell into disuse, partly through changes in the course of trade or methods of navigation, or changes in its own condition, partly as the result of artificial obstructions. In consequence, it has been out of use for a hundred years; but a hundred years is a brief space in the life of a nation; improvements in the methods of water transportation or increased cost in other methods of transportation may restore the usefulness of this stream; since it is a natural interstate waterway, it is within the power of Congress to improve it at the public expense; and it is not difficult to believe that many other streams are in like condition and require only the exertion of federal control to make them again important avenues of commerce among the States."

I think that recognition of the power of Congress to control the diversion of water from Lake Michigan to the Mississippi watershed, that is to determine whether any such diversion should be permitted, and if so, to what extent, necessarily underlay the decision in *Sanitary District of Chicago* v. *United States,* 266 U. S. 405, for that suit appears to have been brought, prosecuted, and decided in the view that the Sanitary District was limited to the withdrawal of 4167 c. f. s. from Lake Michigan. This limitation was enforced because it was the extent of the permit granted

by the Secretary of War under the authority of Congress. The diversion was treated as duly authorized up to that point, but not beyond it. Referring to the arguments of the Mississippi Valley States as *amici curae,* the Court said: "The interest that the River States have in increasing the artificial flow from Lake Michigan is not a right, but merely a consideration that they may address to Congress, if they see fit, to induce a modification of the law that now forbids that increase unless approved as prescribed." (*id.,* p. 431).

It seems to me that the authority of Congress to regulate the diversion in the present instance is not to be denied merely because the water is taken from one watershed to another.

3. The provision of Article I, Section 9, Clause 6 of the Constitution that no preference shall be given by any regulation of commerce or revenue to the ports of one State over those of another, has received but limited judicial construction. By its express terms, it governs the action of Congress in regulating commerce and cannot be understood as applicable to those laws only which are passed for the purpose of revenue. *Gibbons* v. *Ogden,* 9 Wheat. 1, 191. An exposition of the origin and meaning of the clause is found in the *Wheeling Bridge* case (*Pennsylvania* v. *Wheeling & Belmont Bridge Co.,* 18 How. 421). The Court thought (*id.,* p. 435) that "the history of the provision, as well as its language, looks to a prohibition against granting privileges or immunities to vessels entering or clearing from the ports of one State over those of another. That these privileges and immunities, whatever they may be in the judgment of Congress, shall be common and equal in all the ports of the several States." There was deemed to be much included in the prohibition, and certainly it might "embrace any other description of legislation looking to a direct privilege or preference of the ports of any particular State over those of another." But the clause, in terms, seemed to the Court "to import a prohibition against some positive legislation by Congress to this effect, and not against any incidental

advantages that might possibly result from the legislation of Congress upon other subjects connected with commerce, and confessedly within its power." (*id.*, p. 435).

It was contended in that case that the Act of Congress declaring the bridge at Wheeling across the Ohio River to be a lawful structure gave a preference to that port over Pittsburgh, that the vessels to and from Pittsburgh navigating the Ohio and Mississippi Rivers were not only subject to delay and expense in the course of the voyage, but that the obstruction would necessarily have the effect of stopping the trade and business at Wheeling or to divert them in some other direction or channel of commerce. "Conceding all this to be true," said the Court (*id.*, p. 433), "a majority of the court are of opinion that the act of Congress is not inconsistent with the clause of the constitution referred to—in other words, that is not giving a preference to the ports of one State over those of another, within the true meaning of that provision. There are many acts of Congress passed in the exercise of this power to regulate commerce, providing for a special advantage to the port or ports of one State, and which very advantage may incidentally operate to the prejudice of the ports in a neighboring State, which have never been supposed to conflict with this limitation upon its power. The improvement of rivers and harbors, the erection of light-houses, and other facilities of commerce, may be referred to as examples. It will not do to say that the exercise of an admitted power of Congress conferred by the Constitution is to be withheld, if it appears, or can be shown, that the effect and operation of the law may incidentally extend beyond the limitation of the power. Upon any such interpretation, the principal object of the framers of the instrument in conferring the power would be sacrificed to the subordinate consequences resulting from its exercise. These consequences and incidents are very proper considerations to be urged upon Congress for the purpose of dissuading that body from its exercise, but afford no ground for denying the power itself, or the right to exercise it." (*id.*, pp. 433, 444).

The same point was raised in *South Carolina* v. *Georgia,* 93 U. S. 4. South Carolina insisted that the action of the Secretary of War in closing the channel of the Savannah River on the South Carolina side of Hutchinson's Island gave an unconstitutional preference to the ports of Georgia. The Court dismissed the contention, adopting the view expressed in the *Wheeling Bridge* case. I am of the opinion that the diversion in the present case, if otherwise lawfully authorized, cannot be regarded as beyond the power of Congress, as an unconstitutional preference of ports.

4. It is further insisted that the power of Congress extends to the protection and improvement of navigation but not to its destruction or to the creation of obstructions to navigable capacity.

It has been declared by this Court that "the right of the United States in the navigable waters within the several States is limited to the control thereof for purposes of navigation" (*Port of Seattle* v. *Oregon & Washington R. Co.,* 255 U. S. 56, 63) and "while Congress, in the exercise of this power, may adopt, in its judgment, any means having some positive relation to the control of navigation and not otherwise inconsistent with the Constitution, *United States* v. *Chandler-Dunbar Co.,* 229 U. S. 62, it may not arbitrarily destroy or impair the rights of riparian owners by legislation which has no real or substantial relation to the control of navigation or appropriateness to that end." *United States* v. *River Rouge Improvement Company,* 269 U. S. 411, 419. This was ruled in a condemnation proceeding where the United States sought deduction of special benefits and the trial court had erroneously charged the jury that the Government had "the absolute power of control" over navigable streams; and, limiting the rights of riparian owners in this view, the Court had refused the Government's request for an instruction that, with respect to the consideration of the existence and amount of the special benefits due to an improvement, the Government's power

over navigable streams could not be arbitrarily and capriciously exercised so as to destroy these riparian rights but must be exercised with reasonable relation to the requirements of navigation (*id.*, pp. 416-418). This is but an illustration of the principle that there is no room in our system of government for the exercise of arbitrary power and every valid exercise of the power conferred by the Constitution must have reasonable relation to the subject of the power.

But it does not follow that when Congress does act in reasonable relation to the control of navigation, the Court may review the exercise of the discretion of Congress and decide for itself whether that which Congress has authorized is a benefit to navigation or the reverse. It is of the essence of the power of Congress that it has the final determination of that question. The improvement of navigation, the protection and promotion of its facilities and the creation or removal of obstructions to it, involve questions of relation and degree. What may appear to be a destruction or obstruction at one point, with respect to the interests of navigation, may be a benefit or improvement to navigation at another point or in the light of a different relation. When it appears that navigation is affected, it also appears that the question is one for Congress to decide in the light of all pertinent facts. A dike or dam, or works regulating the flow or discharge of navigaable waters, may destroy the possibility of navigation at a particular place, but may be a benefit to navigation when other places or sections are considered. The inhabitants or riparian owners of a particular place or port or region have no constitutional right to the exercise of the discretion of Congress in their favor as opposed to others. It is for Congress, after considering, as it is presumed to consider, the interests of particular localities and of all regions that may be affected by its action, and the consequences to navigation in all its aspects, to determine what is or is not to be deemed an obstruction to navigation, and its decision in this respect is not subject to judicial review.

This principle has had abundant illustration. It has direct application to cases of bridges which are built in and across navigable waters and may unquestionably to some extent obstruct navigation. In the *Wheeling Bridge* case, 18 How. 421, the bridge across the Ohio River did in fact impede steamboat navigation and a decree of this Court (13 How. 625) had declared it to be an obstruction to navigation and had directed that the obstruction be removed either by elevating the bridge to a height designated or by abatement. But when Congress, after this decree, and by the Act of August 31, 1852, declared the bridge to be a lawful structure, the Court held that the bridge was no longer an unlawful obstruction and hence that the decree could not be enforced. The Act was held to be a legitimate exercise of the power to regulate commerce. It was on this precedent that the action of Congress, or under its authority, was upheld in *South Carolina* v. *Georgia,* 93 U. S. 4, 12, although it consisted in the practical closing of a channel and throwing water into another channel to the detriment, it was insisted, of South Carolina. When the first bridge was built over the East River from New York to Brooklyn, it was contended that its elevation was such as to seriously obstruct the navigation of the river. *Miller* v. *Mayor,* 109 U. S. 385. The Court said (p. 393):

> "It is contended by the plaintiff with much earnestness that the approval of the secretary of war of the plan and location of the bridge was not conclusive as to its character and effect upon the navigation of the river, and that it was still open to him to show that, if constructed as proposed, it would be an obstruction to such navigation, as fully as though such approval had not been had. It is argued that Congress could not give any such effect to the action of the secretary, it being judicial in its character. There is in this position a misapprehension of the purport of the act. By submitting the matter to the secretary, Congress did not abdicate any of its authority to determine what should or should not be deemed an obstruction to the

navigation of the river. It simply declared that, upon a certain fact being established, the bridge should be deemed a lawful structure, and employed the secretary of war as an agent to ascertain that fact. Having power to regulate commerce with foreign nations and among the several States, and navigation being a branch of that commerce, it has the control of all navigable waters between the States, or connecting with the ocean, so as to preserve and protect their free navigation. Its power, therefore, to determine what shall not be deemed, so far as that commerce is concerned, an obstruction, is necessarily paramount and conclusive."

Moreover, that which has been authorized by Congress, may subsequently be declared by Congress to constitute an unlawful obstruction. In the case of *Louisville Bridge Co.* v. *United States,* 242 U. S. 409, a bridge which had been erected over the Ohio River in accordance with the Acts of July 14, 1862, and February 17, 1865, was found by the Secretary of War in exercising his authority under the Act of March 3, 1899, to be an unreasonable obstruction. The Court sustained his action and the power of Congress which underlay it, saying (p. 424):

"It may be conceded that the declaration of Congress in the Act of 1865 that the bridge was a lawful structure was conclusive upon the question until Congress passed some inconsistent enactment. As was said by Mr. Justice Nelson, speaking for the court in the *Wheeling Bridge Case,* 18 How. at p. 430, although it may have been an obstruction in fact, it was not such in the contemplation of the law."

In other words, the character of the bridge as an obstruction or not was conclusively determined by Congress or under its authority. The same view has been taken of other action of Congress with respect to navigation. In *United States* v. *Chandler-Dunbar Co.,* 229 U. S. 53, the riparian owner insisted that it had a right in the flow of

the stream over the bed which it owned to the extent that the flow was "in excess of the wants of navigation," that is, of every possible requirement of navigation present and future. But the Court held that the determination of Congress that the whole flow of the stream was required was not subject to judicial review. The Court said (*id.*, pp. 64, 65): "So unfettered is this control of Congress over the navigable streams of the country that its judgment as to whether a construction in or over such a river is or is not an obstacle and a hindrance to navigation, is conclusive. Such judgment and determination is the exercise of legislative power in respect of a subject wholly within its control. * * * The conclusion to be drawn is, that the question of whether the proper regulation of navigation of this river at the place in question required that no construction of any kind should be placed or continued in the river by riparian owners, and whether the whole flow of the stream should be conserved for the use and safety of navigation, are questions legislative in character; and when Congress determined, as it did by the act of March 3, 1909, that the whole river between the American bank and the international line, as well as all of the upland north of the present ship canal, throughout its entire length, was 'necessary for the purposes of navigation of said waters and the waters connected therewith,' that determination was conclusive."

I find no basis for a different rule with respect to the abstraction of water from Lake Michigan and the consequent lowering of lake levels. The question whether such an abstraction should be altogether prohibited, or the extent to which it should be permitted with regard to the interests of navigation, when and in what circumstances and in what amount a diversion of water from the lake would constitute an obstruction to navigation, are questions within the power of Congress to decide in the exercise of its control over navigable waters for the purposes of navigation. When these questions have been determined

by Congress, or under its authority validly conferred, they are not open to reconsideration by the court.

5. But it is the contention of the complainants that the diversion in question is for purposes of sanitation and development of power rather than of navigation, and hence lies outside the power of Congress under the commerce clause.

There is no doubt that the diversion is primarily for the purposes of sanitation. Whatever may be said as to the service of the diverted water in relation to a waterway to the Mississippi, or as to the possible benefit of its contribution to the navigation of that river at low water stages, it remains true that the disposition of Chicago's sewage has been the dominant factor in the promotion, maintenance and development of the enterprise by the State of Illinois and the Sanitary District. The purpose of utilizing the flow through the drainage canal to develop power is also undoubtedly present, although subordinated to the exigency of sanitation. So far as the diverted water is used for the development of power, the use is merely incidental (*supra,* p. 25). This Court in *Sanitary District* v. *United States,* 266 U. S. 405, 424, in describing the channel, looked upon its interest to the Sanitary District "primarily as a means to dispose of the sewage of Chicago" although it was also "an object of attention to the United States as opening water communication between the Great Lakes and the Mississippi and the Gulf." The question remains, however, whether the diversion, although primarily for purposes of sanitation, does not have such relation to navigation that the control of the diversion is within the power of Congress. In determining the constitutional authority of Congress, the purpose of the diversion is not to be considered without regard to its effect. The diversion may affect navigation as well as meet sanitary needs. The basic contention of the complainant States is that the diversion does affect navigation. When navigation is affected, the

power of Congress comes into play. The fact that a local or municipal purpose is being served does not remove the action, which directly bears upon navigation, from the national control. It is the consequence, not the purpose, that is important in the national aspect. The Brooklyn bridge, from the standpoint of primary purpose, could be regarded as a mere local facility to aid the intercommuncations of two parts of a metropolitan district within the same State, and now within the same city, but as the bridge was over a navigable waterway Congress had control. *Miller* v. *Mayor,* 109 U. S. 385.

It would hardly be said that Congress is impotent to enact legislation to prevent, by imposing penalties, the diversion of navigable waters and that the only remedy available in case of such a diversion to the injury of navigation interests in other States would be an application to the court for an injunction. Wisconsin, Michigan and the other complainant States cannot legislate to penalize action outside their respective territorial jurisdictions (*Wisconsin* v. *Pelican Insurance Co.,* 127 U. S. 265) and if Congress may not act to prevent by appropriate penalties the diversion in one State, and with its consent, of navigable waters to the injury of the inhabitants of other States, it would seem that the wrong is removed from legislative consideration and the power of Congress, adequate as to structures over or in navigable waters, would wholly fail in the presence of the abstractions of the waters themselves.

But if Congress may prohibit the diversion of navigable waters, it is by virtue of the authority conferred by the commerce clause of the Constitution, and this authority carries with it to this particular subject of its exercise the full discretion which Congress enjoys. It does not appear to be a tenable construction of the commerce clause to say that Congress may prohibit a diversion of navigable waters, because of its direct relation to navigation, and yet may not determine in the exercise of its discretion what diver-

sions it will prohibit, to what extent it will not prohibit or will permit, and may not reach its conclusion in the light of all the circumstances surrounding the diversion in question and of all consequences it may entail. Where a structure in navigable waters, or a diversion of such waters, affects navigation and thus is brought within the control of Congress, there is no warrant in the Constitution for saying that Congress is confined to one course of action and that the Court, on an examination of the facts, will decide what that course of action must be. Congress has the same freedom in exercising the sovereign power as to navigation to deal with the diversion of navigable waters as with the building of a bridge, and its position is no more open to judicial review in the one case than in the other.

I think that it is also within the power of Congress to legislate for the prevention of the pollution of navigable waters as, *e. g.*, by the introduction of sewage and industrial wastes, where pollution affects navigation. Navigation is not an abstract conception. It requires something more than fluid and a boat. There must be water conditions which make navigation practicable, and Congress is concerned with these conditions. While ordinarily the pouring of sewage into streams may not affect navigation, and the provisions of Section 13 of the Act of March 3, 1899 (30 Stat. 1152, U. S. C., Tit. 33, Sec. 407; cp. Act of June 33, 1910, 36 Stat. 593, U. S. C., Tit. 33, Sec. 421) as to the deposit of refuse in navigable waters excepted refuse in a liquid state flowing from streets and sewers, it is quite evident that sewage, as well as industrial wastes, may be introduced in such volume and condition as to be injurious to navigation, and the power of Congress may be exercised in its discretion to prevent, remove, or mitigate this menace as well as others. This is not to say that Congress may build or maintain intrastate sewer systems or deal with merely local questions of sanitation and health, but that Congress may adopt measures to protect navigable waters, and thus navigation, from the interfer-

ences and injuries brought about by the pouring of sewage and waste into such waters. When New York brought suit in this Court against New Jersey to enjoin the discharging of a volume of sewage into the waters of Upper New York bay, the Federal Government was permitted to intervene on the allegation that the proposed discharge would cause such a pollution of the waters of the bay as would result in an injury to navigation and commerce. *New York* v. *New Jersey,* 256 U. S. 296. The Court said (*id.,* p. 307):

> "As to the United States: The intervention of the Government was allowed upon allegations that the inadequate treatment of the sewage proposed would result in injury to navigation and commerce: by causing deposits of solid matter, to the extent of thousands of tons annually, which would fill up and shallow the channels of the Bay; by rendering the Port of New York less serviceable and attractive to commerce and offensive and unwholesome to persons using and living near it; and by causing injury to the hulls of vessels by the character of the effluent to be discharged. It was also averred that practically irreparable damage would be caused to extensive properties owned by the Government adjacent to the Bay.
>
> "Having regard to the large powers of the Government over navigation and commerce, its right to protect adjacent public property and its officers and employees from damage and disease, and to the duty and authority of the Attorney General to control and conduct litigation to which the Government may be a party (Rev. Stats., Secs. 359, 367), we cannot doubt that the intervention of the Government was proper in this case and that it was within the authority of the Attorney General to agree that the United States should retire from the case upon the terms stated in the stipulation, which were plainly approved by the Secretary of War, who afterwards embodied them in the construction permit issued to the Sewerage Commissioners."

The stipulation provided in detail (*id.*, p. 305) for treatment of the sewage, that is, for screening and sedimentation and thorough dispersion in water through deeply submerged multiple outlets, the method then most approved. It could hardly be said that the Attorney General could be permitted thus to intervene to protect navigation and commerce from pollution of the waters of New York Bay because of the interest of the national government in that protection, and yet that Congress would have been without power to regulate the discharge into New York Bay in the manner described in the Attorney General's stipulation or in any other way deemed by Congress in its discretion to be appropriate to the exigency. The fact that the purpose of the discharge into New York Bay was sanitation in the interest of the communities of Passaic Valley, and that the particular subject was the creation of an injury to navigation by the pollution of waters, did not derogate from the authority of the Attorney General to take the action he did take with that sort of injury, and, on the same ground, would not have derogated from the authority of Congress, not only to that extent but more comprehensively and adequately, to provide measures to attain the same object.

In the present case, it is my opinion, that it would be within the competency of Congress, in dealing with the diversion, not merely to consider the effect upon navigation of the abstraction of a certain quantity of water from Lake Michigan, but also the effect upon navigation of the flow into Chicago harbor and Lake Michigan of the enormous and increasing volume of the sewage, either untreated or but partially treated, and industrial wastes of the City of Chicago and of other portions of the territory of the Sanitary District. The continuous introduction of such a pestilential mass into the harbor and the lake would not only affect the health of the citizens of Chicago viewed as a question of local police, through the contamination of its only water supply, but also would affect navigation and

the allied interests of interstate commerce, a matter of national concern. If Congress had undertaken to deal directly with the situation at the time of the Secretary of War's permit of March 3, 1925, Congress would have been entitled to consider all phases of the problem, that is, to estimate the consequences of whatever action it might take in refusing, allowing, or limiting, the diversion not only with respect to the lowering of lake levels, but also with reference to the creation of a most serious public nuisance in navigable waters, if a sufficient diversion were not allowed to take the sewage in its present condition and industrial wastes away from the lake. Congress would have been entitled to consider what could be done to protect the navigable waters from this pollution, the length of time that it would take to provide appropriate means of sewage treatment, what, if any, diversion of the water of Lake Michigan should be allowed, and how long and on what conditions it should be continued. The evidence in the present suit shows with the greatest clearness the various practical questions which would thus be presented, questions peculiarly appropriate for legislative consideration or administrative action under legislative authority.

When the United States brought suit to prevent a withdrawal from Lake Michigan in excess of 4167 c. f. s., the answer of the Sanitary District of Chicago, as this Court described it, "finally takes the bull by the horns and denies the right of the United States to determine the amount of water that should flow through the channel or the manner of the flow." *Sanitary District* v. *United States,* 266 U. S. 405, 425, 432. The Court overruled this contention and the restriction of the Secretary of War's permit which rested on the authority of Congress was enforced. I find no reason to doubt the power of Congress to meet the exigency.

Congress also has power to consider the advisability of providing for the installation of compensating works to restore the levels of the Great Lakes or compensate for the lowering of their levels due to the diversion. The evi-

dence shows that, as a practical, engineering matter, such compensation can be provided without great difficulty and at relatively small expense. So far as the matter lies within the jurisdiction of the United States, Congress has adequate power to provide for such works, and, so far as it is found that an international agreement is required, the appropriate national authorities have capacity to negotiate it.

Fourth. *The action of Congress.*

If it be assumed that Congress has power to control the diversion, to determine whether and to what extent it should be permitted, the next question is whether it has exercised the power, and, first, whether it has exercised it directly.

It is believed that enough has been set forth in the findings (*supra,* pp. 26-72, 85) to show the grounds for the contention of the defendants with respect to the action of Congress. The defendants refer to the Acts of 1822 and 1827 (*supra,* p. 11) in relation to the Illinois and Michigan Canal. They emphasize the fact that the project of a waterway from Lake Michigan to the Mississippi has from an early date engaged the attention of Congress, and that it has asked for and received many reports upon that subject. Congress was also early and fully advised by official reports as to the action of Illinois in providing for the construction of a drainage canal, its actual construction by the Sanitary District, the plan to divert water from Lake Michigan for the purposes of the canal, and the extent of the diversion contemplated. In these reports, the relation of the drainage canal proposals to a Lakes-to-the-Gulf waterway was clearly shown. As early as 1900 Congress directed (*supra,* p. 41) that the Board of Engineers appointed under the Act of March 3, 1899, report the estimates of cost for channels of specified depth through the proposed route from the Illinois River to Lake Michigan and directed that "the said estimates cover and in-

clude a proper connection at Lockport with the sanitary and ship canal which has been constructed by the sanitary district of Chicago." Defendants have stressed the point that at no time since the diversion at Chicago began could the project depth of seven feet in the Illinois River have been maintained without a diversion of at least 8,500 c. f. s. It is also urged that Congress by the improvements it sanctioned and directed affirmatively authorized and actively aided the construction of what is called the Chicago River segment of the Sanitary District's diversion works. Congress made appropriations for the widening and deepening of the Chicago River and for the development of a waterway from Lockport, the terminus of the drainage canal, to the mouth of the Illinois River. Attention is called to the provision of the Act of March 3, 1899 (*supra,* p. 36) for the improvement of the Chicago River directing a survey and estimate of cost for a channel twenty-one feet in depth for a portion of the river with a proviso that the work of lowering tunnels should be done or caused to be done by the City of Chicago without expense to the United States. This work, it is insisted, was for the purpose of converting the river into an integral part of the Sanitary District's engineering works for the diversion of water from Lake Michigan. In *West Chicago Street Railroad Company* v. *Chicago,* 201 U. S. 506, the proviso, above mentioned, was held to be a sufficient authorization to the City of Chicago to require the lowering of a street railway tunnel. In short, the defendants contend that there has been full knowledge on the part of Congress of all relevant facts and that Congress, and officials acting under its authority and reporting to it, have continuously cooperated with the State of Illinois and the Sanitary District in the creation and maintenance of conditions appropriate to the diversion. Congress has also called for and received comprehensive reports on the extent and effect of the diversion of water from Lake Michigan and on the measures that may be practicable to compensate for the lowered level of the Great Lakes (*supra,* p. 125).

It has not been considered necessary to lengthen the findings so as to include all the statements in a multitude of reports in evidence bearing on the question, as, assuming that Congress was fully informed, the question is not as to what was recommended, but as to the action taken by Congress in the light of its knowledge. I am unable to find that Congress, apart from the authority conferred upon the Secretary of War by Section 10 of the Act of March 3, 1899, and his action thereunder, which will be discussed later, has authorized the diversion in question. The Acts of 1822 and 1827 (*supra,* p. 11) relating to the Illinois and Michigan Canal were considered in *Sanitary District* v. *United States,* 266 U. S. 405, 427, 428, and were found to contain nothing with regard to the amount of water to be withdrawn from the lake. In that connection, the Court said:

> "The defendant in the first place refers to two acts of Congress: one of March 30, 1822, 3 Stat. 659, which became ineffectual because its conditions were not complied with, and another of March 2, 1827, c. 51, 4 Stat. 234, referred to, whether hastily or not, in *Missouri* v. *Illinois,* 200 U. S. 496, 526, as an act in pursuance of which Illinois brought Chicago into the Mississippi watershed. The act granted land to Illinois in aid of a canal to be opened by the State for the purpose of uniting the waters of the Illinois River with those of Lake Michigan, but if it has any bearing on the present case it certainly vested no irrevocable discretion in the State with regard to the amount of water to be withdrawn from the Lake. It said nothing on that subject. We repeat that we assume that the United States desires to see the canal maintained and therefore pass by as immaterial all evidence of its having fostered the work. Even if it had approved the very size and shape of the channel by act of Congress it would not have compromised its right to control the amount of water to be drawn from Lake Michigan. It seems that a less amount than now passes through

the canal would suffice for the connection which the United States has wished to establish and maintain."

Consideration by Congress of the advisability of the proposed waterway from Lake Michigan to the Illinois and Mississippi Rivers, demands by Congress for surveys, plans and estimates, the establishment of project depths, and appropriations for specified purposes, did not in my opinion constitute direct authority for the diversion in question, however that diversion, or the diversion of some quantity of water from Lake Michigan, might fit into an ultimate plan. The appropriations for widening and deepening the Chicago River, and the cooperation with the Sanitary District for several years in that improvement, committed Congress to the work as thus actually prescribed or authorized, but did not go further, whatever the advantage of that work in connection with the purposes of the Sanitary District's Canal. The action which has been taken by Congress may, indeed, be deemed to have an important bearing on the construction of the act of Congress under which, as Congress well knew, the Secretary of War granted permits for the diversion of specified quantities of water from Lake Michigan. But the point now is as to direct authorization by Congress of the diversion as distinguished from action by the Secretary of War under the general authority Congress has conferred upon him.

The defendants invoke the doctrine of *Wisconsin* v. *Duluth,* 96 U. S. 379. There it was found that Congress had developed and was carrying out a system of corporate improvements at Duluth and had made appropriations for that purpose. The Court regarded the suit as an effort to have the Court forbid the execution of the work authorized and dismissed the bill. This decision may be regarded as applicable to the present case, if it be found that the Secretary of War's permit is valid and that the Federal Government under lawful authority has assumed charge of the diversion, its extent, and the conditions on which it is permitted. But the *Duluth* case is not considered to be an

authority for a conclusion here that Congress has directly authorized the diversion apart from the action of the Secretary of War.

The argument that Congress, aside from the action of the Secretary of War, has authorized the diversion, at once raises the question—In what amount has the diversion been thus authorized? There is nothing in any of the acts of Congress upon which the defendants rely specifying any particular quantity of water which could be diverted and it could hardly be considered a reasonable contention that the acts of Congress justified any diversion of water from Lake Michigan that the State of Illinois and the Sanitary District might see fit to make. It is manifest that it was the view of the War Department that Congress had not acted directly and whatever the Department did was subject to such action as Congress might take. In the report of the Board of Engineers required by the Act of June 13, 1902, transmitted to Congress on December 18, 1905, the Board said: "The taking of large quantities of water from Lake Michigan for drainage purposes has not been authorized by Congress. It has been the policy of the War Department thus far to regulate the quantity of water which is admitted to the canal by the necessities of navigation in the Chicago River" (*supra,* p. 44). This shows the understanding at that time. In 1907, in denying the application for an increase in the amount permitted to be diverted, the Secretary of War considered that it might "be fortunate that circumstances now require submission of this question of capital and national importance to the Congress of the United States" (*supra,* p. 51). This understanding that Congress had not yet acted directly so as to authorize the diversion in question has continued. It was in this view that the United States prosecuted its suit to decree in this Court to enjoin the defendants from taking more water from Lake Michigan than the Secretary of War had allowed.

Fifth. *The authority of the Secretary of War.*

The question is as to the construction of Section 10 of the Act of March 3, 1899, 30 Stat. 1151, U. S. C., Tit. 33, Sec. 403, (*supra,* pp. 37, 38) under which the authority has been claimed and exercised.

Section 10 is as follows:

> "Sec. 10. That the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is hereby prohibited; and it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same."

It is clear that the diversion of water from Lake Michigan, with the reversal of the flow of the Chicago River, falls directly within the third clause of this section making it unlawful "in any manner to alter or modify the course, location, condition or capacity of, any port, roadstead, haven, harbor, canal, lake * * * or of the channel of any navigable water" save on the recommendation of the Chief of Engineers and the authorization of the Secretary of War. *Sanitary District* v. *United States,* 266 U. S. 405, 429. The precise question is whether, in the classes of cases specifically described in the second and third

clauses of Section 10 of the Act of 1899, there must be a special authorization by Congress in addition to the recommendation of the Chief of Engineers and the authorization of the Secretary of War.

The policy expressed in the Act of March 3, 1899, had been initiated by the Act of September 19, 1890, 26 Stat. 454, 455. Sections 9 and 10 of the Act of 1899 rearranged and amplified the provisions of Sections 7 and 10 of the Act of 1890. Section 7 of the Act of 1890 (*supra,* pp. 27, 28) comprehended (1) wharves, piers, dolphins, booms, dams, weirs, breakwaters, bulkheads, jetties, and other structures in navigable waters; (2) bridges, bridge-draws, bridge piers and abutments, causeways or other works over or in navigable waters; and (3) excavating or filling, or in any manner altering or modifying the course, location, condition or capacity of navigable waters. The first class, wharves, etc., were not to be built outside of harbor lines, or in navigable waters where no harbor lines are established, in such manner as should obstruct or impair navigation without the permission of the Secretary of War. The second class, bridges, bridge-draws, etc., were not to be constructed under the legislation of a State until the location and plan therefor had been submitted to and approved by the Secretary of War. Finally, excavating and filling, altering or modifying the course, location, condition or capacity of navigable waters was forbidden unless approved and authorized by the Secretary of War. There was a proviso that the section should not apply to bridges, bridge-draws, bridge piers and abutments, the construction of which had theretofore been duly authorized by law, and that the section was not to be construed as authorizing the construction of such structures or other works under State legislation over or in navigable waters which were not wholly within the limits of such State. Section 10 of the Act of 1890 (*supra,* pp. 28, 29) prohibited "the creation of any obstruction, not affirmatively authorized by law, to the navigable capacity of any waters, in respect of which the

United States has jurisdiction." That section also imposed penalties and authorized proceedings by the Attorney General for an injunction.

In the rearrangement and amplification of these provisions in Sections 9 and 10 of the Act of 1899, a new classification was made. In Section 9 (*supra,* p. 37) were placed the provisions as to bridges, dams, dikes or causeways over or in navigable waters. The building of these structures was forbidden until the consent of Congress had been obtained and until the plans had been submitted to and approved by the Chief of Engineers and the Secretary of War. There was a proviso that such structures might be built under State legislation across rivers and other waterways the navigable portions of which were wholly within the limits of a single State, provided the location and plans were submitted to and approved by the Chief of Engineers and the Secretary of War before the construction was commenced. The provision as to wharves, piers, dolphins, booms, weirs, breakwaters, bulkheads, jetties, and other structures in navigable waters, outside of harbor lines or where no harbor lines are established (which had been in Section 7 of the Act of 1890), was placed in Section 10, and such structures were forbidden except on plans recommended by the Chief of Engineers and authorized by the Secretary of War. The provision as to excavating and filling, and altering and modifying the course, location, condition or capacity of the channel of navigable waters (which had been in Section 7 of the Act of 1890) was amplified so as to include "any port, roadstead, haven, harbor, canal, lake, harbor or refuge, or inclosure within the limits of any breakwater", and such action was forbidden unless the work had been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning same. And these provisions of Section 10 of the Act of 1899 were preceded by the provision which had appeared in Section 10 of the Act of 1890 that the creation of any obstruction to navigable capacity, not affirmatively author-

ized, was prohibited, with the change to "affirmatively authorized by Congress" from "affirmatively authorized by law."

This change in the words of the first clause of Section 10 was for the purpose of making mere State authorization inadequate. *Sanitary District* v. *United States,* 266 U. S. 405, 429. *United States* v. *Bellingham Bay Boom Company,* 176 U. S. 211. Under this clause, as thus modified, it was decided in the case of a structure, *e. g.,* a dock, in navigable waters wholly within the limits of a State, that while the recommendation of the Chief of Engineers and the authorization of the Secretary of War were required, it was not intended to override the authority of the State to put its veto upon the construction. Both Federal and State approval were necessary in such a case. *Cummings* v. *Chicago,* 188 U. S. 410. It may be observed that the discussion in the *Cummings* case as to the continuance of State authority in such cases, in the light of Section 10 of the Act of 1899, would have been unnecessary if the view had been taken that the specific consent of Congress was needed under that section for the erection of the structure in question, as there was no such specific consent but a permit by the Secretary of War under the general provision of Section 10, and this permit was apparently deemed sufficient so far as the Federal authority was concerned (*id.,* p. 431). It is further to be noted that in the rearrangement in the Act of 1899 there was an unequivocal provision as to the particular structures described in Section 9 (which were not within the proviso as to waters lying wholly within the limits of a single State) requiring the consent of Congress in addition to the approval of the Chief of Engineers and of the Secretary of War, there being a differentiation between this class and those placed in Section 10. Thus, dams had been put with wharves, etc., in Section 7 of the Act of 1890, but in the Act of 1899, dams, dikes and causeways were placed with bridges in Section 9 where the consent of Congress was expressly required, and wharves, etc.,

and excavating, filling, and altering or modifying course, condition and capacity were put in Section 10. There can be no question of the power of Congress to make this distinction for whatever reasons it may have had. Congress required its specific consent in relation to the particular structures described in Section 9, but was apparently content to leave a broader administrative control of the other structures and work, described in Section 10, with the War Department.

The inquiry, then, is as to the extent of the administrative control thus delegated. With respect to wharves, piers, breakwaters, bulkheads, and other structures described in the second clause of Section 10, it would seem that, except for the requirement of the recommendation of the Chief of Engineers, the same authority was continued in the Secretary of War that had been delegated to him as to such structures by the former Act of 1890. It would be an extreme construction to hold that no wharf, pier, breakwater, bulkhead, or any of the other structures described in the second clause of Section 10 could be built without a special authorization of Congress. But a wharf, pier, breakwater, or bulkhead may be an obstruction to navigable capacity in a particular area, although to the advantage of navigation more broadly considered. Under the second clause of the section, structures are contemplated and plans therefor are to be recommended by the Chief of Engineers and approved by the Secretary of War. Under the third clause, with respect to excavating, filling, and changing course, condition or capacity, it is the "work", the undertaking or enterprise, that is the subject of the administrative control of the War Department. Whether that undertaking should be allowed, with reasonable regard to its effect on navigation, is to be determined by the Secretary of War acting on the recommendation of the Chief of Engineers.

The words "affirmatively authorized by Congress" should be construed in the light of the administrative exi-

gencies which prompted the delegation of authority in the succeeding clauses. "Any obstruction to the navigable capacity of any of the waters of the United States" might be taken to include "anything wherever or however done" which fairly and directly tends to obstruct (that is, to interfere with or diminish) the navigable capacity of a stream." *United States* v. *Rio Grande Dam & Irrigation Co.*, 174 U. S. 690, 708, 709. This is a wide content, embracing innumerable practical problems appropriate for administrative consideration and determination. It is not to be supposed that Congress was intent on prohibiting, unless it passed a special act, whatever might be regarded in any aspect as an obstruction to navigable capacity. Many questions of relation and degree would require examination. The War Department was equipped with a corps of engineers and by continuous study of navigation problems for this examination and could reach an expert decision. It seems to me to be a reasonable construction that Congress, having stated in Section 9 as to what particular structures its specific consent should be required, intended to leave to the Secretary of War, acting on the recommendation of the Chief of Engineers, the determination of what should be approved and authorized in the classes of cases described in the second and third clauses of Section 10. Accordingly, the prohibition in the first clause of that section, in order to make mere state action insufficient, was followed and should be regarded as qualified by the other clauses covering large and important categories, in which administrative action was deemed to be advisable and was authorized, with the import that such action, taken as prescribed, should be enough so far as concerned the Federal Government. If the section were construed to require a special authorization by Congress whenever in any aspect it might be considered that there was an obstruction to navigable capacity, none of the undertakings specifically provided for in the second and third clauses of Section 10 could safely be undertaken without a

special authorization of Congress, as in the absence of that, it would always be a judicial question whether there was an obstruction to navigable capacity, and if there were, the action of the Chief of Engineers and the Secretary of War would be without authority. Unless Congress had acted specifically, every such question would be thrown into the courts and the administrative authority of the Secretary of War which has been regarded as practically essential in the classes of cases described in the second and third clauses of Section 10 would be paralyzed. The fact that Congress amended the provision requiring authorization "by Congress" instead of "by law", to avoid the effect of State action alone, does not seem to require such a construction. In the cases described in the second and third clauses of Section 10, Congress has given its affirmative authorization provided the requirements as to the recommendation of the Chief of Engineers and the authorization of the Secretary of War are met.

The question whether the affirmative authority of Congress must be evidenced in such cases by a specific statute arose in *Maine Water Company* v. *Knickerbocker Steam Towage Company,* 99 Maine, 473, where it was contended that the permit of the Secretary of War for a pipe line across the Kennebec River was not enough without a statute of Congress giving specific authority. The Supreme Court of Maine overruled the contention, saying:

> "We cannot help remarking, in passing, that if the defendant's interpretation of the Act of 1899 is the correct one it leads to a rather surprising condition. It would seem that not a wharf or pier, outside established harbor lines, or where no harbor lines have been established, can now be built, in the navigable waters of the United States, not a dolphin can be anchored for mooring vessels, not a boom can be stretched, nor a weir erected for any purpose, until hereafter authorized by Act of Congress. We think it cannot be assumed that Congress intended any such result unless

the Act in question is so expressed as not to admit of any other reasonable interpretation.

* * * * * *

"Although in the arrangement of parts, the general prohibition now is found at the beginning of a section which also relates to the specific regulation of the building of wharves, and so forth, instead of being in a section by itself as before, we are not persuaded that Congress, by changing its position, intended to change its effect. It is still general as before. And though general in terms before, we think, as we have stated, that structures impliedly authorized by Congress in the preceding sections were not prohibited. And in this new position we think that the general prohibition is likewise qualified by the sentences which follow. It cannot make any substantial difference whether the general prohibition is at the beginning of a section or at the end, or in a section by itself, if it clearly appears from the language used and from the context, all taken together, that the legislative intention was that the general prohibition was to be regarded as subject to specified qualifications. * * * the implication seems clear to us that such structures, if built according to plans recommended and authorized as provided in the section, are authorized by Congress,—that they are affirmatively authorized,—though the affirmative authority arises by implication,—and that they are lawful without any further action by Congress."

This case was cited with apparent approval, although not directly upon this point, in *Southern Pacific Co.* v. *Olympian Dredging Co.,* 260 U. S. 205, 210.

An opinion in favor of a contrary construction was expressed by the Circuit Court for the District of New Jersey in *Hubbard* v. *Fort,* 188 Fed. 987. There the bill was filed by the receivers of the Hudson County Water Company, a New Jersey corporation, seeking to enjoin State officers from interfering with the laying of a water main in the bed of the Kill van Kull, a navigable waterway between New

York and New Jersey, for which the Secretary of War had given permission. The Court was of the opinion that the affirmative authorization by Congress required by Section 10 meant the express authorization of a congressional act and that only after such action could the powers delegated to the Secretary of War be put into operation. It appears, however, on the facts of that case, that the actual decision went no further than to hold that Congress had not shown by Section 10 the intent to assert its authority under the commerce clause by authorizing the crossing of an interstate stream and the using of a State's submerged lands by one of its corporations in opposition to its authority. Thus the Court, describing in its final conclusion the nature of the case before it, said (*id.*, p. 999):

> "This is not a case of the United States government seeking to make a crossing of this interstate stream in the exercise of its governmental powers, but an attempt to override a sovereign state's opposition to the use of its submerged land by a corporation of its own creation, under the claim of being engaged in interstate commerce. This can only be successfully accomplished when it shall be shown that Congress in the assertion of its superior rights under the interstate commerce clause of the United States Constitution has clearly and definitely authorized such crossing. Until then the state of New Jersey as against every comer is sovereign master of the situation."

Where an act of Congress is ambiguous, long continued and uniform practice of the executive department charged with the duty of administering it is "persuasively determinative of its construction." *United States* v. *Minnesota,* 270 U. S. 181, 205; *Swendig* v. *Washington Water Power Company,* 265 U. S. 322, 331; *Kern River Company* v. *United States,* 257 U. S. 147, 154; *United States* v. *Burlington & Missouri River R. Company,* 98 U. S. 334, 341; *United States* v. *Hammers,* 221 U. S. 220, 228; *Logan* v. *Davis,* 233

U. S. 613, 627. In the present instance there seems to be no opportunity for dispute as to the long continued and uniform construction of Section 10 of the Act of 1899 by the War Department. It has been its view that in the cases for which provision is made in the last two clauses of Section 10 of the Act of 1899 a specific authorization by congressional act is not required and that the action of the Secretary of War upon the recommendation of the Chief of Engineers is sufficient. The Acting Attorney General in his opinion transmitted to the Secretary of War (February 13, 1925, 34 Op. Atty. Gen. 410, 416) when the application for the permit for the diversion in question was pending, said: "I am informed that for a long period of years it has been the practice of the War Department to issue permits under Section 10 of the Act of March 3, 1899, without requiring that the particular project be first authorized by special Act of Congress." The Secretary of War gave the initial permit for diversion of water from Lake Michigan through the Sanitary District's drainage canal on May 8, 1899, within about two months after the passage of the Act of March 3, 1899. He acted under Section 10 of that Act and this was an immediate construction of that Act with respect to the authority of the Secretary of War. This was followed in the permits subsequently granted down to that of March 3, 1925. The question of his authority was definitely raised in 1907 in connection with the application for an additional diversion of a large amount of water from the lake through the Calumet Sag Channel. The question was submitted by the Secretary of War to the Judge Advocate General who held that Section 10 of the Act of March 3, 1899, applied to the case and that it was one in which the work could be allowed upon the recommendation of the Chief of Engineers and the authorization of the Secretary of War. As the Chief of Engineers made an adverse recommendation on the merits of the application, the Secretary of War was without power to grant it. But, so far as the construction of the statute was concerned,

the Secretary of War stated that he agreed "in the construction of the Judge Advocate General that the issue is left by statute to the recommendation of the Chief of Engineers and the concurrent decision of the Secretary of War" (*supra,* p. 51). On the application, in 1913, for an increase in the amount of the diversion the Secretary of War doubted his authority to grant it but finally stated that he rested his decision denying the application not upon the question of his legal authority but on the appropriate exercise of his official discretion (*supra,* p. 64). The prior permit limiting the diversion to 4167 c. f. s. was not disturbed. It was soon after (October, 1913) that the Attorney General filed his bill to enjoin the Sanitary District from diverting a greater quantity of water from Lake Michigan than that which had been allowed by the Secretary of War, thus recognizing the validity of the Secretary's permit and seeking to enforce the limitation it fixed.

This administrative construction of Section 10 does not lose, but rather gains, in strength from a consideration of the attitude of Congress. From the outset, Congress was promptly and fully advised of the construction of the drainage canal, the plans for the diversion of water from Lake Michigan, the amount of the diversion, and the permits granted by the Secretary of War. Action was taken by Congress in the light of these facts (*supra,* pp. 36, 41, 43). Congress provided for the widening and deepening of the Chicago River which was an essential part of the plans of the Sanitary District for the diversion through the drainage canal (*supra,* p. 58). The use of that canal as a part of a waterway from Lake Michigan to the Missippi was under consideration by Congress and Congress called for surveys and estimates with this in view (*supra,* p. 41). While, as I have said, Congress did not directly authorize the diversion, it was fully conversant with what had been done by the Sanitary District and with what had been permitted by the Secretary of War purporting to act under the general authority conferred by Congress in Sec-

tion 10 of the Act of March 3, 1899, and it may be regarded as significant that Congress having complete control, all the permits of the Secretary of War being subject to its action, did not at any time adopt measures either to prevent the diversion or to manifest disapproval of the construction which the Secretary of War had placed upon the statute.

When Congress, on June 29, 1906, passed the Niagara Falls Act, 34 Stat. 626 (*supra,* p. 46), it prohibited the diversion of water from the Niagara River and its tributaries except with the consent of the Secretary of War as thereinafter authorized. Provision was made for limited permits for power purposes. The prohibition was followed by a proviso that "this prohibition shall not be interpreted as forbidding the diversion of the waters of the Great Lakes or of Niagara River for sanitary or domestic purposes, or for navigation, the amount of which may be fixed from time to time by the Congress of the United States or by the Secretary of War of the United States under its direction." At the time this bill was passed, the International Joint Commission appointed pursuant to action by Congress (Act of June 13, 1902, 32 Stat. 373) had been considering the conditions and uses of the waters of the Great Lakes and tributary rivers, and the questions raised by diversions, and that Commission had made recommendations to the governments of the United States and Canada, including a recommendation that the Chicago diversion should be limited to 10,000 c. f. s. (*supra,* p. 46). When the Niagara Falls bill, above mentioned, was before the Senate, an amendment was offered by Senator Hopkins of Illinois to the effect that nothing contained therein should be construed "to hold or concede that the waters of Lake Michigan shall be or are subject of international agreement" (*supra,* p. 47). The House of Representatives refused to concur in this amendment, as it might embarrass the President in his negotiations. Reporting to the Senate, on behalf of the Senate conferees, the action of the confer-

ence committee in receding from the amendment, and replying to Senator Hopkins' criticism, Senator Lodge said (*id.*):

> "I had supposed that the Senator from Illinois realizes that the reporting of this bill in its present condition would not in any way endanger the rights of Chicago to have water from the lake. Certainly, I should have adhered to the amendment if I had thought that the drainage canal of Chicago would have been in any way endangered by the Commission. * * * The first section of the bill protects the rights of Chicago. * * * Every right is safeguarded. The conferees were as anxious as the Senator from Illinois could possibly be to protect the drainage canal of Chicago, but they did not feel warranted in allowing the whole legislation for such an important object to fail."

I find nothing in the Niagara Falls Act which can be deemed to indicate disapprobation by Congress of the construction by the Secretary of War of his authority under the Act of 1899; whatever inference may be drawn from the act seems to me to be to the contrary.

Within a few years after the passage of this act, the Canadian Boundary Waters Treaty was signed (1909). Reference has been made to its provisions and to the construction placed upon them by those who negotiated the treaty on behalf of the United States (*supra*, p. 57). The effect of the Chicago diversion on waters through which the international boundary passes is pertinent to the consideration of the national interests, as distinguished from mere state interests, that are involved, and of the power of Congress to control the diversion with appropriate regard both to internal affairs and to foreign relations. But the question in this suit is between States of the Union and relates to the construction of an act of Congress and the validity and effect of the action taken thereunder in relation to the diversion. It does not seem to me to be necessary to discuss the provisions of the treaty of 1909, or the reservations it contains, and I express no opinion upon

them, further than to say that the treaty contains nothing which can be regarded as effecting a repeal of the Act of March 3, 1899, or as operating to deprive the Secretary of War of the authority it conferred in relation to the diversion here in question.

Finally, the authority of the Secretary of War under Section 10 of the Act of 1899, is deemed to have been involved, and to have been passed upon by this Court, in *Sanitary District* v. *United States,* 266 U. S. 405, where the Court said in reference to Section 10 (*id.,* p. 429):

> "There is neither reason nor opportunity for a construction that would not cover the present case. As now applied it concerns a change in the condition of the Lakes and the Chicago River, admitted to be navigable, and, if that be necessary, an obstruction to their navigable capacity, *United States* v. *Rio Grande Dam & Irrigation Co.,* 174 U. S. 690, without regard to remote questions of policy. It is applied prospectively to the water henceforth to be withdrawn. This withdrawal is prohibited by Congress, except so far as it may be authorized by the Secretary of War."

And in entering the decree for the injunction prohibiting a withdrawal in excess of 250,000 cubic feet per minute, the amount allowed by the Secretary of War's permit, the Court coupled with it the provision "without prejudice to any permit that may be issued by the Secretary of War according to law" (*id.,* p. 432).

I do not think that it can be said that the proviso in the Act approved at the last session of Congress (January 21, 1927, 44 Stat., Pt. 2, 1010, 1013) with respect to a modification of the existing project on the Illinois River, that "nothing in this act shall be construed as authorizing any diversion of water from Lake Michigan", affects the question as to the construction of the Act of 1899 or limits the power of the Secretary of War thereunder. This proviso was inserted in the Act while the present suit was pending

and it appears to have been intended to leave the contentions of both parties to this controversy unaffected by the provision which was enacted as to the improvement of the Illinois River. There was a proviso with such a purpose in an act of Congress passed while the case of *Wisconsin* v. *Duluth,* 96 U. S. 379, was pending. The Act of August 14, 1876, making an appropriation for the improvement of the harbor at Duluth, contained the condition that the appropriation should be "without prejudice to either party in the suit now pending between the State of Wisconsin, plaintiff, and the City of Duluth and the Northern Pacific Railroad, defendants." This Court said that "as this suit was then pending the clause that it should be without prejudice to any one in the suit was inserted." But the Court added that the caution was not needed, as the Court held that the Federal Government through the appropriations of Congress and the action of the War Department had already taken charge of the work under consideration.

The Secretary of War's authority under Section 10 of the Act of March 3, 1899, is not to be regarded as unlimited. Such power could not be conferred. His action must have reasonable relation to the exercise of the power granted to Congress by the Constitution and to the purpose of the delegated authority, and must not be arbitrary or capricious. The true intent of the Act of Congress was that unreasonable obstructions to navigation, and navigable capacity, were prohibited, and in the cases described in the second and third clauses of Section 10, the Secretary of War, acting on the recommendation of the Chief of Engineers, was authorized to determine what in the particular cases constituted an unreasonable obstruction. The power of Congress to make such a delegation of authority is deemed to be sustained by repeated decisions of this Court. *Southern Pacific Co.* v. *Olympian Dredging Co.,* 260 U. S. 205, 208; *Sanitary District* v. *United States,* 266 U. S. 405, 428; *Field* v. *Clark,* 143 U. S. 649; *Butterfield* v. *Stranahan,* 192 U. S. 470; *Union Bridge Co.* v. *United*

States, 204 U. S. 364, 386; *Monongahela Bridge Co.* v. *United States,* 216 U. S. 177, 192; *Louisville Bridge Co.* v. *United States,* 242 U. S. 409, 424, 425. And when the Secretary of War acts under the authority conferred by Congress, his determination as to what is or is not an unreasonable obstruction to navigation or navigable capacity in the circumstances of the particular case has the same effect and is as immune from judicial review as if Congress had acted directly. *Monongahela Bridge Co.* v. *United States,* 216 U. S. 177, 195; *Southern Pacific Co.* v. *Olympian Dredging Co.,* 260 U. S. 205, 210.

Sixth. *The validity and effect of the permit of the Secretary of War of March 3, 1925.*

The note which prefaced the permit of March 3, 1925, states that the instrument "does not give any property rights either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to private property or invasion of private rights, or any infringement of Federal, State, or local laws or regulation, nor does it obviate the necessity of obtaining State assent to the work authorized. It merely expresses the assent of the Federal Government so far as concerns the public rights of navigation (see Cummings *v.* Chicago, 188 U. S. 410)." This statement in no way detracts from the effect of the permit as expressing the consent of the Federal Government so far as navigation is concerned. The reference to "State assent" should be taken as referring to the assent of the State within whose territory the action allowed by the Secretary of War was to be taken, that is, in this case, the State of Illinois. The decision in *Cummings* v. *Chicago,* which related to the building of a dock, goes no farther. There, as the Court put it, the question was,—"Did Congress, in the execution of its power under the Constitution to regulate commerce, intend by the legislation in question to supersede, for every purpose, the authority of Illinois over the erection of structures in navigable waters wholly

within its limits?" (*id.*, p. 428). This question was answered in the negative in the light of the decisions as to the authority of the States with respect to the erection of such structures until Congress superseded that authority. But, so far as other States are concerned which may incidentally be affected by the action authorized, there is no ground for the conclusion that their assent is necessary. In this instance, the contention that the assent of the complainant States was required to give efficacy to the Federal action cannot be sustained. That action, when taken under the power granted by the Constitution, is deemed to be taken on behalf of all the States, and of all the people, save as it may be limited by the doctrine of the *Cummings* case with respect to the presumed intention of Congress not to authorize such acts as the erection of structures in navigable waters wholly within the limits of a State without its assent.

In considering the validity of the permit of March 3, 1925, the exigency as it then existed must be considered. The prior permit limiting the withdrawal to 4167 c. f. s. had been enforced by the Court without prejudice to such action as the Secretary of War might lawfully take. The question as to the validity of the permit of March 3, 1925, is narrowed to the point whether in allowing the increase of the diversion from 4167 c. f. s. to 8500 c. f. s. (both exclusive of Chicago's pumpage, *supra*, pp. 22, 81, 85) the Secretary of War acted arbitrarily and without reasonable relation to the purpose of his delegated authority. There had been, and was, an actual withdrawal of far more than this amount. The total flow through the drainage canal in the year 1924 had been 9465 c. f. s., and, exclusive of Chicago's pumpage 8191 c. f. s. (*supra*, p. 23). In exercising his authority under the statute, it was incumbent upon the Secretary of War to consider the interests of navigation, but he was bound to consider those interests in relation to the Chicago River and the Chicago harbor as well as in connection with the effect on other harbors and the levels of the lakes. As

the Court had decided that 4167 c. f. s. was the limit of the quantity of water which could lawfully be taken from Lake Michigan, in the absence of a valid permit for an increased withdrawal, the Secretary of War had to consider the effect of an immediate stoppage of any diversion in excess of 4167 c. f. s. There could be no question as to the consequences of such action. They appeared on the application to the Secretary of War substantially as they appear in the evidence here. So clearly do these consequences appear, that the complainants, pressing for a decree to prevent the diversion, at the same time suggest that the Court if it enters the decree should suspend its operation and direct the defendants to meet specified requirements, with a provision that the parties may come before the Court from time to time to show the difficulties encountered, the speed made, whether the delay was too great, asking in short that the Court should direct and supervise the steps necessary to be taken to make it possible ultimately to give effect to such a decree, which, it is recognized could not reasonably be made operative forthwith. And it is plain that this supervision would have to continue for a number of years. The Court would thus be compelled to deal with questions essentially of an administrative character. These questions would concern not simply the health of the citizens of Chicago and the adjacent territory, but also the interests of navigation, questions of the sort which were appropriately before the Secretary of War. It appeared that a diversion of 4167 c. f. s. was not sufficient to keep the Chicago River reversed at all times, and when not kept reversed, the enormous volume of Chicago's sewage would pour into the lake and under present conditions could not fail to create a pestilential condition in the lake, and in the port and harbor of Chicago. The nature of the injury which would be sustained by the interests of navigation and commerce, and the propriety of the intervention of the United States, in such a case were pointed out by the Court in *New York* v. *New*

Jersey, 256 U. S. 296. There the question was merely as to the introduction of sewage into Upper New York Bay by an artificial conduit. Here, in connection with the effect, adequately shown, of the sewage there is the related question of the diversion of navigable waters, the extent to which it should be allowed, and the effect upon navigation of a given diversion, matters directly within Section 10 of the Act of 1899, and requiring the exercise of the administrative discretion of the Secretary of War. Called upon to consider the effect upon navigation of the stoppage, or reduction, of an actual, existing diversion, he had to determine what he would permit in the face of a definite and inescapable exigency. What was necessary to prevent intolerable conditions in the waters of the lake, and in the port and harbor of Chicago? Within what time could steps be taken which would permit a reduction of the quantity diverted with safety to navigation? What should be the nature of the steps to be taken? What supervision should there be of the work necessary to be done? These questions none the less related to navigation because they involved questions of sanitation. If in the circumstances the Secretary of War had authority to allow a withdrawal of water from Lake Michigan to pass through the drainage canal, and if in the exercise of that authority he could fix 4167 c. f. s., I can see no ground for the conclusion that he acted arbitrarily in the conditions confronting him in fixing 8500 c. f. s. If Congress had no power to regulate the diversion, or if it lay outside the authority delegated to the Secretary of War, he could not deal with it at all; but if Congress had the power, and the Secretary of War had the administrative authority to regulate the diversion, there seems to me to be no basis for a decision that he transcended his authority in determining the quantity allowed or that his action is subject to judicial review.

The Secretary of War in granting the permit of March 3, 1925, and fixing its conditions, while meeting the requirements of the existing situation, was obviously aiming

at a reduction of the amount of the diversion and providing for arrangements which would make a reduction practicable. His permit was temporary and conditional. The Secretary of War in granting the permit was entitled to impose conditions. "The power to approve implies the power to disapprove and the power to disapprove necessarily includes the lesser power to condition an approval." *Southern Pacific Co.* v. *Olympian Dredging Co.*, 260 U. S. 205, 208. An examination of the conditions of the permit in question discloses an appropriate exercise of discretion. They were conditions in the interest of navigation, providing for suitable inspection and supervision, and were directed to the object of decreasing the pollution of navigable waters and of bringing about conditions in which the withdrawal of water from Lake Michigan could be diminished. The Secretary of War also had regard to the practicability of providing regulating or compensating works to restore the levels of the Great Lakes or compensate for the lowering of their levels due to the diversion. This had reference to the power of Congress to take steps looking to such compensating works as a practical solution of the problem. The Secretary of War contemplating this possibility demanded that the Sanitary District guarantee a specified portion of the expense. Further, as Chicago increased the amount of water withdrawn from Lake Michigan by pumpage for its water supply, the Secretary of War insisted upon a program for metering with the object of reducing the quantity taken from the lake.

The permit is in terms revocable at the will of the Secretary of War, and is subject to such action as may be taken by Congress. If not revoked, or extended, the permit is to expire on December 31, 1929. It seems to me that the Secretary of War had authority to impose these conditions.

It is said that the permit is wholly ineffective as it provides that "there shall be no unreasonable interference with navigation by the work herein authorized." It is

urged that the permit is thus self-contradictory. But this condition must be construed not as withdrawing or rendering nugatory the permission expressly granted but as providing that, in the manner of doing it, all that is done under that permission, and in performing the conditions of the permit, shall be done with reasonable regard for the interests of navigation, and the Secretary of War for this purpose as well as others reserved the right of immediate revocation at any time. This permit, like those previously granted, was only a revocable license. (*Sanitary District* v. *United States,* 266 U. S. 405, 429.) But, as such, the permit was effective. It created no vested right in the Sanitary District. It is at all times subject to review, and the complete control of the diversion remains, as it should remain in view of the national interests involved, with Congress.

In my opinion, the permit of March 3, 1925, is valid and effective. In this view, it should not be overridden by judicial action.

Summary of Conclusions.—My conclusions are:

1. That the complainants present a justiciable controversy.

2. That the State of Illinois and the Sanitary District of Chicago have no authority to make or continue the diversion in question without the consent of the United States.

3. That Congress has power to regulate the diversion, that is, to determine whether and to what extent it should be permitted.

4. That Congress has not directly authorized the diversion in question.

5. That Congress has conferred authority upon the Secretary of War to regulate the diversion, provided he acts in reasonable relation to the purpose of his delegated authority and not arbitrarily.

6. That the permit of March 3, 1925, is valid and effective according to its terms, the entire control of the diversion remaining with Congress.

Recommendations for Decree.

In the light of these conclusions, the bill, in my opinion, should be dismissed. I think, however, that if a situation should develop in which the defendants were seeking to create or continue a withdrawal of water from Lake Michigan without the sanction of Congress or of administrative officers acting under its authority, the complainant States have such an interest as would entitle them to bring a bill to restrain such action.

I therefore recommend that the bill be dismissed without prejudice to the right of the complainants to institute suit to prevent a diversion of water from Lake Michigan in case such diversion is made or attempted without authority of law.

Respectfully submitted,

CHARLES E. HUGHES
Special Master.