Norman Project

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The Norman Project

The United States Reclamation Service was formed in 1902, with it's primary mission the "reclamation" of arid western lands through construction of water storage and irrigation facilities to provide stable, reliable sources of water for agricultural uses. As the face of the west changed, so did Reclamation's focus. An increase in population combined with the reduction of agricultural activities caused Reclamation to expand its focus to include development of non-agricultural benefits such as hydropower and water for municipal and industrial uses. The Norman Project is one example of a reclamation project constructed for non-agricultural purposes.

Project Location

The Norman Project is located in the central Oklahoma counties of Cleveland and Oklahoma. Major cities in the project area include Oklahoma City, Norman, Midwest City, and Del City, as well as Tinker Air Force Base. Project facilities consist of Norman Dam and Lake Thunderbird located on Little River east of Norman, the Norman Pipeline, Midwest City Pipeline/Del City Pipeline system, and two pumping plants. Water stored in Lake Thunderbird is lifted by pump into the Norman Pipeline and the Midwest City/Del City Pipeline system. The Norman Pipeline conveys water east to the City of Norman. The Midwest City/Del City Pipeline system conveys water north to a second pumping plant were a portion of the water is lifted to the Del City Pipeline and carried east to Del City. The Midwest City Pipeline continues northward to Midwest City.[1]

Historic Setting

1. United States Department of the Interior, Water and Power Resources Service, *Project Data*, (Washington: U.S. Government Printing Office, 1981), 695-7.

The earliest evidence of human activity in Oklahoma dates back 11,000 years. A mammoth kill site located near Anadarko in central Oklahoma contained stone spear points identified as belonging to the Clovis culture. From about 500 to 1,300 AD, the Spiro Mound Builders inhabited eastern Oklahoma leaving behind numerous burial mounds. The first written descriptions of the region come from the 1540s when Spanish explorer Coronado traveled through the area. At that time, the region was inhabited by a variety of Plains Indian groups such as the Osage, Kiowa, Apache, and Comanche.

Oklahoma was sold to the United States in 1803 as part of the Louisiana Purchase. In the 1830s, President Andrew Jackson ordered the relocation of the Five Civilized Tribes, the Cherokee, Creek, Chickasaw, Choctaws, and Seminoles, to Oklahoma. For the Cherokee people, the forced exodus was particularly hard, with over 4,000 Cherokee dying on the march, which became known as the Trail of Tears. The last of the five tribes, the Seminole, reached the Oklahoma Indian Territory in 1842.

During the Civil War, many of the Indians in Oklahoma sided with the Confederacy. As punishment, the U. S. Government forced the Indian nations to sign several treaties giving up portions of their territory for the relocation of other tribes. Following the war, the cattle industry began to flourish in Texas, and several major cattle trails cut through Oklahoma and the way to railheads in Kansas. During cattle drives many ranchers began to notice that Oklahoma was a prime location for raising cattle, and by the early 1870s, many Anglos began demanding lands in Oklahoma for their own settlement. In 1879 and 1880, President Rutherford B. Hayes prohibited Anglo settlement in the Oklahoma Indian Territory, but the pressure to open the region to white settlement continued, and in 1885, the United States began negotiating with the Creek and Seminole tribe to open vacant lands to white settlement.

The first land run in Oklahoma took place in April 1889. In one day, more than 10,000 settlers staked claim to lands in the newly opened region. This was followed by four other land runs. The largest, the Cherokee Outlet Run, took place in April 1892. The last Oklahoma land run took place in May 1895.[2]

Following the opening of the Oklahoma Indian Territory to settlement, the population of the region grew rapidly. Early settlers established cattle ranches which were eventually replaced by farming operations. The relatively high rainfall, about 30 to 35 inches per year, reduced the need for irrigation development, and the abundance of ground water slowed development of surface water resources. The discovery of natural gas and oil created another population boom, straining ground water supplies. Continuous lowering of the water table and an increasing deterioration in ground water quality drove cities and towns to step up development of surface water resources.[3]

Project Authorization

The first comprehensive investigation of water resource development possibilities on the Little River was contained in the Army Corps of Engineers' 308 Report which was submitted to Congress in 1936. This report was followed by a second Corps report in 1947. Both reports concluded that development on the Little River for flood control and other associated benefits were not economically justified. The Board of Engineers for Rivers and Harbors upheld that conclusion in 1948.

Local interests, primarily from the City of Norman which was beginning to develop water supply problems, began to enlist support for development of surface water resources,

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2. "History of Oklahoma," http://www.okccvb.org/okhist.html, 28 December 1998; H. Wayne Morgan and Anne Hodges Morgan, *Oklahoma: A Bicentennial History*, States and the Nation Series (New York: W. W. Norton & Company, Inc., 1977), 22-6.
3. *Project Data*, 697.

asking the Bureau of Reclamation to include the Little River Basin in studies of the Arkansas, White, and Red River Basins which began in 1946. As a result of this request, Reclamation conducted studies of reservoir sites on the Little River beginning in 1949. The following year, the 1950 Flood Control Act authorized a comprehensive, inter-agency investigation of the long-term development of land, water , and other resources in the Arkansas-White-Red River Basins. In 1952, a tentative plan for the Little River Basin was issued which described construction of several reservoirs in the basin, along with flood channel improvements and drainage improvements in the basin flood plain. Economic studies of the plan showed that the plan was not economically justified.

Continued investigations resulted in a revised plan which was introduced in 1954. The revised plan called for the construction of one large reservoir on the Little River, the Norman Reservoir, along with flood channel and drainage improvements. This plan proved to be economically feasible and Norman Reservoir was determined to be the key feature in the overall plan for flood control in the Little River Basin.

During the investigations it became clear that Norman was not the only municipality in the area to be have water supply problems. Midwest City, Del City, Moore, and Tinker Air Force Base, which all received their water from the same general source as Norman, were beginning to experience similar water supply problems. In 1953, it was determined that any plans for water development in the region should take into full account the needs of those cities as well as Norman. Investigations revealed that the Norman Reservoir would yield sufficient water to meet the needs of all affected municipalities.

In June 1953, Oklahoma City approached the Bureau of Reclamation seeking to be included in studies for Norman Reservoir. Investigations revealed that the flow of the Little

River was sufficient to meet only a fraction of Oklahoma City's needs, and that the long-term yield of Norman Reservoir would be needed to meet the future demands of Norman, Midwest City, Del City, and Tinker Airforce Base, leaving no water available for Oklahoma City. But the studies also showed that the needs of the water users wold be substantially less than the project capacity for 10 to 20 years following completion of the reservoir, and that the portion of the reservoir capacity reserved for sediment accumulation would be available as active storage for several years. Project studies indicated that about 15 million gallons a day would be available beginning in 1960, and would diminish over time as the needs of the water users increased. It was agreed that the Central Oklahoma Water Users Association, sponsors of the Norman Project, would allow Oklahoma City or other water users to use any surplus water so long as a surplus was available.[4]

The Norman Project was authorized under Public Law 86-529, 86th Congress, 2nd Session, which was signed into law by President Eisenhower on June 27, 1960. Funds for advanced planning were authorized in the 1961 Public Works Appropriation Bill, and construction funds were authorized in the 1962 Public Works Appropriation Bill which was signed by President Kennedy on September 30, 1961.[5]

Construction History

Specifications for construction of Norman Dam were issued in May 1962. The bids were opened on June 21, 1962, and the low bid of $3,692,177 was submitted by Comso Construction Company of Oklahoma City. The contract for construction of the dam was awarded to Comso Construction on June 28, 1962. Notice to proceed was issued on July 23, 1962, and

4. Denver, National Archives and Records Administration, Records Group 115, Records of the Bureau of Reclamation, "Annual Project Histories: Norman Project," Vol. I, 1961; 4-7 (hereafter cites as "Annual Project History," with volume number, year and page).
5. *Ibid*., 8-9.

acknowledged on July 25. The contractor began moving equipment onto the site on July 31.

The first work undertaken consisted of clearing a road to the site and clearing a work area. This work began on August 1 and was followed by clearing of the spillway and outlet works area on August 3. Included in the contract for construction of Norman Dam was relocation of State Highway No. 9. Work on that portion of the contract began on August 3 and was carried out by a sub-contractor. Excavations for the spillway and outlet works channels began in late August. Material excavated from the channels were stockpiled for use if the dam embankment.

Embankment placing operations began in mid-September 1962 with placement of zone 3 material. Norman Dam is a zoned, earthfill structure with three separate zones of material. Zones 1 and 2 make up the central portions of the dam embankment while zone 3 material is confined to the extreme upstream portion of the embankment and the downstream face of the dam. Placement of zone 2 material began in early December 1962, with placement of zone 1 material, the central core of the dam, beginning February 3, 1963.[6]

The L&A Construction Company, sub-contractor for spillway and outlet works construction, began concrete placements on February 13, 1963. In mid-April, six Native American graves were uncovered during excavations for the dam. Ten days later, two other graves were discovered in borrow area A. Due to the sensitive nature of the discoveries, Reclamation officials sought an appropriate solution. On April 17, 1963, following the first discoveries, the US Government (for the Department of the Interior, Bureau of Reclamation) and the Absentee-Shawnee Indian Tribe of Oklahoma, entered into an agreement whereby the government would excavate any Native American remains and relocate those remains in the

6. *Ibid*., Vol. II, 1962: 6, 11, 13, 46; Vol. III, 1963: 15; *Project Data*, drawing 670.

tribal cemetery.[7]

The contract for construction of the Norman, Midwest City, and Del City Pipelines was awarded to the International Pipe and Ceramics Corporation on May 17, 1963. The winning bid was $2,759,547. Construction activities under the contract began on September 16 with clearing of the Norman Pipeline right-of-way. Pipe laying operations began on October 29. The contract for construction of the reservoir and relift pumping plants was awarded on August 9, 1963. The winning contractor was the Lee-Emmert Corporation, which bid $1,219,523. Work under the pumping plant contract began September 23 with clearing of access roads to the construction sites. Excavation for the reservoir pumping plant began on October 1, 1963.[8]

Progress on all aspects of construction moved forward at a steady pace through 1963. Concrete placement in the spillway conduit began April 30, with placements in the outlet works intake structure beginning May 8. Backfilling of the cut-off trench commenced June 13, and the Little River was diverted into the diversion channel on July 10. Excavations for the reservoir pumping plant were completed on November 7, and clearing of the reservoir site began on November 13. Reservoir clearing operations were carried out under contract by the Schutt Construction Company, which had bid $96,000 for the contract.[9]

Construction activities continued through 1964. The contract for construction of recreation facilities at the reservoir was awarded to the Pool Construction Company on March 13. Concrete placement in the spillway was competed in April, and Schutt Construction Company completed work under the reservoir clearing contract on May 25. International Pipe & Ceramic began installation of the Del City Pipeline on July 16. In September, work on the

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7. "Annual Project History," Vol. III, 1963; 15, 22, 61, 169.
8. *Ibid*., 7, 11-2.
9. *Ibid*., 7, 13, 15, 22-3, 106-7.

recreational facilities was completed, and the contract for construction of the dam tenders house, warehouse and maintenance shop was awarded to Stoldt Builders, Incorporated. The diversion channel was closed on September 8, allowing water to back-up behind the dam. Water flowed through the outlet works for the first time on November 17.[10]

Norman Dam was topped out in late February 1965, and construction was essentially complete by the end of March. The outlet gates were closed on March 1, allowing storage of water to begin. The contract for construction of the dam was accepted as complete on April 30. The contract for construction of the pipelines was accepted as complete July 13, and the contract for construction of the pumping plants was accepted on July 23. Testing of the pumping plants and pipelines was conducted in November 1965, and deliveries of water began in February 1966.[11]

Norman Dam is a zoned earthfill structure 7,260 feet long and 144 feet high. The embankment contains just over 3,111,000 cubic feet of material. The spillway is an uncontrolled, morning-glory inlet type with a capacity of 2,840 cubic feet per second (cfs). The spillway has never been operated. The outlet works consists of an approach channel, trashrack structure, 13-foot diameter concrete conduit, a gate chamber, and a 17-foot diameter, flat-bottomed conduit which discharges into a concrete stilling basin and outlet channel. Flow through the outlet works is controlled by two, 6½- by 10- foot high pressure gates, and two 6½- by 10- foot emergency gates. Maximum flow through the outlet works in 6,950 cfs. Lake Thunderbird had a maximum capacity of 196,200 acre-feet (af) and a surface area of 8,788 acres when at capacity.[12]

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10. *Ibid*., Vol. IV, 1964: 6, 11, 14, 19.
11. Denver, National Archives and Records Administration. Records Group 115. Records of the Bureau of Reclamation. "Biennial Project Histories: Norman Project," Vol. V, 1965-6, 12-4, 19, 41.
12. *Project Data*, 698-9.

The Reservoir Pumping Plant is located on the north shore of Lake Thunderbird. It houses eight, vertical turbine pumping units. Four of the units are each driven by 200 horsepower (hp) motors and supply water to the Norman Pipeline. The total capacity of the four units is just over 22 cfs. The other four units are each driven 350 hp motors and supply water to the Midwest City/Del City Pipeline system. The total capacity of the Midwest City/Del City pumps is just over 29 cfs. Water pumped into the Midwest City/Del City system travels about 12½ miles to the Relift Pumping Plant. The Relift Pumping Plant houses eight horizontal centrifugal units. Four of the Units are powered by 100 hp motors and supply a total of just over 21 cfs to the Midwest City Pipeline. Of the other four units, two are powered by 40 hp motors and two by 30 hp motors. The four units supply just under 8½ cfs to the Del City Pipeline.[13]

The Norman Pipeline, which begins at the Reservoir Pumping Plant, is a reinforced concrete pressure pipe just under 8½ miles long with a capacity of just under 22 cfs. The Midwest City Pipeline begins at the Reservoir Pumping Plant and runs just over 12 miles to the Relift Pumping Plant. From the Reservoir Pumping Plant to the Relift Pumping Plant, the pipeline is a precast concrete pressure pipe with a capacity of 28 cfs. From the Relift Pumping Plant to its terminal, the pipeline is a precast concrete pressure pipe with a capacity of just over 21 cfs. The Del City Pipeline begins at the Relift Pumping Plant and runs almost 6½ miles to Del City. It is a precast concrete pressure pipe with a capacity just under 8 cfs.[14]

Post Construction History

Operation and maintenance of the Norman Project was transferred to the Central Oklahoma Master Conservancy District on May 2, 1966. The name of the reservoir was changed

13. R. W. Spencer, "Technical Data Workbook Abstract Report for Norman Dam, Norman Project, Oklahoma, Southwest Region," Prepared for Division of Safety of Existing Dam, Bureau of Reclamation (Contract No. 1-07-DV-00139). Goodson & Associates, Inc, Aurora, Colorado, 1981: 21.
14. *Project Data*, 699.

from Norman Reservoir to Lake Thunderbird in late 1965 at the request of the water users. Water deliveries to the City of Norman began February 1, 1966, followed by deliveries to Midwest City on March 29. During the initial operational period, excessive vibrations were experienced in several of the pump units. Efforts to resolve the vibration problem took several years and were finally resolved in early 1969.

In 1974, just over a mile of the Del City Pipeline was relocated to allow construction of a General Motors assembly plant. Work on the relocation began in January 1974 and was completed in early May.[15]

During the first decade of operation, the Del City Pipeline experienced numerous breaks requiring a significant amount of repair work. The problem was linked to expansive soils in the area. Prior to 1972, the contractor for construction of the pipeline, International Pipe and Ceramic Corporation, repaired the breaks without charge. In 1972, the water users association took over responsibility for pipeline repairs with costs incurred over and above normal maintenance being credited towards the repayment contract with the government.

The Norman Project continues to operate as project planners intended it to. Each year, with few exceptions, the water users have receive theirfull allotment of water from Lake Thunderbird, and project facilities continue to operate without significant problems. Lake Thunderbird continues to be a popular recreation area and the recreation facilities have been expanded several times to keep up with the demand.[16]

Settlement of Project Lands

As no irrigation benefits are derived through the operation of the Norman Project, no

15. "Biennial Project history," Vol. V, 1965-6: 7-9; Vol. VI, 1967-8: 10-2; Denver, National Archives and Records Administration. Records Group 115. Records of the Bureau of Reclamation. "Project Histories: Norman Project," Vol. VIII, 1971-6: 23-4.

16. Information on pipeline breakage is covered in the project histories beginning in 1967.

lands were withdrawn for later settlement. Prior to construction of the project, the area was already extensively settled. Construction of the Norman Project helped assure that there would be an adequate water supply for future settlement.

Project Benefits and Uses of Project Water

The major benefits derived from the Norman Project are flood control, recreation, and supplemental water for municipal and industrial uses. The relatively high annual rainfall, between 33 and 35 inches per years, virtually eliminates any demand for irrigation water. The primary benefit of the Norman Project is the supplemental supply of water for municipal and industrial uses in the cities of Norman, Midwest City, Del City, and Moore. In 1992, these cities received just over 17,800 af of water benefiting over 156,000 people.[17]

Norman Dam and Lake Thunderbird provide significant flood control benefits along the Little River to its confluence with the Canadian River. Since its completion, flood control operations at Norman Dam have prevented more than $33,250,000 in flood damages along the Little River. Flood control operations are conducted in accordance with regulations developed by the Army Corps of Engineers.[18]

Major secondary benefits of the project are recreation and fish and wildlife enhancements. Located near the metropolitan areas of Norman, Oklahoma City, and several other cities, Little River State Park on the shore of Lake Thunderbird annually hosts thousands of visitors. In 1973, Lake Thunderbird ranked third in visitors among all Reclamation constructed reservoirs. Activities include fishing, hunting, boating, water skiing, camping and swimming.

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17. United States Department of the Interior, Bureau of Reclamation, *1992 Summary Statistics: Water, Land, and Related Data*, (Denver: US Government Printing Office [1995]),. 64, 73; *Project Data*, 697-8.

18. Memorandum: Dan Jewell, Group Leader, Water Resource Service Group [Great Plains Region], to Assistant Commissioner - Resources Management, Subject: 1997 Flood Control Operations and Benefits - Great Plains Region, 20 February 1998. Located in the Land, Recreation, and Cultural Resources Office, Program Analysis Office, Bureau of Reclamation, Denver, Colorado; *Project Data*, 698.

Recreational activities are administered by the Oklahoma Tourism and Recreation Department. Wildlife management areas were originaly administered by the Oklahoma Department of Wildlife Conservation, but management of those areas has been taken over by the Tourism and Recreation Department.[19]

Conclusion

The Norman Project is just one example of the Bureau of Reclamation's ability to alter its program to meet the needs of the water users. Generally tasked with the development of water resources for irrigation and agricultural uses through the construction of water storage and conveyance facilities, the Norman Project demonstrates Reclamation's ability to use its engineering skills for the development of water resources for municipal and industrial uses. It is also an example of Reclamation's ability to change its program to meet the changing needs of water users in the West as the Norman Project was constructed at a time when the West was undergoing a shift from a region with an agricultural base to one with a non-agricultural base.

About the Author

William Joe Simonds was born and raised in Colorado and has a clear understanding of the importance of water in the American West and its influence on the development of that region. He attended Colorado State University where he received a BA in History in 1992 and a Masters in Public History in 1995. He lives with his wife and two children in Fort Collins, Colorado.

19. *Summary Statistics*, 109, 114; *Project Data*, 698; "Project Histories: Norman Project," Vol. VIII, 1971-6: 19; Additional information provided by Reclamation's Oklahoma City Field Office.

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