

Milk River Project

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The Milk River Project

Project Location

The Milk River Project is located in north-central Montana. Lands served by the project are located along a 165 mile stretch of the Milk River in Blaine, Phillips, and Valley Counties. In addition, project features are located in Hill and Glacier Counties. The water supply for the project originates in the St. Mary River watershed in Glacier National Park. Runoff is stored in Lake Sherburne for release into the St. Mary River. It is then diverted into the 29-mile long St. Mary Canal and discharged into the north fork of the Milk River. The water continues along the Milk River into Canada and travels more than 200 miles through Alberta before re-entering the United States. After re-entering the United States, the water flows into Fresno Reservoir where it is stored until needed for irrigation. Down river from Fresno Reservoir, several dams divert water for irrigation of more than 120,000 acres in the Chinook, Malta, and Glasgow Divisions.¹

Historic Setting

Montana is a state with abundant natural resources. One of its greatest resources is its vast water supply. The Missouri River and its tributaries has always played an important role in its history. As the route for the Lewis and Clark expedition and later as highways of waterborne commerce and trade, the rivers of Montana where the primary focus of settlement and development well into the 19th century.

Although Montana has an abundant water supply, it is still classified as a semi-arid state, receiving only 13 inches of precipitation in the eastern half of the state and 18 inches in the west, with most precipitation coming during the winter months. Because of this, Montanans have

1. United States Department of the Interior, Water and Power Resources Service, *Project Data*, (Denver: U.S. Government Printing Office, 1981), 627; United States Department of the Interior, Bureau of Reclamation, *Milk River Project*, Map No. 15-600-137, November 1983.

always relied on irrigation to see their crops through to maturity. The earliest non-Indian settlers in the Montana territory were fur traders, prospectors, and those wishing to escape service in the Civil War. Irrigation began almost as soon settlers arrived in the area. Early irrigation was practiced beginning in 1841 at the St. Mary's Mission in the Bitter Root Valley. Farmers in the Missoula Valley began irrigating their lands in 1864, and along the Flathead River in western Montana, irrigation systems were be constructed as early as 1885.

During the last 30 years of the 19th century, mining and smelting were the primary industries in much of Montana, with farming and ranching acting in a secondary economic role. But by the turn of the century, the silver boom had tapered off, and agriculture replaced mining as the region's primary industry. As agriculture increased in economic importance, irrigation became increasingly important to Montana.

The Milk River Valley in north-central Montana was one of the last areas in the West to be settled. During the 1880s, several small private irrigation systems had been constructed which diverted water directly from the Milk River. In the mid-1890s, several farmers joined together and constructed a small diversion dam to provide additional water to their system. Other dams soon followed, and before long, upwards of a dozen small dams where spread out along the river. While their systems functioned sufficiently during periods of high river flows, the inconsistent nature of the supply threatened the stability of the area. Unless a way could be found to ensure a stable and reliable water supply, the future of the region would be in question. Establishment of the Reclamation Service in 1902 was the first step to providing a secure future for farmers of the Milk River Valley.²

Project Authorization

2. United States Department of the Interior, Bureau of Reclamation, *Montana*, (Denver: U.S. Government Printing Office, 1983), 3-15.

The initial plans for the Milk River Project were prepared by the Reclamation Service and submitted for approval by the Secretary of the Interior on July 8, 1902, only a few weeks following the formation of the Reclamation Service. This submission relied on information developed during ongoing work within the U. S. Geological Survey. The initial approval authorized the allotment of funds for additional surveys and administrative costs. On March 14, 1903, the Secretary of Interior authorized construction of Reclamation's first five projects, including the Milk River Project. On March 25, 1905, \$1,000,000 was allocated for construction of storage works on the St. Mary River and facilities to divert water from the St. Mary River to the head of the Milk River. This authorization was limited by the condition that prior to the start of construction, a suitable agreement between the United States and Canada would have to be negotiated that would allow the stored waters of the St. Mary River to be transported through Canadian territory without interference.

By early 1906, even though the governments of the United States and Canada had been unable to reach an agreement, the Reclamation Service was authorized to draw up specifications and advertise for bids to construct the St. Mary Canal from the St. Mary River to the Milk River. It was believed that construction of the canal would help to solidify the United States' claims to the waters of the St. Mary River and, that if no agreement could be reached, the canal could be used to irrigate some 100,000 acres in the eastern part of the Blackfeet Indian Reservation and surrounding areas.³

Authorization for construction of the Dodson Diversion Dam on the Lower Milk River near Dodson, Montana, was given in early August, 1906. Additional authorizations were given

3. Denver: National Archives and Records Administration, Rocky Mountain Region, Records of the Bureau of Reclamation, Record Group No. 115, "Project Histories: Milk River Project" Vol. I, 1909, 6-8 (hereafter cited as "Project History: Milk River Project" followed by volume number, year, and page).

in 1935 (Fresno Dam and Reservoir), and 1944 (Dodson Pumping Unit).⁴

Construction History

Investigations

The St. Mary River begins life high on the eastern slope of the Rocky Mountains near the U.S./Canadian border. Annual precipitation in the St. Mary watershed comes as both rain and snow, and is usually very heavy. From its source in the Rocky Mountains, the St. Mary River flows north into Canada and empties into the Saskatchewan River, which flows into Hudson's Bay.

The Milk River rises from the plateau region just east of the St. Mary watershed, but is cut off from the mountain water supply by a low divide separating the two basins. The Lower Milk River Valley, that area generally east of Havre, Montana, is well suited for agriculture, but low annual rainfall necessitates the use of irrigation to fully utilize the region's agricultural potential. Early settlers to the region soon realized that the best source of additional water for the Milk River was the St. Mary River. The problem was how to get the water from one river to the other.

The first investigations into the transfer of water from the St. Mary River watershed to the Milk River were conducted by the Department of Agriculture in 1891. At that time, E. S. Nettleson, Chief Engineer for the Department of Agriculture, conducted a survey of canal lines from the St. Mary River to the Milk River and found such a route to be feasible. In 1900, Gerard Matthes of the United States Geological Survey, under authority of Congress, conducted further surveys in the St. Mary watershed. In 1901, a survey was conducted to determine if a canal route entirely within the United States was possible. That survey determined that a canal could

4. *Ibid.*, 22; *Project Data*, 630-1.

be located within the United States, but that it would be more than 300 miles long and cost \$4,000,000.⁵

The plan as envisioned by Reclamation Service engineers in the early 1900s called for storage of water from the St. Mary River behind a dam constructed at the mouth of St. Mary Lake. From the lake, the water would be diverted into a 30-mile long canal which would convey the water to the north fork of the Milk River. Once discharged into the Milk River, the water would flow into Canada and travel about 200 miles before re-entering the United States. Upon re-entering the United States, the water would be stored in a reservoir to be constructed near Havre, Montana, where it would be held until needed by irrigators downriver. Downriver, a diversion dam constructed near Dodson would divert water into two canals. One canal would deliver water to lands along the north side of the river while the second canal would deliver water to lands on the south side. In addition, a second canal would branch from the south canal and provide water to lands in the vicinity of Bowdoin. The southern canal would empty into a small storage reservoir just west of Saco. Water in that reservoir would be used to irrigate lands in the vicinity of Saco. A second diversion dam would be constructed near Vandalia, about 44 miles downstream from the Dodson Diversion Dam, to divert water into a canal that would provide service to lands along the south side of the Milk River. When completed, the Reclamation Service hoped to provide reliable irrigation service to almost 220,000 acres.⁶

The key to the success of Reclamation's plan was negotiation of an agreement with Canada to allow the safe passage of water through Canadian Territory, but Reclamation officials realized that a successful agreement might not be reached, and investigated a number of alternative plans. One such plan divided the project into two sub-projects, the Lower Milk River

5. "Project History: Milk River Project" Vol. I, 1902-11 Inclusive, 5-7.

6. *Ibid.*, 5-9; Department of the Interior, Bureau of Reclamation, *Repayment of Reclamation Projects*, (Washington: U.S. Government Printing Office, 1972), 234.

Project, and the St. Mary Project. The two projects were essentially the same as the Milk River Project, but without transport of water through Canada. The St. Mary Sub-Project would divert water from the St. Mary River to the Milk River, and use the water to irrigate lands on and adjacent to the Blackfeet Indian Reservation, while the Lower Milk River Sub-Project would store water in a reservoir constructed near Havre and use that water to irrigate lands along the lower Milk River. Another plan contemplated diverting water from the St. Mary River to the Milk River via a series of canals which would carry the water to the Marias River and then to the Milk River. Reclamation determined this plan unfeasible and eliminated it from consideration.⁷

The Boundary Waters Treaty with Great Britain

The key to the success of the Milk River Project was the successful negotiation of a treaty with the Dominion of Canada that would ensure the unrestricted passage of the combined waters of the St. Mary and Milk Rivers through Canadian territory. Although not the only dispute among the two nations over waters shared by both, the St. Mary/Milk River dispute was one of the driving forces behind the negotiation and ratification of the 1909 Boundary Waters Treaty.

When the Reclamation Service announced plans to divert water from the St. Mary River to the Milk River, the Canadian government protested, stating that the diversion would interfere with existing Canadian appropriations along the St. Mary River. The United States ignored the protests, contending that the diversion would have no effect on Canadian interests. Canada's response came in July 1904, when it was announced that the Canadian government had granted permission to two applicants to divert the waters of the Milk River to the St. Mary River in

7. United States Department of the Interior, United States Geological Survey, *Fourth Annual Report of the Reclamation Service, 1904-5*, (Washington: Government Printing Office: 1906), 177-8; United States Department of the Interior, *Sixth Annual Report of the Reclamation Service, 1906-1907*, (Washington: Government Printing Office: 1907), 110-8.

Canada. Realizing the it was at a severe disadvantage, the United States withdrew its plan to unilaterally divert the waters of the St. Mary River, and in December 1904, proposed a conference to seek an equitable agreement with Canada. The situation was summed up by U.S. Secretary of State Elihu Root who, while speaking to the U.S. Senate, noted:

We had started to use the waters of the St. Mary River and were met by a protest from Great Britain because they were afraid that we would injure the settlers below, in Canada. They had started to use the water of the Milk River in Canada and were met with protests from us [the United States] because they would injure settlers lower down on the Milk River, in Montana. It was apparent that we had to make some agreement or else both countries would grab all they could get. They had us at a decided disadvantage. They could have ruined a lot of people and a very large area of farms.

The Canadian government responded in August 1905 with an official statement:

[I]t is . . . in the interest of both of the countries that the waters of the St. Mary and Milk Rivers should be conserved for the beneficial use of the owners of agricultural and ranch lands through which these rivers flow, and that the Canadian government should join in this arrangement with the United States for the purpose of attaining this end, due regard being had for the protection of vested right to use of water as recognized in both countries.

Although both nations recognized the benefits to each, it took several years of negotiations before the United States and Canada signed the Boundary Water Treaty on January 11, 1909, continuing a 125-year tradition of peaceably settling boundary disputes by mutual agreement.⁸

Water Rights Adjudication

In addition to resolving potential conflicts with Canada, it was necessary to adjudicate the existing water rights along the Milk River in order to determine if there would be sufficient water to make the project feasible after existing rights had been met. Prior to the commencement of the Milk River Project by the Reclamation Service, some 115 water rights claims had been made for the waters of the Milk River and several canals were diverting water

8. Albert E. Utton, "Canadian International Waters," chap. In *Waters and Water Rights*, 1991 Edition, Vol. 5. ed. Robert E Beck (Charlottesville: The Michie Company, 1991), 48-51.

from the river. Before the Reclamation Service could commence with construction of the project as envisioned, it was necessary to determine if sufficient water would be available after all existing rights had been met.

In October 1905, a complaint was filed in the District Court for the County of Choteau, Montana, seeking the adjudication of water rights on the Milk River. Almost immediately following submission of the complaint, the proceedings were stayed pending resolution of another water rights suit on the Milk River. That suit, *The United States v. Winters*, arose from a dispute between Indians of the Fort Belknap Indian Reservation and several private irrigators on the Milk River. The United States Government had financed and constructed an irrigation system on the Fort Belknap Reservation to irrigate 5,000 acres of land. A dam had been built across the river to divert water into the reservation's distribution system. The dispute arose when the owners of four private dams upstream from the Indian's dam diverted such an amount of water as to leave no water in the river for the Reservation. The United States Attorney, acting on behalf of the Indians, filed an injunction seeking to halt diversions by the private ditch owners until such time as the rights of the Indians had been met.

The initial decision in the case was handed down in late 1905. In that decision, the judge noted that when the United States established the Fort Belknap Reservation, it was, in part, for the purpose of "enabl[ing] the Indians to become self-supporting as pastoral and agricultural people . . .," and that when the Indians made the treaty granting the United States the rights to all lands not within the reservation, they reserved sufficient water necessary to irrigate their lands. The judge determined that all water rights on the Milk River would be subject to the treaty and established the date of the treaty as the priority date. The case eventually went before

the United States Supreme Court which decided in favor of the plaintiffs.⁹

Following settlement of the *Winters* case, the Reclamation Service began pressing for settlement of the water rights issue. Attempts to renew the suit that had been filed in 1905 but suspended pending settlement of the Indian water rights suit met with resistance from many of the water users along the Milk River. Many, fearing the time and cost to settle the issue would delay construction for many years, sought a more timely solution to the issue. In December, 1910, a committee representing the private ditch companies, water rights owners, the Upper and Lower Milk River Water Users Associations, the United Milk River Water Users Association, and the Great Northern Railway, was formed and traveled to Washington D.C. to negotiate a water rights agreement between the water users of the Milk River and the U.S. Government. After several meetings, an agreement was reached and approved by the Secretary of Interior on December 20, 1910.

The formal contract was drafted and approved by the Secretary of Interior in late January 1911, but concerns over some of the provisions required amendments, forcing the Secretary to again approve the contract in August. The contract was then submitted to the water users for approval, but by early December, only five water users had signed the contract. Following a meeting on December 7, representatives of the Reclamation Service and the Great Northern Railway began traveling throughout the region collecting signatures from the water users, and by January 15, 1912, most of the water users had approved the contract. The final vested water rights contract between the water users on the Milk River and the U.S. Government was executed by the Secretary of Interior in May 1912, ending almost a decade of effort. With the execution of the water rights agreement, construction of the project to its full potential could

9. "Project History: Milk River Project" Vol. I, 1902-11 Inclusive, 145-7.

continue without delay.¹⁰

Construction

Construction of the features of the Milk River Project began in 1907 and would not be completed for almost four decades. Early stages of construction were delayed due to uncertainties related to the international water rights agreement and the Milk River adjudication process. Because of the delays in reaching a suitable agreement between the United States and Canada regarding the safe passage of water through Canadian territory, the Reclamation Service elected to move forward with construction based upon the alternative plan which divided the project into two sub-projects. The first construction activities took place on the St. Mary Canal. Bids for construction of the canal were opened in July 1906, and the only bid submitted, which was submitted by the Puget Sound Bridge and Dredging Company, was rejected as too high. The Reclamation Service was then given the authority to begin construction by force account, and in 1907, excavations for the St. Mary Canal began.¹¹

Excavation of the canal was carried out using a steam shovel and excavator. During the first three years of construction, work progressed only sporadically with operations moving forward for only part of each year. It had been proposed to excavate the last ten miles of the canal using teams and scrapers operated by Indian labor because that portion of the canal traversed the Blackfeet Indian Reservation. In 1907, about 80,000 cubic yards (cy) of material was excavated by Indian teams. Construction of the canal was delayed for several years as engineers determined the best route for the canal. Work by government forces resumed in mid-1912. In 1913 and 1914, contracts were issued for construction of the remaining portions of the canal and all structures except two major river crossing structures, one at the St. Mary River and

10. *Ibid.*, 148-72.

11. *Ibid.*, Vol. I 1909, 7-8; *Sixth Annual Report of the Reclamation Service*, 116-7.

one at Hall's Coulee. By the end of July 1914, just over 40% of the excavations for the canal were complete.¹²

By the end of 1915, the canal, structures, one barrel of the St. Mary River crossing, one barrel of the Hall's Coulee crossing, and one barrel of the Spider Lake Coulee flume were completed. The canal and structures were constructed with a capacity of 850 cubic feet per second (cfs) and each of the crossing pipes and the flume had a capacity of 425 cfs, limiting the total capacity of the canal to 425 cfs until the second barrels and flume were installed. Installation of the barrels and flume was deferred until demand warranted the upgrade.¹³

In 1908, the Reclamation Service began construction of the Dodson Diversion Dam, a rock-filled, timber crib structure on the lower Milk River near Dodson, Montana. Completed in early 1910, the dam has an overflow ogee crest. Although only 26 feet high, the dam, including spillway section and embankment wings, is over 8,000 feet long. Two canals head at the Dodson Dam. The Dodson North Canal was constructed during the period from 1912 to 1914. It is 28 miles long and has a capacity of 200 cubic feet per second (cfs) and conveys water to lands along the north side of the Milk River. It was first operated in 1913. The Dodson South Canal conveys water for irrigation of lands along the south side of the Milk River and carries excess water for storage in Nelson Reservoir. Construction of the Dodson South Canal began in 1908 and was temporarily halted following construction of the first nine miles of canal. Construction resumed in 1913 and continued until it was completed in 1915. It was first operated on a limited basis in 1911. The Dodson South Canal is 43 miles long and has a

12. United States Department of the Interior, *Ninth Annual Report of the Reclamation Service, 1909-1910*, (Washington: Government Printing Office: 1911), 160; United States Department of the Interior, *Twelfth Annual Report of the Reclamation Service, 1912-1913*, (Washington: Government Printing Office: 1914), 130-1; United States Department of the Interior, *Thirteenth Annual Report of the Reclamation Service, 1913-1914*, (Washington: Government Printing Office: 1915), 157-8.

13. United States Department of the Interior, *Fifteenth Annual Report of the Reclamation Service, 1915-1916*, (Washington: Government Printing Office: 1916), 216-7.

capacity of 500 cfs. At about the mid-way point of the Dodson South Canal, the Bowdoin Canal branches from the Dodson Canal. The Bowdoin Canal is 18 miles long and has a capacity of 175 cfs. Constructed between 1915 and 1917, Bowdoin Canal supplies water to lands east of Malta and discharges excess water into Beaver Creek which is then used to irrigate lands to the north along the creek.

The Dodson South Canal discharges into the reservoir formed by the Nelson Dikes. Nelson Reservoir is contained in a natural basin that was increased in capacity by construction of several earthen dikes. The reservoir and dikes were designed to be enlarged over time to bring the ultimate storage capacity to more than 130,000 acre feet (af). The initial development of Nelson Reservoir was carried out in 1914 and 1915, and consisted of construction of five dikes with a total length of 9,900 feet. The reservoir formed by the initial development had a maximum storage capacity of just over 27,000 af. The initial construction was carried out under contract by the Security Bridge Company. Water storage in Nelson Reservoir began in early June 1915.¹⁴

Two canals head at Nelson Reservoir. The Nelson North Canal is about one mile long and has a capacity of 250 cfs. Water stored in Nelson Reservoir is released into the Milk River via the North Canal to be diverted for irrigation of lands downstream. The Nelson South Canal conveys water to lands on the south side of the Milk River near Soco and Hinsdale. The Nelson South Canal is 27 miles long and has a capacity of 500 cfs. The Nelson North Canal was constructed in 1915, and the South Canal from 1915 to 1917. The South Canal began operation in 1918. The lands irrigated under the Dodson, Nelson and Bowdoin Canals constitute the area

14. United States Department of the Interior, *Twelfth Annual Report of the Reclamation Service, 1912-13*, (Washington: Government Printing Office, 1914), 128-9; *Fifteenth Annual Report of the Reclamation Service, 1915-1916*, 215; *Project Data*, 629-33; "Project History: Milk River Project," Vol. 7, 1915, 6.

known as the Malta Division.¹⁵

The lands comprising the Glasgow Division are supplied by the Vendalia Diversion Dam and Vendalia South Canal. Investigations into the irrigation possibilities and the location of the Vendalia Diversion Dam were carried out in the later part of 1908. Construction of the dam began in May 1913, and was carried out by Government forces. The dam was completed with exception of the movable crest in June 1915. Materials for the movable crest arrived in October 1916, and installation of the gates and machinery was completed the following October. The Vendalia Diversion Dam is a concrete slab and buttress dam with embankment wings and a movable crest. It is 32 feet high, 2,350 long, and has a diversion capacity of 300 cfs. The Vendalia South Canal heads at the south end of the dam and runs south-east for about 45 miles. Constructed between 1915 and 1917 under a series of contracts issued by the Reclamation Service, the Vendalia South Canal first saw service in 1916.¹⁶

Construction of Lake Sherburne Dam, the primary storage feature of the project, began in late June 1914. Under the original plan of development, St. Mary Lakes were to be used for storage, but investigation at the St. Mary's dam site revealed poor soil and foundation conditions that would have required significant expenditures to mitigate. Because of the foundation problems, Reclamation engineers began to look for alternative storage sites. Investigations and surveys of the Lake Sherburne site began in late 1912, and authorization for construction of Lake Sherburne Dam by government forces was given by the Secretary of the Interior on June 6,

15. *Project Data*, 632-3; *Milk River Project*, Map No. 15-600-137.

16. *Fifteenth Annual Report of the Reclamation Service, 1915-1916*, 216; United States Department of the Interior, *Sixteenth Annual Report of the Reclamation Service, 1916-1917*, (Washington: Government Printing Office, 1917), 140; United States Department of the Interior, *Seventeenth Annual Report of the Reclamation Service, 1916-1917*, (Washington: Government Printing Office, 1918), 163; United States Department of the Interior, Bureau of Reclamation, *Eighth Annual Report of the Reclamation Service 1908-1909*, (Washington: Government Printing Office, 1910), 102-3.

1914.¹⁷

Activities at Lake Sherburne during the 1914 construction season consisted of construction of the camp, stripping of the dam and spillway areas, excavations for the cutoff trench and outlet works, and some concrete placement in the outlet works and spillway chute. Activities during the early months of 1915 were delayed by funding shortages and work was limited to equipment repairs, camp improvements, and preparations of plans and drawings for future work. In late April, \$25,000 was allotted to continue work on the dam.¹⁸

One problem encountered was the high cost of transporting gravel and sand to the construction site. In 1914, a screening plant was constructed at the upper end of Sherburne Lakes, about 3½ miles from the dam site. Materials were hauled from the screening plant by teams pulling 1½ cubic yard dump buckets: a method which proved to be very expensive. To solve the problem, the Reclamation Service purchased a small tug boat and several barges to transport materials over the lake. The boat was purchased for \$1,900 from a Seattle ship yard and hauled overland to the construction site. Even with the costs of the boat and the expense incurred hauling the boat to the site, the savings over the original method proved substantial.¹⁹

Construction activities during the 1915 season were severely delayed due to poor weather conditions. Rain delayed work during much of May and June, and again in September. Back-filling of embankment material along the outlet conduit began in late-June, and construction of the embankment began in late-July. Embankment materials were placed in 6-inch layers, wetted

17. Denver: National Archives and Records Administration, Rocky Mountain Region, Records of the Bureau of Reclamation, Record Group No. 115, Entry 10, "St. Mary Storage Feature of the Milk River Project, Feature History" Vol. 3, 1912, 15-7; Vol. 5, 1913, 121; Vol. 7, 1914, 8-9 (hereafter cited as "Feature History: St. Mary Storage" followed by volume number, year, and page).

18. Denver: National Archives and Records Administration, Rocky Mountain Region, Records of the Bureau of Reclamation, Record Group No. 115, Entry 10, "St. Mary Storage Unit, Milk River Project, Sherburne Lakes Reservoir Dam, Feature History" Vol. 10, 1914, 4-5; Vol. 11, 1915, 28; (hereafter cited as "Feature History: Sherburne Lakes Reservoir Dam" followed by volume number, year, and page).

19. "Feature History: Sherburne Lakes Reservoir Dam," Vol. 11, 1915; 28-9, 34-6, 69.

if necessary, and rolled by a heavy traction engine. Excavations for the outlet tower foundation began in July, and the first concrete was placed in the structure near the end of August. Frost in early November halted embankment operations for the season, and all work was stopped on December 15.²⁰

Weather again caused delays during the 1916 construction season, delaying the resumption of work until March. By late April, work on the dam and outlet works had reached the point where it was possible to divert the flow of Swiftcurrent Creek through the outlet works. With the stream diverted, it was possible to begin excavations in the stream channel. Work in the stream channel was twice delayed by high water overtopping the coffer dam, first in early May, and again in mid-June. The second flood caused a one month delay. Work on all aspects of the dam continued throughout the 1916 season, and by the end of the year, the embankment was about 50% complete. In the spillway area, about one-half of the excavation was complete along with about one-third of the concrete placement. As a whole, the dam was about 60% complete after almost three years of work.²¹

The 1917 construction season began in early April with resumption of concrete placement in the outlet tower and gate house. This work continued until late May when the structure was complete. At that time, concrete operations moved to the spillway and continued until late November. Excavations in the spillway channel continued throughout the season, with excavated material used in the embankment. The outlet works emergency slide gates were installed and successfully tested in mid-December.

In early October, it was noted that the spillway structure appeared to be moving. Continuous observation confirmed that the spillway structure was rising and moving sideways.

20. *Ibid.*, 26, 31-2.

21. "Feature History: Sherburne Lakes Reservoir Dam," Vol. 16, 1916; 9-11.

The cause was traced to movement of the hillside to the north of the spillway. Efforts to stop the slide, which included draining several small lakes above the slide area and channeling surface runoff away from the effected area, proved fruitless, and the movement continued. Concrete placement in the spillway chute downstream from the crest was delayed while Reclamation engineers investigated ways to combat the problem.²²

Work on the dam and control works continued into 1918. In March, the lower cylinder gate was installed in the outlet tower, and the upper gate and operating mechanisms were installed in April. The embankment, without the parapet wall along the crest, was completed in September. By the end of 1918, the dam was essentially complete, with only backfilling along the parapet wall and placement of protective paving around the downstream end of the outlet conduit remaining. Excavations in the spillway channel were completed, but placement of concrete in the spillway chute floor and sidewalls was placed on hold while plans to mitigate the slide problem continued. Lake Sherburne Dam and Lake Sherburne were operated for the storage and release of project water for the first time in 1919, storing, then releasing 28,800 a/f of water for project lands. Minor work at the site continued for several years as shortages of funds and labor delayed placement of embankment protection and completion of the spillway chute. Reclamation engineers determined that constructing the floor and sidewalls of the spillway chute out of timber would be the best course of action. This would allow for movement in the structure without costly damage to a concrete chute. Construction of the timber chute was completed in November 1920. All work on the dam under the initial plan of development was completed in 1921.²³

Lake Sherburne Dam is an earth embankment dam, 1,086 feet long, containing 228,000

22. "Feature History: Sherburne Lakes Reservoir Dam," Vol. 18, 1917, 7-11, 29-60.

23. "Feature History: Sherburne Lakes Reservoir Dam," Vol. 20, 1918, 5-9, 19-34; "Project History: Milk River Project" Vol. 16, 1919, 3; Vol. 18, 1920, 147-9; Vol. 20, 1921, 37.

cubic yards (cy) of material. The original height of the dam was 94 feet, with an overflow spillway located on the north abutment. Later modifications raised the crest of the dam several feet and replaced the original spillway. The outlet works consist of a twin barreled concrete conduit through the base of the dam. The original installation had two cylinder gates in the outlet tower to control releases, and seven emergency slide gates at the upstream end of the conduit. Lake Sherburne, as constructed, had a maximum capacity of 66,100 acre-feet (af) and a surface area of 1,760 acres.²⁴

From the beginnings of project investigations, Reclamation engineers had planned for construction of an additional storage reservoir on the Milk River below the US/Canadian border. The site initially picked for the reservoir was an area known as Chain of Lakes, northwest of Havre, Montana. In 1933, the National Industrial Recovery Act allocated \$2,000,000 for construction of additional storage on the Milk River. Reclamation renewed investigations at Chain of Lakes in late 1933. Those investigation revealed that a new site, called the Fresno site, was more suitable than previously surveyed sites, and investigations were shifted to the new site. Presidential approval for construction of a dam on the Milk River was received in August 1935, and on February 20, 1936, the Secretary of the Interior approved construction of Fresno Dam.

Specifications were drawn up and an advertisement for bids was published in early 1936. Bids for construction of the dam were opened on October 30, 1936. The winning bid, \$980,000, was submitted by a joint venture of the Wachter-O'Neil Company and the Megarry Brothers. The contract was awarded on November 27, 1936, with notice to proceed issued on January 10, 1937. Work on the dam began in late March.²⁵

24. *Project Data*, 627, Eric B. Kollgaard and Wallace L. Chadwick, eds., *Development of Dam Engineering in the United States*, (New York: Pergamon Press, 1988), 745-7.

25. "Project History: Milk River Project" Vol. 35, 1933: 1, 24-5; Vol. 37, 1935: 4; Vol. 38, 1936: 5, 11; Vol. 39, 1937: 4.

Work began with excavation on the upstream portion of the diversion/outlet tunnel. Soon after, excavations for the spillway began. Concrete placement in the lower portions of the spillway began in July and continued until October when the stilling basin was completed up to the high water level. Materials excavated from the spillway were used in the rockfill portion of the dam. Rock conditions in the tunnel proved worse than anticipated, requiring the use of steel lining throughout the entire length. Concrete placement for the tunnel lining commenced in late August. Placement of concrete in the trashrack structure began in early July and continued until mid-December when the structure was complete. By the end of 1937, work under the contract was about 25% complete.²⁶

Work continued through 1938. The contractor completed concrete lining of the outlet tunnel on July 8, and successfully diverted the river through the tunnel on July 13. With diversion of the river, excavations within the river channel could begin. Excavated material was sorted for use in the embankment. Embankment material was spread by bulldozers and compacted by a sheepsfoot roller. Placement of embankment materials was completed in September 1939, and the riprap blanket was completed in late October. Concrete placement in the spillway structure was completed in early October, and installation of the gates and control works was completed on December 13. Although some minor work remained, Fresno Dam was dedicated on November 7, 1939, three years and eight months after authorization.²⁷

As originally constructed, Fresno Dam is homogeneous earthfill dam, 109 feet high and 1,855 feet long, containing 2,075,000 cy of material. The spillway is an uncontrolled concrete lined channel located at the left end of the dam. The maximum capacity of the spillway is 51,000 cfs. The outlet works consist of a concrete lined tunnel through the left abutment

26. *Ibid.*, Vol. 39, 1937: 33-7.

27. *Ibid.*, Vol. 40: 1938: 36-8, 43; Vol. 41, 1939: 4, 42, 46, 48-50, 59.

controlled by two, 5-foot by 6-foot slide gates and an identical set of emergency gates. The capacity of the outlet works is 2,180 cfs. Fresno Reservoir was constructed with an initial capacity of 127,200 af, but subsequent modifications have increased that capacity to just over 129,000 af. with a surface area of 5,670 acres.²⁸

In mid-1944, Reclamation began planning and surveys for the last major feature of the Milk River Project, the Dodson Pumping Unit. Designed to supply water to just over 1,000 acres above the Dodson North Canal, the unit consists of a two unit pumping plant and a 7½ mile long distribution canal. Surveys for the unit began in July 1944. Bids for construction of the pumping plant and canal were opened on July 7, 1945. Only one bid was received, and it was rejected as too high. The work was readvertised, and five bids were received. The contract was awarded to the Union Construction Company which bid \$52,582.50.

Work on the unit began in early April 1946, with excavations for the pumphouse substructure. Concrete operations began in early May and progressed at a steady pace. Installation of the two pump units was completed in early November, and all work under the contract was completed on November 14, 1946. The Dodson Pumping Plant is located on the Dodson North Canal about 2½ miles northeast of the town of Dodson. The two-50 horsepower pumps, each with a capacity of 15 cfs, lift water just over 20-feet into the Dodson Pump Canal, which serves just over 1,000 acres.²⁹

Post Construction History

Reclamation moved forward with plans to enlarge Nelson reservoir in 1921. The contract to enlarge the capacity of the reservoir from 27,000 af to 70,000 af was awarded to the White, Brown & Leahy Company of Great Falls. The contract called for raising the existing

28. *Project Data*, 632; United States Department of the Interior, Bureau of Reclamation, *Summarized Data on Federal Reclamation Projects*, (November 1941): 92.

29. "Project History: Milk River Project," Vol. 47, 1945: 7; Vol. 48, 1946: 6-7, 14-22; Vol. 49, 1947: 5.

dikes, constructing several new dikes, and raising the operating platforms of the outlets works above the new reservoir water level. Work under the project began in mid-June 1921 and was completed in November 1922.³⁰

When originally constructed, the St. Mary Canal was designed to carry a maximum of 850 cfs. While the canal was constructed such, two steel pipe siphons, one which crosses the St. Mary River and one that crosses Hall's Coulee, were constructed to carry 425 cfs. Designers planned to enlarge them to 850 cfs by installation of a second steel pipe when the demand for water required the increased capacity. Installation of the second pipe of the St. Mary River and Hall's Coulee Siphons was carried out during 1925.³¹

In addition to enlarging Nelson Reservoir and upgrading the St. Mary River and Hall's Coulee siphons, Reclamation carried out a systematic program of upgrading and replacing the many control structures on project canals. Many of the original drops and turnouts were constructed of wood which, after several decades of service, began to show significant deterioration. The maintenance and upgrade program was carried out throughout the 1920s and into the 1930s. In 1933, two camps of Civilian Conservation Corps (CCC) enrollees were established at Lake Sherburne to work on clearing the reservoir area of timber and brush. The camps were manned for several summers. In addition to clearing debris from Lake Sherburne, CCC enrollees from several camps located on the project worked on repair and rehabilitation of project structures as well as clearing Fresno Reservoir.³²

Since its completion in 1921, Lake Sherburne Dam has undergone two major modifications. In 1960, the original spillway was filled in and the current spillway constructed.

30. "Project History: Milk River Project," Vol. 20, 1921: 14, 109-10; Vol. 22, 1922: 12, 14-5.

31. Ibid., Vol. 27, 1925: 25-6.

32. Information about maintenance and upgrade activities can be found in annual project histories which were published for all years. Information about CCC activities at Lake Sherburne can be found in the annual project histories for the years 1933 through 1937.

The original spillway had been rendered unusable due to a major slide in the left abutment area, and had never been operated. The replacement spillway consists of a morning-glory type crest that partially encircles the outlet works control tower and discharges into the downstream portion of the outlet conduits. In conjunction with construction of the new spillway, the old cylinder gates, which had been inoperable for several years, were removed and replaced by two slide gates located at the base of the tower.³³

In the early 1980s, the crest of the dam was raised almost 20 feet to protect the dam from overtopping during the projected maximum flood. The crest was raised by construction of two walls, 24 feet apart, along the top of the existing crest, then placement of compacted fill between the walls. The walls are constructed of interlocking pre-fabricated concrete panels that are anchored in place with reinforced strips embedded in the fill. This was the first time that Reclamation had used this technique, which proved to be very cost effective. In conjunction with raising the crest of the dam, the outlet works control house and access bridge were raised to accommodate the change in maximum reservoir water level.³⁴

In 1965, flood waters along the Milk River destroyed the old Paradise Valley Diversion Dam. Faced with the loss of crops due to lack of water and without sufficient resources to replace the dam, the Paradise Valley Irrigation District sought the assistance of Reclamation in rebuilding the dam. Reclamation agreed to rebuild the dam and entered into a contract with the district. The dam was completed in 1966. The new dam is 570 feet long consisting of an earth embankment and a 200-foot long concrete diversion structure. The spillway is a 100-foot long

33. *Development of Dam Engineering in the United States*, 745-7.

34. *Development of Dam Engineering in the United States*, 745-7; United States Department of the Interior, Bureau of Reclamation, *SEED Report on Lake Sherburne Dam, Milk River Project, Montana*, Examination Report, (Denver, Colorado: U. S. Department of the Interior, 1982), 31; United States Department of the Interior, Bureau of Reclamation, *Review of Operation and Maintenance Program and Safety of Existing Dams Program, Examination Report, Lake Sherburne Dam, Milk River Project, Montana*, (Denver, Colorado: U.S. Department of the Interior, 1982), 5.

overflow section located in the diversion structure. The dam diverts 200 cfs into the district's canal.³⁵

Settlement of Project Lands

Following construction of the initial features of the project, settlement moved at a very slow pace. Up to 1920, there were no formal land openings, and the division and sale of large holdings was infrequent at best. In April 1920, a special order was issued making 21 farm units available to veterans of the war with Germany. Any of the units unclaimed by June 30 would be made available to any qualified entrymen, but by that date, all of the units had been claimed by veterans.³⁶

Throughout the 1920s, settlement of project lands continued at a slow pace. By 1924, 85% of the project was settled, but most of that was private lands which had subscribed to one of the water users associations. A number of factors contributed to sporadic settlement. Large landholders were slow to divide their lands into smaller units for sale, and delays in reaching an agreement between the government and the water users associations over the costs of repayment further hindered settlement efforts. In 1924, about 100 families settled on lands in the Chinook Division, but inexperience and poor conditions forced half the settlers to leave within a year.

Several dry years in the late 1920s and early 1930s stimulated interest in project lands from area dry land farmers. While several years of poor crops had depleted most of their resources, many were able to secure farm units, and for several years, the movement of dry land farmers onto project lands helped to boost settlement.³⁷

The onset of the dust bowl era forced many farmers in Oklahoma and Texas from their

35. *Project Data*, 629; *Repayment of Reclamation Projects*, 235.

36. United States Department of the Interior, *Nineteenth Annual Report of the Reclamation Service, 1919-1920*, (Washington: Government Printing Office, 1920), 182.

37. "Project History: Milk River Project," Vol. 26, 1924: 31-2; Vol. 27, 1925: 42; Vol. 32, 1930: 14; Vol. 34, 1932: 63; Vol. 35, 1933: 67; Vol. 36, 1934: 66.

lands, and numerous agencies were formed to assist those displaced by the disaster. One of those agencies, the Agricultural Adjustment Administration (AAA), purchased large tracts of project land, and using Works Progress Administration (WPA) labor, leveled the land, constructed irrigation facilities and farm buildings, and settled displaced farmers on the project. Between 1935 and 1939, the AAA, later known as the Farm Security Administration (FSA), provided more than 130 families farm units ranging in size from 50 to 160 acres. In addition, 30 smaller units, ranging up to 5 acres were settled near towns where the settlers could supplement their farm income with part-time jobs. In 1940, 1,100 acres between Nashua and Glasgow was purchased by a cooperative organization that was sponsored by the FSA. The FSA supplied the funds for the purchase, and a corporation was formed to manage the co-op and repay the FSA. The land was divided, improved, and buildings purchased as surplus from the Fort Peck Dam Project were moved on to the lands as farm houses.³⁸

In 1940, there were 678 farms located on the project. By 1950, this number had dropped to 671, reflecting a general trend which saw the population, both on farms and in towns, in the project area decline. By 1960, the number of farms in operation on the project had risen to 724, but the number again declined, falling to 691 in 1970. By 1980, the number of farms had dropped even further to 679. In 1992, the last reporting year, there were 522 full-time farms and 102 part-time farms on the project with a total farm population of just over 1,900 people.³⁹

38. *Ibid.*, Vol. 37, 1935: 60-1; Vol. 39, 1937: 12; Vol. 40, 1938: 59-60; Vol. 41, 1939: 57; "Project History: Milk River Project," Entry 10, Vol. 42, 1940: 53.

39. United States Department of the Interior, Bureau of Reclamation, *1992 Summary Statistics, Water, Land and Related Data* (Denver: U.S. Government Printing Office, 1995), 61, 65; *Summarized Data on Federal Reclamation Projects*, 94; United States Department of the Interior, Bureau of Reclamation, *1950 Crop Summary and Related Data, Federal Reclamation Projects*, 37, United States Department of the Interior, Bureau of Reclamation, *Statistical Appendix to 1960 Crop Report and Related Data, Federal Reclamation Projects*, 185; United States Department of the Interior, Bureau of Reclamation, *Statistical Appendix, Water & Land Resource Accomplishments, 1970*, ([Denver]: U.S. Government Printing Office, 1971), 234; United States Department of the Interior, Bureau of Reclamation, *1980 Annual Report, Appendix I, Crop and Related Data, Bureau of Reclamation*, ([Denver]: U.S. Government Printing Office, 1981), 275.

Project Benefits and Uses of Project Water

The primary benefit derived from the Milk River Project is a reliable water supply for the irrigation of as much as 120,000 acres along the lower Milk River. In 1992, water was delivered to more than 620 farm units for irrigation of slightly less than 100,000 acres. The total value of all crops grown on project lands in 1992 was just over \$9,770,000. The primary crops grown on the Milk River Project are alfalfa hay, wheat, and barley. The cumulative crop value since the first project crop report was issued in 1911 is \$324,254,000 (1992).

Along with irrigation benefits, the Milk River Project provides many recreational benefits. Lake Sherburne, which is located completely within Glacier National Park, is a popular spot for fishing and windsurfing. Recreational activities at Lake Sherburne are administered by the National Park Service in conjunction with management of Glacier National Park. Boating and water skiing are popular activities at Fresno Reservoir, while fishing and camping are popular at Nelson Reservoir. Recreational activities at Fresno and Nelson Reservoirs are administered by the Bureau of Reclamation.⁴⁰

In addition to recreation and irrigation benefits, Fresno Reservoir provides limited flood protection along the lower reaches of the Milk River above Fort Peck Reservoir. In 1995, the Army Corps of Engineers, which keeps flood control statistics, estimated that Fresno Reservoir prevented \$59,000 in flood damages, and since 1950 has prevented a cumulative total of more than \$7,200,000 in damage.⁴¹

Conclusion

The Milk River Project was developed to provide a reliable source of water for irrigation

40. *1992 Summary Statistics, Water, Land and Related Data*, 59, 61, 71, 108, 114, 276.

41. Memorandum, Manager, Resource Management Services Group, Bureau of Reclamation, Great Plains Region; to: Assistant Commissioner - Resource Management, "1995 Flood Control Operations and Benefits - Great Plains Region". February 6, 1996, Bureau of Reclamation, Land, Recreation, and Cultural Resources Office.

of over 100,000 acres of productive lands along the Milk River. While helping to provide a secure future for farmers in the region, the project was at the center of some of the most important water rights issues of the twentieth century. The 1909 Treaty with Canada set the standards for cooperation between the two nations which still stands today. The Winters Decision, though not directly linked to the Milk River Project, established the doctrine of reserved rights for Indian reservations and continues to influence water law in the West. The development of the Milk River was not only played an important role in the development of the region, but in the development of the western United States and Canada as well.

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.

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