

DAMS ON THE GRAND RIVER*

By W. R. Holway

Almost ever since men first realized that electric power could be produced from the streams and rivers of our country, the imagination of Oklahoma builders has been attracted to the waters of the Grand River as a source of power. The stream's constant flow, its descending slope from the confluence of the Spring and the Neosho Rivers to the Arkansas, and the many suitable dam sites along its course have kept this possibility alive through the years.

Forty years ago, in January, 1907, C. S. Avery and others obtained a charter from the United States District Court in Indian Territory for the forming of a corporation to develop hydroelectric power on the Grand River. However, this corporation did not make any engineering investigations or perform any of the preliminaries of such development. In October, 1913 the Grand River Power and Electric Company was incorporated with a capital stock of \$5,000. This was a company fostered by Henry C. Holderman and certain interests connected with the K. O. & G. Railroad. In 1914, bonds were issued and preliminary surveys were started. The first World War intervened to stop the work. In 1934 the charter of this company was canceled by the Oklahoma Tax Commission for nonpayment of the license fee.

In August, 1917, the Grand River Hydro-Electric Company was incorporated, capital stock of \$10,000. Incorporators were Henry C. Holderman, C. H. Fenstermacher, J. H. Rothhammer, C. D. Swem, and W. C. Garlington. New interest had been aroused in the project by Royal D. Salisbury, an engineer from Denver, Colorado, who was the vice-president and general manager of the new company. Henry C. Holderman was president; C. H. Fenstermacher secretary; Major W. B. Collins (Ketchum) treasurer; Dr. T. L. Rippey (Dallas) field finance representative; and Byron Kirkpatrick and Judge Thomas L. Brown attorneys. Offices were opened in the Mayo Building in Tulsa, options were taken on land, and reconnaissance surveys were conducted. In 1920 an estimate of cost for this project was announced as \$23,900,000, but efforts to enlist Eastern capital were not successful. In June, 1922, this company filed an application with the State Engineer for a permit to appropriate the entire flow of the river at approximately the present Pensacola Dam site, for the purpose of generating electric power, to be produced at a dam to be

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known as Dam No. 1. The permit was issued in September of that year. In June, 1923, the company filed applications on Dams No's. 2, 3, and 4, and these were approved by the State Engineer on July 1, 1924. Mr. Salisbury was still the engineer for the company. A considerable number of land condemnation suits were started at this time but never pushed to completion. In March, 1923, the rights of the Grand River Hydro-Electric Company had been transferred to the Oklahoma Hydro-Electric Company, incorporated by Abram Stanfield, M.S. Schull, and Tracey Wilkerson, with capital stock of \$10,000. These men were owners of land near and on the site of the proposed dam.

At this time Mr. J. B. Robinson of Miami, Oklahoma, one of the large mining operators in the Tri-state District became interested in the project, primarily because it could furnish cheap power for the mining area. In March, 1926, Mr. Robinson filed an application with the Oklahoma Conservation Commission for the construction of four dams on the Grand River. This application was approved in October of that year, but Mr. Robinson had by then assigned his rights to Wash E. Hudson of Tulsa, who, in turn, assigned them to a new corporation, Grand-Hydro, organized under the laws of Oklahoma on November 6, 1929. This company had a capital stock of \$500,000 and was incorporated by P.D.C. Ball of St. Louis (whom Mr. Robinson had interested in the project), B. F. Lyons of Chicago, W. H. Calvin of Chicago, S. E. Wolff of Sand Springs, and R. D. Hudson, Wash E. Hudson, and D. Vensel of Tulsa. The Fargo Engineering Company of Jackson, Michigan, was employed to make new surveys and prepare plans for a dam and power plant on the Grand River. During 1929 and 1930 approximately 2100 acres of land were acquired by the Grand-Hydro for the dam and the reservoir.

In July, 1931, the Grand-Hydro filed its application with the Oklahoma Conservation Commission for a permit to construct a 50-foot dam on the river at what is known as the "Tynan Bluff Site", six or seven miles above the Pensacola Site, and for a 14-foot equalizing dam near the present Pensacola site. This application was approved in August, 1931, but no construction was undertaken by the Grand-Hydro or any use made of the waters of the river by that company.

About this time the interest of public agencies in this project was begun. In 1932, the Congress of the United States authorized the U. S. Army Engineers to study and report on the Grand River, as part of a report on flood control in the Mississippi Valley. Early in 1935 this report was made to Congress in House Document 308, a report on the Arkansas River and its tributaries, which recommended "that there be no participation by the United States in the control of floods in the Grand (Neosho) watershed."

The following paragraphs, quoted from this report, indicate the conclusions of the U. S. Army Engineers which led to this recommendation:

"The flood problem is of local interest and no Federal interest seems to be involved.

"There is no plan for flood control in the river below the mouth of Spring River that is practical from both an engineering and an economic standpoint. Furthermore, if this reach of the river is used to its best advantage for the ultimate development of the water resources of the watershed, it will be used for the development of water power and will have no flood problems, as practically the entire reach will be occupied by water-power reservoirs."

Another recommendation made herein was that "This report, with all tables, maps, and appendices be printed for the benefit of those interested in the future development of the water resources of this watershed."

The Fifteenth Oklahoma Legislature, on April 26, 1935, passed an Enabling Act, creating a "conservation and reclamation district" consisting of fourteen counties in northeast Oklahoma, in which was set up the Grand River Dam Authority to administer this district, granting to this Authority the right to appropriate the waters of Grand River for the purposes as set forth in the Act, among which were the development of hydroelectric power and control of floods. In August of 1935 the first Board of Directors was appointed, nine men, with J. Howard Langley of Pryor as the chairman. For two years a group of young men from the District carried on public meetings, and went to Washington, and put forth ingenious publicity to keep the project before the attention of the public, the Public Works Administration of the Federal Government, and the President of the United States. Wesley E. Disney in the House and Senator Elmer Thomas in the Senate worked with this group for the project. The public works program of the Government offered an opportunity to finance the first structures of the project, at least.

The original bill in the Oklahoma Legislature had attached to it the so-called Kirkpatrick amendment, which provided that all the power from this project was to be sold to the utilities at the switchboard. But before the Public Works Administration would approve an allocation and the President would allocate the money, they imposed the condition that this amendment must be repealed. The 1937 Legislature therefore repealed this restriction on the sale of power, considerable public pressure being also exercised to bring this about.

In August, 1937, President Roosevelt made the offer of a loan and grant to the Authority for the construction of the Pensacola Dam and power plant and appurtenant structures, \$11,563,000 as loan and \$8,437,000 as grant. The offer was accepted by the Authority on September 16th, and the loan and grant agreement was signed in

October of 1937. The Supreme Court of Oklahoma, on February 1, 1938, upheld the validity of the Enabling Act, and on the next day the first construction contracts for the project were let, and in July of that year the main contracts for the dam and power house were let.

These contracts provided for the construction of the longest multiple-arch dam in the world,—one mile long and 150 feet high, with solid concrete spillway section capable of discharging 525,000 cubic feet per second of flood waters. The dam creates a lake of 45,000 acres at normal pool level. The power house at the west end of the dam has five 15,000-kilowatt generators with provision for the installation of a sixth unit at some future time. The building of the project necessitated the elevation of five miles of the Frisco tracks and the building of a new railroad bridge over the river; the relocation of seven miles of the K.O. & G. Railroad, including a concrete bridge over Horse Creek; a highway bridge approximately one-half mile long over a narrow portion of the lake midway in its fifty-mile length; new waterworks intakes for the city of Vinita and the town of Grove; the relocation of pipelines, highways, and telegraph, telephone, and power lines; and the clearing of 17,750 acres of reservoir area. The building of transmission lines and substations followed the completion of the power plant, and was greatly extended because of the war needs.

The quantities of excavation in the project were 2,870,000 cubic yards of earth and 590,000 cubic yards of rock, approximately half this work performed in the construction of the dam. Material quantities were 655,000 barrels of cement (5,000 carloads), 625,000 barrels in the dam; 535,000 cubic yards of concrete (510,000 in the dam); and 30,000,000 pounds of steel (600 carloads). The total cost of the project is \$27,000,000.

The gates of the dam were closed and the storage of water began in March, 1940; the first generation of power was early in 1941.

The six largest floods of record in the Grand River occurred in 1895, 1927, one in the spring of 1941 and one later in that year, one in 1943, and one in 1944. The largest flood of record is the one of May, 1943, when the discharge at the dam was 315,000 cubic feet per second. It is interesting to note that of the six largest floods, four occurred in the first three years of operation; and that also the driest period on record for the river was in 1939-40, during the peak of construction. During the first five years of operation there was discharged over the spillways 27,600,000 acre-feet of water, or twelve and one-half times the capacity of the reservoir when filled to Elevation 755, the full flood level. In addition, another six times the reservoir capacity was discharged through the turbines.

In November, 1941, the project was taken over by the Federal Government, to utilize its full power production for the war effort.

For five years various war plants were served and the plant produced approximately 350,000,000 kilowatt-hours of power per year. On September 1, 1946, by contract approved by an Act of Congress, the project was returned to the Grand River Dam Authority and the State of Oklahoma. The flood control features of the reservoir continue under the control of the War Department.

The 1935 Enabling Act authorized the full development of the Grand River. Subsequent sessions of the Legislature authorized issuance of bonds for the construction of the Markham Ferry and Fort Gibson Dams. These two dams have also been authorized by Congress, to be constructed by the U. S. Corps of Engineers, in 1935 recommended that the Federal Government should not build these dams. Some money has been appropriated for the Fort Gibson Dam construction and the Corps of Engineers has started its building. No funds have been appropriated for the Markham Ferry Dam, and the Grand River Dam Authority still hopes to build this dam as a part of the Grand River Project, owned and operated by the State of Oklahoma.

There has been considerable controversy with the U. S. Army Engineers as to the flood control problem on the Grand River. On the reservoir created by the Pensacola Dam the Army has urged that the capacity above Elevation 735 should be used for flood water storage; the Grand River Dam Authority has contended that the flood control burden of the Pensacola reservoir should be above Elevation 745. The Federal Power Commission agreed with the Authority and the license reads to that effect. If the pool level were lowered to Elevation 735, the power production would be cut by twenty per cent (20%), at least. But when the water reaches Elevation 745 it is entirely under the control of the War Department and the Army Engineers are the only ones who say, in time of flood, when the gates shall be opened and closed. Of course it is true that the Army is interested in the effect of floods on the Mississippi perhaps more than on the Grand, and the gates are often controlled in the light of that interest.

The Authority has contended that since this project is a state project and the Grand a state river, and since no other state in this area is proposing to control the floods on their rivers, Oklahoma should not be asked to contribute so large a benefit to the flood control of the lower Arkansas Valley and the Mississippi River as the Engineers contemplate. The control of the water below Elevation 745 for power production by the Authority and the control between 745 and 755 by the War Department for flood control, seems to the Authority to produce a maximum benefit of the combined resources of the river,—power production, flood control, and recreation. If control were exercised as the Army Engineers wish, the recreational benefits would be very small because of the alternate flooding and

drying of lakeshore areas, producing an unattractive and unsightly shoreline. Under the Army's plan twenty per cent of the power possibilities would be lost; but the only advantage lost by the Authority's plan is the additional volume of flood control storage, benefiting Oklahoma very little, if at all. If every major stream contributing to the Arkansas and Mississippi River floods would reduce their peak flows by as much as the Pensacola Reservoir does, there would be almost no serious floods in those rivers in the future.

The same problem arises in the construction of the Markham Ferry and Fort Gibson Dams. The Engineer Corps plan to build these two dams as combination flood control and power dams. It is the opinion of the Grand River Dam Authority that the State of Oklahoma should build these other two dams, ignoring entirely the small amount of benefit that would be gained for flood control, at the expense of destroying the larger part of a beautiful valley. If these two dams are built as power dams only, letting the Pensacola Reservoir carry the flood control burden as it is now, the lakes behind the lower dams will have a constant level and will be attractive and valuable from a recreational standpoint, as well as for the power they will enable the river to produce. If the flood control features are added, they will be worthless as recreational lakes, due to the wide variation in water level between flood times and ordinary seasons. Oklahoma's rivers are among her most valuable resources. They should be developed for the greatest good to the greatest number of her citizens, and become possessions of which any State might well be proud.