

for hearing upon the exceptions filed by all parties to the Special Master's Report on Re-reference pursuant to the opinion and order of the Court of January 14, 1929.

The Court's opinion (278 U. S. 367) was rendered pursuant to a hearing upon the exceptions of the Complainants to the Special Master's Original Report filed November 23, 1927, and it is printed for convenience as an appendix to this brief.

THE FINDINGS, CONCLUSIONS AND RECOMMENDATIONS OF THE SPECIAL MASTERS REPORT ON RE-REFERENCE.

The re-reference was conceived by the Special Master to embrace the determination of the practical measures required to accomplish with due speed the elimination of the unwarranted part of the diversion, namely, that portion which was and is used to oxidize sewage and wastes and which may not be required in the interest of navigation and its protection when practicable artificial means are used to purify said sewage (Master's Report, p. 4*). The Special Master having found what plants and structures are practicable, (costing approximately \$176,000,000), to be installed and put in operation to purify and eliminate sewage and wastes, was confronted with the fact, well known in the sanitary engineering art, that such works will not entirely, (100%), purify, eliminate or dispose of all the sewage and wastes of the great metropolitan area of Chicago and its environs (Master's Report, p. 35). The extent of such purification or elimination of sewage and wastes will be only 85 to 90 per cent of complete theoretical purification at ordinary dry weather times after all such sewage disposal works are in operation (December 31, 1938). These works will not and

*NOTE: The Special Master's Report on Re-reference filed December 17, 1929, will be referred to herein as "Master's Report," and the Special Master's Original Report of November 23, 1927, will be referred to as "Master's Original Report."

cannot practicably at storm times treat a volume of sewage flow in sewers substantially in excess of 150 per cent of the dry weather flow. At storm times all flow in the sewers in excess of 1½ times the dry weather flow never will come in contact with or reach the sewage disposal plants, and the sewage and wastes therein will be wholly untreated (Master's Report, pp. 34, 35).

Consequently, the effluents from the sewage disposal plants containing the residual wastes equal to 15 per cent, (maybe 10 per cent), of the untreated sewage of the human population and industrial waste equivalent population, (6,000,000 on December 31, 1938, when all works shall be in operation according to the Master's Report and 6,800,000 in 1945), served by the plants, and at storm times vast and increasing quantities of wholly untreated sewage and wastes must pass into the channels of the Chicago and Calumet Rivers and Canals of the Sanitary District, part of the waters of the Port of Chicago (Master's Report, p. 136).

These effluents, at dry weather times equal to about 1,700 cubic feet per second flow in the sewers, and the storm water, equal frequently to 6 or 7 times that amount, must pass from the rivers and channels of the Port of Chicago either into Lake Michigan or away from the Lake through the Main Drainage Canal to the DesPlaines River at Lockport (Master's Report, pp. 92, 93, 138), where they have been all discharged for the last thirty years and where they were, to a considerable degree, passed for almost fifty years before that (Joint Abst., 87).

The Special Master, having had the benefit of the opinions of the various experts for all the parties, and particularly of General Jadwin, then Chief of Engineers of the United States Army, called to testify by the

Special Master, also concluded that, while no discharge at Lockport is required for purposes of navigation in the Chicago River so far as depths are concerned, nevertheless it would be incompatible with the interests of navigation and its protection in the rivers and canals of the Port of Chicago, including the Chicago Harbor, for these effluents and storm water, with its untreated sewage and wastes, to be discharged into Lake Michigan (Master's Report, pp. 126, 138); and that they should pass in the interest of navigation and its protection, through the Main Drainage Canal to the DesPlaines River, together with a reasonable amount of water from Lake Michigan to prevent the waters of the Port of Chicago, including the Harbor and Shore waters, becoming objectionable from a nuisance standpoint to navigation and to other interests such as bathing and domestic water supply uses (Master's Report, pp. 126, 135-140).

Believing that he was directed by the Court's Opinion (January 14, 1929) to consider the subject, the Special Master concluded from the opinions of said experts and from the opinions of General Jadwin, the Chief of Engineers, that the amount of diversion in the interest of navigation and its protection, so far as navigation in the Port of Chicago was concerned, should be, when all the works are in operation, 1,500 cubic feet per second* (Master's Report, pp. 138-140). Thus, the total discharge from the Drainage Canal at Lockport would be 3,200 cubic feet per second, that is, 1,700 second feet of effluent at ordinary dry weather times (assumed to be approximately the pumpage from the lake for ordinary domestic purposes), plus the above mentioned 1,500 cubic feet per second which includes about 1,000 cubic feet per

*Note: "Cubic feet per second" will at times be indicated by the abbreviation c.f.s.

second direct from the Lake, and about 500 cubic feet per second, being the rain water runoff of the Chicago River and Calumet River Watersheds.

Having concluded as a matter of law that complainants had not by their pleadings complained and could not in law complain of the use of water pumped for ordinary domestic purposes by the City of Chicago and the other cities within the territorial limits of the Sanitary District, and that the place of discharge of sewage in the form of effluents from sewage treatment plants and storm water, was within the discretion of the defendants (Master's Report, pp. 120, 121), the Special Master further concluded that the said 1,500 cubic feet per second in addition to the pumpage, would not cause such a substantial injury to the complainants as to warrant the discharge of effluents and storm water wastes into Lake Michigan, thus interfering with navigation and bathing beaches and endangering the domestic water supply (Master's Report, p. 140).

The Special Master also recommended certain reductions in the diversion at certain times during the construction period corresponding to completion dates as fixed by him for important units of the construction program. Consequently he recommended that the diversion be fixed at 6,500 cubic feet per second (in addition to pumpage) from July 1, 1930, to the date when controlling works should be installed either at the mouth of the Chicago River near Lake Michigan or in the Main Drainage Canal near its northern terminus, to prevent reversals or flows of the Chicago River, in times of storm, into Lake Michigan, at which time the diversion should be reduced to 5,000 cubic feet per second in addition to domestic pumpage; and at that amount it should continue to the end of the construction period, December 31, 1938,

when it should be reduced as before stated to 1,500 cubic feet per second, in addition to pumpage.

However, the reduction in diversion below the 6,500 second feet after July 1, 1930, is to be subject, according to the Master's Report, to the approval of plans (to be submitted immediately to the War Department by the Sanitary District) by the Secretary of War on the recommendation of the Chief of Engineers for and the construction of said controlling works within two years after such approval of plans (Master's Report, pp. 142, 143, 147).

The decree recommended by the Special Master, in addition to embodying the above mentioned findings as to completion dates for the different sewage treatment works, including said controlling works to prevent flows into Lake Michigan from the Chicago River, and as to amounts of diversion (in addition to pumpage), during the construction period, and at the end of such period, provides, in ordinary mandatory and coercive terms, for injunctions against the defendants to compel the installation of the said works at the times stated and to prevent diversions in excess of those fixed. The decree recommended also provides that the Court should retain jurisdiction for the purpose of entering any order or direction or modification of the decree or any supplemental decree in relation to the subject matter, and for the purpose of receiving and acting upon reports required by the decree to be filed semi-annually, beginning July 1, 1930, by the Sanitary District relating to the progress of construction work on the sewage disposal plants, the extent and effects of the operation of plants placed in operation, and the average diversion of water covering the period from the entry of the decree to the date of the particular report.

The recommended decree also provides that upon the coming in of each of said reports, any of the parties may apply for such action or relief, either with respect to the time to be allowed for the construction or the progress of construction, or the methods of operation of any of the sewage treatment plants, or with respect to the diversion of water from Lake Michigan, as may be deemed to be appropriate, and that at the foot of the decree the parties may apply for any other or further action or relief, irrespective of the filing of the above mentioned reports (Master's Report, pp. 148, 149).

DEFENDANTS' CONTENTIONS ON THEIR EXCEPTIONS.

Defendants' objections to the Special Master's Report embrace principally the following contentions:

- (1) The Master's Report (p. 85) finds that
 - 27) "since the hearings on the original reference (1926-27) the levels of Lake Michigan and of the other Great Lakes have risen",
 Lakes Michigan and Huron approximately 3 feet 9 inches, Erie and Ontario during the said period exhibiting a corresponding relative rise in level. Consequently, there is now no interference to complainants' commercial, riparian and other interests due to the diversion at Chicago to the amount fixed by the March 3, 1925, permit. On the contrary, the said high lake levels have caused and are now causing and will cause damage to complainants' riparian interests, to docks, wharves, piers and other like structures. If complainants' contention is correct as to the effect of the Chicago diversion in lowering lake levels, the damage so caused would have been greater had such diversion not existed and therefore such damage will be greater if said diversion is reduced (Defts. Ex. 1456, Photographs showing conditions of high water and effect of same upon shore properties).

The hydrograph of the Great Lakes (Defts. Ex. 1447), showing the rise and fall of their elevations from 1860 to date, indicates that under ordinary circumstances such high lake levels extend over periods of from six to eight years. For instance, in 1881 when the levels of Lake Michigan reached approximately the elevation 582 (present level of Lake Michigan 582.4—Master's Report, p. 86), in the beginning of the year, they remained at the same elevation or higher until the latter part of the year 1888. During four years of that period, namely, from the beginning of the year 1883 to the latter part of the year 1886, they were always above 582, and during a considerable portion of such period they were above 583. From about the middle of the year 1875 to the end of the year 1878, they were substantially 582 or higher. From the beginning of the year 1860 to the end of the year 1863, except for a period of two months, they were always above 582. From the beginning of the year 1904 to the end of the year 1908, they remained substantially at elevation 581. From the middle of the year 1916 to substantially the end of the year 1920, except for short periods, they were near elevation 581.

In view of said high lake levels now existing, which in all probability will continue to exist for a number of years, the nine year period (ending December 31, 1938), fixed by the Master for the construction of all the sewage disposal works required, is too short. It appears from his report that he disregarded to some extent the testimony of defendants' witnesses as to the reasonably practicable period required for construction, and fixed the short period of nine years as the period of construction for all the works, in view of his conclusion that the Court by its opinion of January 14, 1929, intended to impose "an immediately heavy burden" upon the Sanitary District in the installation of said works (Master's Report, p. 80).

This conclusion as to the effect of the Court's opinion should not have been given weight since the said opinion was rendered with reference to low lake level conditions when there was a supposed immediate or existing injury to the complainants' commercial and riparian interests. The high lake level conditions removed any necessity for undue haste or the imposition of "an immediately heavy burden" in the installation of the sewage treatment works. Furthermore, in all likelihood, compensating works for lake levels may be constructed by the time high lake levels may recede, which works the Master found by his Original Report to be entirely feasible costing only a small sum, a reasonable portion of which expense the Sanitary District has offered to bear (Master's Original Report, p. 125).

(2) The program for the installation of sewage disposal works and their appurtenances, requires the expenditure of the huge sum of approximately \$176,000,000. This program is made up of immense plants—Southwest Side Project costing approximately \$71,000,000, West Side Project costing approximately \$62,000,000, Calumet Project costing approximately \$21,000,000 and other miscellaneous works costing several millions (Master's Report, pp. 10, 11). The magnitude of these plants almost surpasses the powers of imagination. Located upon areas of from 500 to 600 acres each for the largest plants, and each serving populations of 2,000,000 to 2,500,000 people or industrial waste equivalent population, they have no peers in the sanitary engineering art. The nearest approach to those two large projects (West Side and Southwest Side Works), is the Sanitary District's own North Side Project, upon which there has been expended \$33,000,000 and will be expended to complete, the additional sum of \$4,783,000 (Master's Report, pp. 7, 10), serving a population of 830,000 people and being the larg-

est activated sludge sewage disposal plant in the world. The Master should have extended the completion date fixed by him (ending December 31, 1938) for all the projects for a number of years to about January 1, 1945, to allow for necessary delays due to carrying on a number of vast construction projects at the same time by one organization, (the Sanitary District), and to acquiring sites for plants and rights of way through condemnation, and to delays necessarily arising in a municipal corporation's raising and providing moneys as and when needed for construction work.

(3) The decree of the Court if entered as recommended by the Master, fixing the amounts of the diversions in the interest of navigation and its protection at various times during the period of construction as important units in the construction program go into operation and at the end of the period when all the works are completed and in operation, would usurp the functions of the Secretary of War on the recommendation of the Chief of Engineers under section ten of Rivers and Harbors Act of 1899, and invade the Political and Administrative branches of Government contrary to the Constitution. However the Court can properly determine what works should be constructed and put in operation and the time for the completion of such works.

(4) The Master concluded that all the works installed, (December 31, 1938), to treat from a practicable standpoint all the sewage and wastes, will accomplish only 85 to 90 per cent purification of such sewage and wastes; that the population and equivalent population in trade wastes of the Sanitary District when the works are installed, will be approximately 6,000,000 people, and by 1945 approximately 6,800,000; that there will remain an effluent from these sewage purification works substan-

tially equal to the raw sewage of 10 to 15 per cent of the human population and equivalent population in industrial wastes served by such works, or equal to the untreated sewage of a city of 600,000 to 900,000 people; that it is impracticable to treat all the sewage at storm times; that at such storm times only 150 per cent of the dry weather flow may be, practicably, treated; that consequently at storm times, when the storm flow will range from $1\frac{1}{2}$ to 7 times the dry weather flow, there will be large quantities of sewage wholly untreated that will not come in contact with or be treated by any sewage disposal works; that said effluent from said sewage purification works and sewage wholly untreated at storm times, must pass into the Chicago River and its branches and the various channels and canals of the Sanitary District; that complainants have not sought by their bills of complaint to enjoin the taking of water from Lake Michigan by the City of Chicago for the ordinary uses of its inhabitants; that as a matter of law, the City of Chicago is entitled to take its water supply from Lake Michigan for the ordinary and reasonable uses of its inhabitants; that when the City of Chicago sought to intervene in this case to assert its right of domestic consumption, complainants opposed such intervention and this was denied; that, if it is so entitled, then it cannot be said that the State or the City is subject to any established rule of law which requires it to turn into the Lake what is no longer water but sewage or the effluent of sewage treatment works (Master's Report, pp. 120, 121); that the effluents from the sewage treatment plants and the storm water must go somewhere; that with all flow stopped at Lockport, the said effluent from sewage disposal works, together with untreated sewage and waste carried with storm flow, discharged into the limited channels of the Drainage Canal and Chicago River, will create conditions in these channels seriously detrimental

to navigation; that the discharge of this effluent and storm water into Lake Michigan, even with circulating water through the Chicago River, would be incompatible with the interests of navigation in the Chicago Harbor, and there would be serious danger of contaminating the water supply and of creating offensive conditions at the bathing beaches of the city (Master's Report, pp. 136-140); that if the effluents from the sewage treatment plants and the storm water are taken away from the Lake, and discharged through the canal at Lockport, both the danger to the water supply will be removed and conditions suitable to navigation can be maintained; that under such conditions, 1,500 c. f. s. annual average from the Lake is required to maintain proper conditions for navigation; that the said 1,500 second feet annual average diversion from the Lake, in addition to domestic pumpage, would not produce

“such a substantial injury to the complainants when the fluctuations of lake levels due to other causes than diversions are considered as to preclude attention to the serious consequences which may result from a failure to maintain suitable conditions in the interest of navigation in case all flow at Lockport should be terminated” (Master's Report, p. 140); that this disposition of the problem by the discharge of the effluent from treatment plants and storm water, together with 1,500 cubic feet per second annual average from Lake Michigan, is

“in accord with the equitable principles which appropriately govern the exercise of the jurisdiction to determine controversies between States, a jurisdiction which is unfettered by technicalities and in the last analysis is for the purpose of establishing substantial justice.” (Master's Report, p. 139.)

It appears that there is navigation in the Chicago River or its branches which passes over and upon navigable waters of the United States south of the southern

terminus of the Drainage Canal, namely, upon the DesPlaines River, the Illinois and Michigan Canal and the Illinois River (Master's Report, pp. 122-123); that there will be required to maintain the waters of the DesPlaines River, Illinois and Michigan Canal and Illinois River in a condition reasonably acceptable for navigation when all the sewage disposal works are installed with the discharge of the effluent and storm water to the DesPlaines River, a total discharge, including effluent, storm water and diversion directly from the Lake, of approximately 5,000 cubic feet per second, or approximately 3,300 cubic second feet diversion from the Lake, in addition to pumpage, (1,800 cubic feet per second more than the 1,500 cubic feet per second that the Master allowed), (Master's Report, pp. 94-95).

Defendants contend that the Master should have found that said 3,300 cubic feet per second diversion in addition to domestic pumpage, will be required in the interest of navigation and its protection and that it would be a reasonable amount under all the equitable considerations involved, and that said 3,300 cubic feet per second, in addition to domestic pumpage, would be a reasonable riparian use of the Great Lakes waters.

(5) Even considering only that navigation which plies in and about the Port of Chicago and the various waters thereof and enters the Chicago River from Lake Michigan, or passes from the Chicago River into Lake Michigan, according to the weight of the evidence, a mean annual diversion of 2,000 cubic feet per second in addition to domestic pumpage instead of 1,500 cubic feet per second in addition to domestic pumpage, as allowed by the Master, will be required when all the sewage purification works are installed, and such amount is a reasonable amount under all the equities of the case (Special Master's Report, pp. 131-132).

