

Yakima Project

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Yakima Project

Westerners began irrigation in many locations and, then sought Bureau of Reclamation help to expand their efforts. The Yakima Project in Washington is a result of Reclamation expanding and improving on the early irrigation efforts of settlers. The Yakima Project is one of Reclamation's earliest and largest efforts. Nearly one half million acres of sage covered lands were converted into one of the richest agricultural areas in the nation. Construction began in 1906 and three divisions were opened for irrigation by 1910. Since that time the Yakima Project has undergone a period of substantial growth and agricultural success. The Project is a testimony to Reclamation's importance in the reclaiming of the "Great American Desert."

Project Location

The Yakima Project is located in south central Washington. It includes portions of Franklin, Benton, Yakima, and Kittitas counties. Approximately 464,000 acres of land are irrigated currently by the system. Irrigation waters for the Yakima Project are provided by the Yakima River and its tributaries. The river is a main branch of the Columbia River. Its source lies in the Cascade Mountains and it flows southeasterly. Storage facilities include six lakes at the headwaters of the Yakima River and its tributaries, the Naches, Tieton, Kachess, and Cle Elum rivers. Bumping, Clear Creek, Rimrock, Cle Elum, Kachess, and Keechelus lakes provide project storage.

The south central valley of Washington annually receives only about 7.5 inches of rain. An abundance of streams in proportion to land make the area receptive to irrigation efforts. The streams and rivers in the valley are easily diverted to the surrounding rich soil. Volcanic ash is the main component in the soil of the valley. It is rich in minerals and has a depth of four to twenty inches. Minimal rainfall in the valley does not wash away this considerable mineral content, leaving the soil fertile.¹ High summer temperatures also make the area suitable for irrigation.

1. William E. Smythe, *The Conquest of Arid America*, (New York: Harper Brothers, 1909), pp. 199-200.

Early settlers recognized these traits of the valley. The Northern Pacific Railway was interested in irrigating the valley as it raced toward the Pacific coast. Both early settlers and the railroad started private irrigation projects. These early attempts laid groundwork for completion and success of the Yakima Project.

Historic Setting

The early history of irrigation in south central Washington begins with the limited contributions of the Yakima Indian Tribe. The Yakimas never developed any form of agriculture prior to their direct contact with Euro-American culture in the 19th century. A few small irrigation ditches were the only attempts to reclaim the land made by the Yakimas. Instead, they preferred to use the rich resources their environment had to offer. The tribe was blessed with a wide variety of local environments to range as they followed their seasonal economic rounds. Fishing, hunting, and gathering wild plants were the Yakima's food sources.²

Settlers first came to the valley around 1860. They were cattlemen attracted to the abundance of bunch grass, wild game, and fertile bottom lands. These pioneers built only minor irrigation ditches to serve small individual tracts of land.

The railroad and the race for the Pacific coast provided the greatest impetus for larger irrigation efforts and settlement. First surveys done by the railroad companies showed a bleak prospect for successful irrigation. The engineers for the Northern Pacific Railway reported the valley as fit for only rattlesnakes and jackrabbits. They did not believe a canal built in the light volcanic ash which constituted the greater part of the soil would withstand water pressure. Nevertheless, the railroad company continued to investigate irrigation possibilities in the valley, because a government grant gave the railroad ownership of half the valley. Irrigation was the key to growth and settlement in the valley, and the sooner the northwest was colonized the more profitable it would become for the railroad.³

In June of 1889 Walter M. Granger organized the Yakima Canal and Land Company. He

2. Dr. Richard D. Daugherty, *The Yakima People*, (Phoenix: Indian Tribal Series, 1973), p. 2.
3. Record Group 115, Box 347, vol. 1, to 1912 (Sunnyside), p. 1. Hereafter Record Group 115 cited as R.G. 115.

merged his company with the railroad to form The Northern Pacific and Yakima Irrigation Company. The company began construction of what would become the Sunnyside Canal in the fall of 1890.⁴ Granger became an important figure in the growth of the Sunnyside Canal network.

Realizing the potential of the valley, Granger and the railroad formed a new company, The Northern Pacific, Yakima, and Kittitas Irrigation Company. The purpose of this company was to investigate a larger field for irrigation. The railroad was able to sell irrigated land for \$40-50 an acre, compared to \$4 an acre for dry land, and the cost of irrigating the valley was determined to be \$10 per acre. Incentive was there for reclamation. Two canals in Yakima County, one canal in Kittitas County, and an extensive system of natural and artificial reservoirs at the headwaters of the Yakima River were planned. The main canal would be the Sunnyside Canal which would traverse the entire valley.⁵

Work began in 1891 and 42 miles were completed on the Sunnyside Canal by the following year. Financial problems, however, struck the railroad in 1893, with the Depression of 1893, forcing them to withdraw their resources from the operation. The depression also cut off the flow of potential settlers and, progress and development in the Yakima Valley came to a halt.

The Yakima Investment Company was formed to float a bond issue to raise funds for the necessary financial support. Paul Schulze, a trustee for the railroad interests, controlled the bond sale. Schulze hypothecated \$400,000 of securities, forcing the investment company to go into a receivership. This halted further irrigation plans. Granger retained supervision of the project throughout this troublesome time.⁶

Private irrigation ventures in Tieton Canyon also occurred in this period. Engineer Guy Sterling was employed in 1891 by the newly formed Cowiche Irrigation District to make examinations for use of area water for irrigation. Sterling's report of May 4, 1891, was very similar to what Reclamation constructed twenty years later. He estimated the length of the main

4. *Ibid.*

5. Donald J. Pisani, *To Reclaim a Divided West. Water and Public Policy 1848-1902*, (Albuquerque: University of New Mexico Press, 1992), p. 86.

6. *Ibid.*, p. 3.

canal to be eleven miles. His plans also included a tunnel and he suggested use of the bed of the north fork of Cowlitz Creek as a waterway at the head of the distribution system. These recommendations were realized during Reclamation's construction of the Tieton Division. As in the case of the Sunnyside Canal, the Depression of 1893 halted these plans.⁷

The turn of the century marked a brief turn of fortunes for both Sunnyside and Tieton. The Washington Irrigation Company acquired the Sunnyside Canal system and an attempt to legislatively secure water rights was enacted in Tieton Canyon.

The Washington Irrigation Company sold a \$500,000 bond issue and proceeded with an aggressive campaign of settlement and development. A steady stream of settlers began to flow into the valley. The 56 mile Sunnyside Canal controlled by the Washington Irrigation Company, along with smaller canals owned by other companies, were designed for lands sold by the irrigation companies. These plots were known as "company lands." The distribution systems were not designed for an entire geographical area. Therefore, maximum water use potential was not achieved.⁸

In 1904 it became apparent the water supply in the Yakima River was over-appropriated and shortage threatened. Unprecedented restrictions sought to reduce the amount of water used. Rating stations were established on the river and along the main branch canals to regulate water flow. Weirs at the head of all laterals were built to check water quantities delivered. This careful attention to water flow revealed the need for some type of facility to store the excess waters from the flood season for use during the dry summer months.

The restrictions placed by the companies were not very effective in regulating water flow. A crisis arose in 1905 as a result of over-appropriation of the Yakima. New canals and extensions of old canals above the Sunnyside Canal diverted more water than ever before. The river, on the other hand, was at its lowest recorded stage. Irrigation companies were desperate to meet the demands of their subscribers and hostilities between the companies grew. The

7. R.G. 115, Box 347, vol. 1, to 1912 (Tieton), p. 2.
8. R.G. 115, Box 347, vol. 1, to 1912 (Sunnyside), p. 4.

Washington Irrigation Company blew up the newer Union Gap and Irrigation Company's temporary storage dam at Lake Cle Elum so water could reach threatened crops on its subscribers land.⁹

Landowners who could not afford the purchase price of \$30 per acre per year for irrigated land with perpetual water rights formed an organization to force irrigation companies to furnish water to their lands. The landowners wished to bring the matter to the courts. The cost sought was the actual cost of carriage, not to exceed 25 cents per acre annual charge.¹⁰

Tieton Canyon landowners tried to secure larger supplies of water because of a shortage of unappropriated water. Developers George S. Rankin and George Weikel sought to enlist \$1,500,000 of capital and to secure necessary legislation for providing a sufficient water supply in Tieton Canyon. The legislation would have allowed corporations or individuals the right to store flood waters. It would also allow for the use of the natural bed of streams as channels to convey water to a diversions along the way.

The bill was introduced to the State Legislature in 1903. It was passed in the Senate but was defeated in the House. Representatives of other local constituents believed their prior rights would be infringed upon. Rankin then placed his ideas before the Yakima Commercial Club. He asked the members to use their influence and efforts to try to induce Reclamation to send engineers to investigate the project.¹¹

This was the situation in Sunnyside and Tieton when it became known there was a possibility of Reclamation taking over the Sunnyside Canal and developing Tieton. Several potentially valuable private projects were commenced only to bring the financial ruin of their backers before they could be completed and successfully operated.¹² Landowners were excited over the prospect of government involvement. If Reclamation assumed control, water rights disputes would be settled and irrigation systems would be improved, resulting in better service

9. *Ibid*, p. 6.

10. *Ibid*, p. 8.

11. R.G. 115, Box 347, vol. 1, to 1912 (Tieton),p. 4.

12. George Wharton James, *Reclaiming the Arid West*, (New York: Dodd, Mead and Co., 1917), p. 339.

and increased prosperity.

Project Authorization

The citizens of Yakima County aroused government interest in the Sunnyside Canal and Tieton Canyon. Residents sent a petition dated January 28, 1903, to Secretary of the Interior, Ethan A. Hitchcock. The petition presented the favorable opportunities for construction and development in the south central Yakima Valley.¹³ Of the five districts in Washington which applied for U.S. Reclamation Service development, Yakima Valley was chosen as the greatest opportunity at the lowest construction cost.¹⁴

Once the Yakima Valley was chosen, Reclamation sent a board of consulting engineers to Sunnyside and Tieton in 1904 and 1905. In April of 1905 the Sunnyside survey team met to discuss the feasibility of various projects, including the purchasing and enlarging the existing Sunnyside Canal network.

The consulting engineer's report included two reasons Reclamation should become involved in taking over the Sunnyside Canal. They believed the current system of over-appropriation to "company lands" was a detriment to the development of the valley. A more uniform appropriation system would be enforced if the government became involved and took over the present system.

The engineers believed enlargement of the existing system was feasible. Increased development was possible either by extending the Sunnyside Canal, or by building another canal above and parallel to the system. This would add 250,000 acres of land, which two-thirds were irrigable, to the system.¹⁵

On the basis of these positive survey results, Reclamation engineers recommended continuing investigations into the expansion and enlargement of the Sunnyside Canal. Purchasing the current system, owned by the Washington Irrigation Company, was the next step in development. The government accepted an offer from the irrigation company on October 23,

13. *Project Data*, p. 1341.

14. James, *Reclaiming the Arid West*, p. 340.

15. R.G. 115, Box 347, vol. 1, to 1912 (Sunnyside), p. 9.

1905, and purchased the project for \$250,000. The terms of the agreement included the company turning over to Reclamation the canal and its lateral system. The irrigation company also relinquished all its water rights in the Yakima River.¹⁶

As in other projects, Reclamation insisted that water rights existing in the valley be made definite and certain. This was to insure that water remaining subject to appropriation by Reclamation's project would likewise be definite and protected under law. Accordingly, limiting agreements were secured with various irrigation companies.¹⁷

Engineers investigating Tieton Canyon also provided favorable reports for development of that area. On October 16, 1905, a board of engineers recommended setting aside \$1,000,000 toward the construction of a canal system by the Tieton River. The recommendation was subject to four conditions; a favorable soil report, satisfactory adjustments made to the claims of private appropriators, the landowners form a water-users association, and the rights of the water of the Yakima Indian Reservation be adjusted satisfactorily. These conditions were quickly met and the engineers recommended the project to Secretary Hitchcock later that month.¹⁸

Final authorization for the Yakima Project came on December 12, 1905. Secretary of the Interior Hitchcock approved the further development of the Sunnyside Canal and the construction of a canal system in Tieton Canyon under the name Yakima Project.¹⁹

Construction History

Seven divisions make up the project. Six divisions are used for irrigation and one for storage. The six irrigation divisions have individualized distribution systems to meet the needs of the water users.

The first division completed for irrigation in 1907 was the Sunnyside Division. It contains 103,600 acres of irrigable land located north of the Yakima River. The Sunnyside Diversion Dam diverts water from the Yakima River to the distribution system. The irrigation

16. *Ibid*, p. 10.

17. "Yakima Valley Water Settlement Upheld," *The Reclamation Era*, January 1918, p. 10.

18. R.G. 115, Box 347, vol. 1, to 1912 (Tieton), p. 4.

19. *Project Data*, p. 1341.

districts within the Sunnyside Division pump water to their lands by using hydraulic turbine pumps at drops in the Sunnyside Canal.²⁰

Tieton Division, completed for irrigation in 1910, is an area of 27,271 acres of irrigable land located west of the city of Yakima. Water is diverted from the Tieton River into a flume by the Tieton Diversion Dam. The flume carries water across the canyon divide and pours it into the Tieton Canal. Six tunnels totaling two miles in length are in the canal system.

There are two units included in the Tieton Division. The Canyon Unit, which includes the Tieton Canal and dam, runs along the south side of the river. The Valley Unit distributes water diverted from the Tieton Canal to the irrigable acreage off the north fork of Cowiche Creek. Two canals branching off from the canal provide the irrigation water for these lands. The 12.5 mile Naches Branch Canal runs south east from the Tieton Canal follows the Naches River. Wide Hollow Branch Canal runs 29.7 miles off the end of the canal in a southerly direction.

Water for the Kittitas Division is diverted from the Yakima River by the Easton Diversion Dam, located at the foot of the Cascade Mountains. This water is used to irrigate 59,582 acres. The Kittitas Main Canal, completed in 1934, carries water along the south side of the river and splits into two branches near Thorp.

Two divisions use water for irrigation and for power. The Roza Division lies on the north side of the Yakima River and contains 72,511 acres of irrigated land. The Roza Diversion Dam diverts water for the distribution and power system. A portion of this water is sent to the Roza Power Plant. Since 1958 the plant has been generating 11,250 kilowatts of power for the eighteen pumping plants needed to irrigate the 27,000 acres above the canal.

A second division employing the waters of the Yakima for power and irrigation is the Kennewick Division. Originally part of the Columbia Irrigation District, this division was rehabilitated by Reclamation as part of the Yakima Project beginning in 1930. 19,171 acres of

20. U.S. Department of the Interior, Bureau of Reclamation. *Yakima Project: Annual Project History, 1974, vol. 1*, R.G. 115, Records of the Bureau of Reclamation, Project Histories, Yakima, 1974, Box 329, p. 69. (located in National Archives, Denver, Colorado), Hereafter cited as R.G. 115, followed by box number, volume, year, and page number. There are seven irrigation districts in the Sunnyside Division. They are Grandview, Granger, Outlook, Prosser, Snipes Mountain, Benton, and Sunnyside Valley.

land are included in the district. An additional 6,300 acres southeast of the Yakima River are also served by the system in the Kennewick Division Extension. The Chandler Power Plant is included in the division generating 12,000 kilowatts of power for irrigation and public use. The energy not needed for irrigation is sent to the Bonneville Power Administration.

The final section of the Yakima Project is the Storage Division. Six storage reservoirs located at the headwater lakes of the river system makeup this unit. The division has total supervision over the Yakima River supply, including both the natural overflow and the stored reservoir water. The capacity of the storage reservoirs total 1,070,700 acre-feet of water.²¹

Early Reclamation construction in the Yakima Valley involved three divisions, Sunnyside, Tieton, and Storage. In each division Reclamation expanded on the original private canal and reservoir systems. Construction of the Sunnyside Diversion Dam in 1907 and the enlargement of the Sunnyside Canal in 1907-1911 were the initial efforts made by Reclamation.

Construction in these divisions was done primarily through force account. Failure of contractors to make satisfactory progress on the principle contracts resulted in contract suspension. Force account was also necessary because of the various uncertainties in connection with the work, on account of the necessity of maintaining irrigation services through canals throughout the building period.²²

Sunnyside Division

Located on the Yakima River near the town of Parker, the Sunnyside Diversion Dam was constructed by the Northern Pacific, Yakima, and Kittitas Irrigation Company. In 1890 the company built a small earthfill structure. The future expansion of the Sunnyside Canal made necessary a weir with its crest at a fixed elevation, where no adjustments would be needed.

Reclamation engineers faced a dilemma in building a dam of sufficient height to give the required diversion during low water flow without obstructing the channel during the flood season. This obstruction would lead to overflowing the adjacent lands lying above the dam. To

21. U.S. Department of the Interior, Water and Power Resources Service, *Project Data*, (Denver: United States Government Printing Office, 1981), pp. 1337-40.

22. James, *Reclaiming the Arid West*, pp. 341-2.

solve this problem, an 8 ½ foot fixed weir was constructed about one mile above the original dam site. The new dam would protect low lands during the high waters. The dam is a concrete structure of the ogee type 500 feet long.²³

Water was ready for irrigation in the Sunnyside Unit by the 1907 irrigation season. The new diversion dam was completed in October of that year and construction commenced on enlargement of the Sunnyside Canal.

The 60 mile Sunnyside Canal runs from the diversion dam in a southeasterly direction to the vicinity of Benton City. All irrigable lands are irrigated by either gravity flow or one of seven pumping plants.²⁴ These high lands are located on the south side of the Yakima, east of Mabton, Washington.²⁵

The capacity and grade of the canal were altered by Reclamation to increase carriage capacity. The depth of the canal was increased 9 inches to enlarge diversion capacity. Changes in the quantities of water led to changes in hydraulic gradient. Old wooden checks were replaced with 24 vertical drops situated two miles apart. Water fell 0.5 to 2.25 feet when entering a drop.²⁶

Reclamation completed enlargement in the main body of the Sunnyside Canal in 1911. Some problems arose during construction that lead to minor delays and hindered progress. Small floods and extreme cold temperatures of the valley, sometimes reaching sub-zero, slowed progress. Frozen ground made digging almost impossible. This problem was overcome only through the diligence of the work force, and many days were spent digging into the frozen ground to complete the day's task.²⁷

Irrigators established seven irrigation districts within the Sunnyside Division. These included Grandview, Granger, Outlook, Prosser, Snipes Mountain, Benton, and Sunnyside Valley irrigation districts. Between 1910 and 1916 seven extension canals were constructed to

23. R.G. 115, Box 347, vol. 1, to 1912 (Sunnyside), pp. 26-7.

24. *Project Data*, p. 1348. In the Sunnyside Division, pumping plants are located in Grandview, Snipes Mountain, Outlook, Prosser, West Grandview, Spring Creek, and Hillcrest.

25. R.G. 115, Box 347, vol. 1, to 1912 (Sunnyside). p. 20.

26. *Ibid*, p. 21.

27. *Ibid*, p. 44.

bring water from the Sunnyside Canal to the districts. 1923 saw the completion of a siphon and lateral system to supply water to the Granger District. Districts were developed as water right applications were completed.

The canals are combined earth and concrete lined, ranging from eight to eighteen miles long. Outlook, Benton, Snipes Mountain, Grandview and the Prosser Irrigation District Canal are of the gravity flow type. The Mabton and Prosser Canals receive their water from the Sunnyside Canal through siphons.²⁸

Construction in the Sunnyside Division from 1914-1925 consisted mainly of extension of the canal to mile sixty and betterment of existing distribution systems. An agreement between the United States and the Sunnyside Irrigation District was signed in October of 1914. It called for a ten mile extension in the existing canal to be completed by open contract. This decision resulted from the success of the existing districts and the desire of Reclamation and the local districts to expand the irrigation area.

Plans were made to improve and expand existing distribution systems as new areas mailed water right applications to Reclamation offices. This construction involved building small laterals, flumes and pipe lines to more efficiently deliver water to new lands. The concrete lining of sections of the canal network distributing water to the irrigation districts was a major focus of this period. Depleted old wooden structures were also replaced by concrete wherever needed.²⁹

Tieton Division

The Tieton Division was the second unit of Reclamation construction in the Yakima Project. The Tieton Diversion Dam diverts water from the Tieton River into the Tieton canal. Construction of the Tieton Canal commenced in 1907 and water was first used for irrigation in 1910. Primary construction for the 27,271 irrigable acres west of the city of Yakima between the Naches River and Ahtanum Creek was completed in 1911.

The Canyon Unit of the Tieton Division includes the Tieton Canal and dam. The Tieton

28. *Project Data*, pp. 1344-8.

29. R.G. 115, Box 346, vol. 2, 1915, p. 109.

Diversion Dam is located on the south bank of the Tieton River. Construction on the concrete weir with embankment wing began in the spring of 1908. A flood in 1906 caused radical changes in the bed of the river necessitating changes in the original location of the dam. The site of the dam was moved 75 feet upstream to take advantage of a solid rock cliff. Work was done by force account and completed in late 1908. The weir is five feet high with a crest length of 110 feet.

Work progressed steadily and without problems on the diversion dam, flume, canal, and distribution system. Construction of the 12 mile canal began in April of 1907 and was completed in December of 1908. The cost of building the canal exceeded original estimates due to the isolated location of the project. Skilled labor was hard to find as farmers returned to their fields at the end of summer to cut their dry crops. Eventually enough men were secured through force account to complete the project. The driving of the Columnar Tunnel was the only work completed by open contract.³⁰

Open canal excavation and tunnel driving began in April of 1907. 10,000 cubic yards of loose earth, slide rock, and hard basalt were removed by machine. Large difficult to move boulders in the ground caused some problems in excavation. Portions of the walls were lined with concrete and work was completed fairly easily on May 25, 1909.³¹

Hard rock made tunnel driving difficult. The Trail Creek, Columnar, Tieton and the North Fork Tunnels were all driven by electric drills, while the two Steeple Tunnels were hand driven. Some time was required to remove trees and earth from the tunnel areas and acquire temporary support timbers for the tunnels. Tunnel work began in May of 1907 and they were all completed by September of 1909.³² All the tunnels are concrete lined with headings seven feet three inches in diameter and are perfectly straight in alignment throughout.³³

Once the Tieton Canal was completed, construction of the Valley Unit commenced. Two branch canals located at the end of the Tieton Canal are featured in this unit. The 12.5 Naches

30. R.G. 115, Box 347, vol. 1, to 1912 (Tieton), pp. 21-5.

31. *Ibid*, pp. 56-61.

32. *Ibid*, pp. 53-61.

33. *Ibid*, p. 25.

Branch Canal was begun in 1909 and completed one year later. Wide Hollow Branch Canal is 29.7 miles long and was finished in 1911. Both canals are concrete and earth lined and are of the gravity flow type.³⁴ Upon completion, the Tieton Division's main structures and distribution systems were in place.

In 1914 it was determined necessary to raise the sides of the Tieton Canal to maintain maximum capacity. Two factors made reconstruction necessary. First, there was settlement at points where the concrete lined section was supported by dry rock walls. Second, larvae grew on the concrete canal lining. This growth in some sections decreased the water capacity to such an extent that the rated amount could not be diverted.³⁵ The enlarged canal would provide water needed for the continued expansion of the Tieton Division. By raising the sides of the canal one foot in the open sections, the irrigable acreage was increased from 24,000 to 32,000 acres. Reclamation added concrete extension walls to the canal beginning in 1916, and completed in 1918.³⁶ It was also decided to resurface the bottom of the Tieton Canal in 1918.

Beginning in 1919 and extending over a four year period, the entire length of the canal was lined with concrete. Eleven miles of several neglected small wooden flumes were also replaced with concrete structures.³⁷ Reclamation signed contracts with the Tieton Irrigation District for general maintenance and repair.

Storage Division

Once irrigation waters were delivered to the Sunnyside and Tieton Divisions, Reclamation engineers shifted their attention to development of an extensive storage system. Expansion of the six lakes at the headwaters of the valley rivers proved to be perfect for use as storage facilities.

The importance of the Storage Division to the Yakima Project lies in its regulation of the water flow in the Yakima River and its tributaries. Operation of the Storage Division insures a

34. *Project Data*, p. 1347.

35. R.G. 115, Box 346, vol. 2, 1914, p. 25.

36. R.G. 115, Box 345, vol. 6, 1918, p. 173.

37. R.G. 115, Box 345, vol. 6, 1919, p. 118.

maximum irrigation supply while still providing maximum flood control. Storing a portion of the flood runoff supplements the normal low water flow during July, August and September. Two annual flood seasons in the valley, in late fall and in early spring, provide opportunities to store surplus waters.³⁸ Storage of water is vital since the maximum irrigable acreage on the project is directly controlled by the amount of water that can be stored.³⁹ Five storage dams were completed between 1909 and 1925, the sixth in 1933.

Each reservoir site had to be cleared. Saleable timber in the form of fir, spruce, tamarack and cedar, covered the land to be cleared. Reclamation tried to contract with private companies to remove the timber, but contractors accepted bids only if they had easy access to and from the reservoir site. Force account was used in locations that were too remote for lumber companies.⁴⁰

A recurring problem in the development of the reservoirs concerned lack of a skilled labor force. The isolated locations of the sites, the work available elsewhere, and the agricultural patterns of the farmers working for Reclamation made it difficult to get full crews of efficient, skilled men. Often laborers had to be brought in from other states to help complete projects.⁴¹

Bumping Lake Dam and Reservoir was the first storage facility built by Reclamation on the Yakima Project. Stored water is fed into the Bumping River for use on the Project downstream. Construction began in May of 1909 and was completed in 1910. Originally planned as an zoned earthfill dam, designs had to be altered because the ground was not as firm as expected. Loose gravel and coarse sand under the hard pan caused serious seepage problems. A large percentage of cobbles and boulders that could not be satisfactorily removed also presented problems for the engineers.⁴²

The Board of Engineers developed an idea to puddle, pack with plastic clay to waterproof, the cut-off trench and to effect a separation of materials in the embankment.

38. Tiffany, R. K. "Yakima River Flood of December 1917," *The Reclamation Era*, June 1918, p. 281; "Report on Yakima Project Flood," *The Reclamation Era*, January 1922, p. 7.

39. R.G. 115, Box 347, vol. 1, to 1912 (Storage), p. 1.

40. *Ibid*, p. 63.

41. *Ibid*, p. 70.

42. *Ibid*, p. 27.

Reclamation workers hauled the earthfill material on to the dam and dumped it near the outer edges of the embankment. This created a waterproof cut-off trench for taking the rapid stream flow and resulted in a solid dam structure.⁴³

Storage capacity at Bumping Lake is 33,700 acre-feet. The earthfill, puddled core dam is 61 feet high with a crest length of 2,925 feet. Other structures include a open uncontrolled concrete weir spillway. First storage began November 11, 1910.

Storage at Lake Kachess began in 1902. There the Cascade Canal Company built a small crib dam at the mouth of a natural lake. The lake drains into the Kachess River and is located about two miles northwest of the town of Easton, Washington. Reclamation negotiated with the canal company in late 1906, and the government assumed control of the dam in April of 1907.⁴⁴ In the summer of 1908, Reclamation investigated sites for a permanent dam. Construction of an earthfill dam, 115 feet tall with a 1,400 foot crest, began in 1910. The dam and concrete spillway were completed in the fall of 1912. The reservoir has a storage capacity of 239,000 acre-feet which was first available in June of 1911.⁴⁵

A temporary crib dam was built by force account on Lake Keechelus in 1907. This small dam allowed for 15,000 acre-feet of storage. Located on the Yakima River ten miles northwest of Easton, this temporary dam was replaced by a permanent earthfill structure completed in 1917. Construction began in 1913 and the building period was extended longer than originally planned due to excessive moisture in 1916. This made it difficult to get dry materials to work with and shortened the favorable work season to only three months.⁴⁶ The completed reservoir has a storage capacity of 157,800 acre-feet. Water is held back by the 128 foot Keechelus Dam. Also included in the system is a concrete lined open spillway.⁴⁷

Clear Creek Dam and Reservoir was the fourth storage facility developed by

43. *Ibid*, pp. 19-20; John S. Scott, *Dictionary of Civil Engineering*, (New York: Halsted Press, 1981), pp.56, 251.

44. *Ibid*, p. 76.

45. *Project Data*, p. 1344.

46. R.G. 115, Box 346, vol. 3, 1916, p. 32.

47. *Project Data*, p. 1344.

Reclamation. Initial investigations were undertaken in 1913 and construction commenced in 1914. The dam was completed in the following year without incident or delay. In 1918, Reclamation raised the dam 21 feet to its present height of 83 feet for increased storage. Clear Creek Dam is a variable radius concrete arch with two small earth embankments southeast of the dam. The dam is located on the North Fork of the Tieton River and has a storage capacity of 5,300 acre-feet. The concrete weir spillways were constructed in 1918. First storage was in 1914.⁴⁸

Built between 1917 and 1925, Tieton Dam captures Rimrock Lake Reservoir behind it. Construction began in 1917 but was postponed in 1918. United States entrance into World War One meant labor demands of the project could not be met, and Secretary of the Interior Alexander T. Vogelsang ordered Tieton Dam construction stopped.⁴⁹ In 1921 building resumed, and the dam was completed in 1925. First storage occurred in April of 1925. The dam is an earthfilled structure with a concrete core wall diaphragm. It is located at the headwaters of the Tieton River at Rimrock Lake and has a storage capacity of 198,000 acre feet. A concrete lined open channel spillway lies in the left abutment of the 319 foot high dam.⁵⁰ Reclamation made initial investigations in 1908 and were enlarged plans in 1914. Originally named the McAllister Meadows Reservoir, the name Tieton dam replaced the original to reflect the name of the river regulates.

The storage system at the natural Lake Cle Elum was the last completed by Reclamation. A small two foot high, 225 foot long, temporary crib dam was built by Reclamation in 1907. The work was done by force account and allowed 23,000 acre feet of storage.⁵¹

Construction of a permanent dam at Lake Cle Elum began in 1931. The dam is zoned earthfill and is 165 feet high with a 1,801 foot crest. The spillway is a concrete lined open

48. *Ibid*, p. 1345.

49. R.G. 115, Box 345, vol. 7, 1921, p. 234.

50. *Project Data*, p. 1345.

51. R.G. 115, Box 347, vol. 1, to 1912 (Storage), pp. 81-2.

channel. Storage was first available in February of 1932.⁵² Renovation on the spillway gates was completed in 1936 increasing the storage capacity of the reservoir from 360,000 acre feet to 436,900 acre feet.⁵³

Development of the Storage Division of the Yakima Project was vital to the overall success of irrigation in the valley. Stored flood waters helps guarantee adequate water supply for irrigation in the dry summer months. Flood control is an additional benefit of the extensive Yakima Project reservoir system.

Post-Construction

Once the Sunnyside, Tieton, and Storage divisions of the Yakima Project were operating, Reclamation further investigated the possibility of irrigating larger areas in the Yakima Valley. The prosperity of the farmers in Sunnyside and Tieton directly influenced the decision to expand the Yakima Project into four additional divisions: Kittitas, Roza, Kennewick, and Kennewick Extension divisions.

Prosperity of the farmers also led to sentiment against further reclamation. Some established farmers believed increasing the amount of irrigable land in the valley would also increase competition. Proponents of more reclamation argued that development of irrigation was not just a matter of agricultural production and sale of products. They believed the Yakima Valley was a place for building homes, rearing children, and building civic and community enterprises of all kinds.⁵⁴

Kittitas Division

The Kittitas Division was the fourth irrigation unit constructed by Reclamation in the Yakima Project. Construction of the Easton Diversion Dam and Kittitas Main Canal in the Kittitas Division took place between 1926 and 1931. The dam diverts water is diverted from the Yakima River into the Main Canal near Easton, Washington. The canal then carries the water

52. *Project Data*, p. 1344.

53. Ball, D. E. "Storage Reservoirs, Yakima Project, Washington," *The Reclamation Era*, September 1939, p. 234.

54. "Reclaiming More Land," *The Reclamation Era*, August 1927, p. 119; "Western Development Must Not be Throttled," *The Reclamation Era*, May 1932, p. 101.

along the south side of the river where it divides into two branches, the North and South Branch Canals. The reservoirs at Kachess and Keechelus Lakes release supplemental water into the Yakima River for use in this Division. Irrigation water is provided for 59,582 acres of irrigable land.⁵⁵

Reclamation entered into a contract with the Kittitas Reclamation District for construction of the irrigation system in 1921. Instead of the then standard 20 year repayment plan, construction charges were to be paid on the basis of 5% of the gross crop returns from the land benefitted.⁵⁶

Construction of the Easton Diversion Dam on the Yakima River began in 1927. It is a straight gravity ogee weir type made from concrete. Completed in 1929, the dam stands 66 feet tall with a crest length of 248 feet. A drum automatic gate and moveable crest on the dam helps regulate the flow of water into the Main Canal. Other structures include an ogee weir type spillway.⁵⁷ Water was first made available for irrigation in the Kittitas Division for the 1930 season.⁵⁸

Construction on the 25 mile Kittitas Main Canal started in 1926 and continued until 1929. Canal construction included 55,000 cubic yards of concrete in canal and tunnel lining, combination lining and flume sections, along with ten inverted siphons for stream crossings.⁵⁹ Four tunnels, the Milwaukee Tunnel, Northern Pacific Tunnel, Rocky Point Tunnel, and Yakima River Tunnel, were built to traverse rocky areas. Work was contracted through competitive bidding.

Two branch canals were started at the proposed end of the Kittitas Main Canal in 1926. The South Branch Canal contains two concrete lined tunnels and runs in a southerly direction for 14 miles. Sections of the canal are concrete lined while less than half remain unlined earth. The

55. *Project Data*, p. 1339.

56. R.G. 115, Box 344, vol. 9, 1925, p. 6.

57. R.G. 115, Box 343, vol. 10, 1926, p. 12.

58. R.G. 115, Box 329, 1974, p. 53.

59. Reuttigers, Arthur and A. Whitmore. "Construction of Main Canal Lining on Kittitas Division, Yakima Project, Washington," *The Reclamation Era*, October 1930, p. 186.

South Branch Canal was completed without delay in 1929.

The North Branch Canal is connected to the Main Canal by an one mile long steel pipe siphon. The siphon is supported by concrete piers and carries the water across the Yakima River on a high steel bridge. Water is then delivered to the Wippel Pumping Plant. The plant lifts water 130 feet to laterals for irrigation of 2,500 acres of irrigable land above the gravity canal. Lined and unlined canal carries water 34 miles eastward through five concrete lined tunnels to irrigate the lands on the northern edge of the Kittitas Division.⁶⁰ Construction of the siphon and the North Branch canal was completed in 1931.

Roza Division

The Roza Division contains 72,511 acres of irrigable acreage lying north of the Yakima River. Water is supplied to the distribution system by the Roza Canal originating at the Roza Diversion Dam. The dam is located on the Yakima River, 12 miles north of the city of Yakima. Irrigation is achieved by gravity and pumping units. 45,000 acres are incorporated into a gravity flow system and 18 electric pumping units supply water for the balance of the Division.

Contracts for surveying irrigation feasibility were signed in the summer of 1920 by Reclamation with the Yakima Irrigation District (Moxee Unit) and with the Yakima-Benton Irrigation District.⁶¹ Soil surveys were completed only in 1926. At that time the 38,000 acre Moxee Unit was combined with the 45,000 acre Benton Unit to form the Roza Division. The project was authorized for construction by President Franklin Roosevelt on November 6, 1935, and work began on the Roza Diversion Dam in the Yakima River in 1938.⁶²

The dam was constructed by private contractors to have a monolithic ogee gravity section. The dam has a concrete weir with a moveable crest. Completed in 1939, the dam is 67 feet high with a crest length of 241 feet. Special features of the dam include an elaborate fish ladder and adjustable gates at the crest. The fish ladder is needed because of the large number of

60. "Construction of the Kittitas Division, Yakima Project, Washington," *The Reclamation Era*, August 1926, p. 130.

61. R.G. 115, Box 345, vol. 7, 1920, pp. 7-8.

62. *Project Data*, p. 1341.

salmon breeding in the area. The ladders allows spawning fish to swim upstream and it prohibits their young from getting into the irrigation system. The 110 foot long gates are used to maintain a constant level in the forebay.⁶³

Reclamation used a new joining technique during construction of the diversion dam. Nine-inch wide rubber water stops seal contraction joints in the concrete. These rubber stops replaced the old copper and wrought-iron stops that tended to wear out over a period of time. Reclamation hoped the new rubber stops would last indefinitely.⁶⁴

Reclamation began construction on the Roza Canal in 1941 and completed it after World War II. Surveys revealed the need for 90 miles of primary canal, five monolithic concrete siphons for stream crossings, and five tunnels. The canal runs from the Roza Diversion Dam southeast along the north side of the Yakima River to Benton City. Most of the canal is concrete lined.⁶⁵ Portions of the gravity flow distribution system were in place in time for the 1941 irrigation season.

Tunnel excavation proved the most difficult aspect of building the Roza Canal for the contractors. The hard rock encountered made driving the most costly and time-consuming aspect of construction of the canal. The five tunnels are concrete lined totaling 4 ½ miles in length. The tunnels are horseshoe shaped with cross sections as follows: Tunnels Nos. 1 and 2, 17 feet; Tunnel No. 3, 13.75 feet; and, Tunnels Nos. 4 and 5, 13.25 feet.⁶⁶

Delays in construction resulted from World War II. In November of 1942, the War Production Board issued a stop order that limited construction on the Roza Division to work designed to provide irrigation for the 15,000 acres expected to be ready in 1943. This order was lifted in July of 1944.

A pumping unit for 27,000 additional acres was started in 1948. This acreage was added

63. Klingensmith, C. E. "The Roza Diversion Dam," *The Reclamation Era*, May 1941, p. 135.

64. *Ibid*, p. 136.

65. *Project Data*, p. 1347.

66. Nelson, Harold T. "Tunnel Lining Methods, Roza Division, Yakima Project," *The Reclamation Era*, p. 172; *Project Data*, p. 1426.

to the gravity flow system to bring the total irrigated acreage to 72,185 in 1950.⁶⁷

Diverted water in the Roza Division is used for irrigation and for power. The Roza Power Plant was built in 1959 to provide 11,250 kilowatts of energy. More than 70 miles of transmission lines carry this power to the pumping stations within the division for irrigation.

Kennewick Division and Extension

The Kennewick Division is the second unit in the Yakima Project to use diverted water for both irrigation and power. Water is diverted from the Yakima River near the town of Prosser at the Prosser Diversion Dam. It is then carried ten miles through the Chandler Power Canal to the Chandler Power and Pumping Plant. There, the water goes as pumped through a siphon under the Yakima and lifted 100 feet to the Kennewick Main Canal. The canal travels southeasterly for 42 miles and the water is used to irrigate 19,171 acres south of the Yakima River. Water not needed for irrigation is used for power and the energy is sent to the Bonneville Power Administration.⁶⁸

Several private irrigation efforts formed the basis of the Kennewick Division. The Columbia Irrigation District Company built a pumped irrigation system in 1909, using water of the Columbia River. The Prosser Diversion Dam was completed in 1904 by other private interests.⁶⁹

Reclamation became involved in development of the Kennewick Division when it signed a contract in 1919 with the Kennewick Irrigation District to survey the land for irrigation potential. Original studies revealed water could reach 35,000 acres of irrigable land by diverting the Yakima River at Prosser in a pumping plant.⁷⁰ Reclamation completed favorable soil surveys in 1926 and rehabilitation of the existing Prosser Diversion Dam began in 1932.

The Prosser Diversion Dam was modified from an earthfill structure to a concrete weir dam by 1933. Its height is 9 feet and it has a crest length of 661 feet. From the diversion dam

67. R.G. 115, Box 335, vol. 23, 1950, p. 120.

68. R.G. 115, Box 329, 1974, p. 64.

69. *Ibid.*

70. R.G. 115, Box 345, vol. 7, 1920, p. 8.

water flowed through a small earth and concrete lined canal on the left bank of the Yakima River to the Prosser Hydroelectric Plant.

Further development in the Kennewick Division occurred in 1952. Congress approved \$1,500,000 to enlarge the distribution system in the unit. Major developments included: a 42 mile canal; extension of the existing canal to be renamed the Chandler Power Canal; and, replacement of the Prosser Power Plant with the Chandler Power Plant.

The Chandler Power Canal was enlarged and extended on the left bank in 1953 and 1954. The work was contracted out, and when completed the canal supplied water to the new Chandler power facility. At Chandler, two turbine-powered pumps push water through a siphon under the Yakima River and lift it into the Kennewick Main Canal. The 12,000 kilowatt hydro-electric power station is used to irrigate 19,171 acres. 1955 saw the closing of the Prosser Power Plant as it was incorporated into the Chandler system. The plant was placed into operation in 1956.⁷¹

Kennewick Main Canal construction began in 1954 and ended in 1956. The canal runs from the north slope of Horse Heaven Hills to the Columbia River. It has both earth and concrete lining. Problems with leakage were experienced upon completion. Rodents, lining failure and bank settlement were major maintenance problems.⁷²

The Kennewick Extension adds 6,300 acres of irrigable land to the division. Water is pumped by the Chandler Power Plant through a 5,800 foot siphon. A 22 mile canal network then sends the irrigation water to farms. Subsequent expansion of the first seven miles of the Kennewick Main Canal was determined necessary to provide for additional water necessary for the acreage. Work was begun in 1981 and completed the following year.⁷³

Rehabilitation and Betterment

Cooperation between Reclamation and the irrigation districts meant highly efficient maintenance on the Yakima Project. Periodic inspections of existing structures and immediate replacement of old deteriorated structures guaranteed high efficiency and performance of the

71. R.G. 115, Box 329, 1974, p. 64.

72. *Ibid*, p. 65.

73. *Project Data*, p. 1339.

storage and distribution systems. The bulk of Reclamation construction after irrigation systems were in place dealt with the replacement of old wooden edifices with permanent concrete ones and preventive maintenance. Few major repairs were required after initial construction.

At first, funds for rehabilitation in the Divisions were allocated by Reclamation to the irrigation district in need. Contracts were then signed establishing individual repayment schedules. As the divisions grew and prospered they assumed responsibility for operation and maintenance of the structures.

Repairs in the Sunnyside Division included reconstruction of the Zillah Wasteway and the rehabilitation of the Mabton Siphon, originally built by Reclamation in 1908-1909 as part of the Sunnyside Division construction. These efforts concentrated on necessary improvements and expansion for better control, regulation and conservation of water. Reclamation replaced 727 feet of wooden flume at the lower end of the Sunnyside Canal near Zillah, Washington with concrete U-shaped structures.⁷⁴ Treated wood-staved pipe replaced the original untreated wood pipe at the Mabton Siphon in 1928.⁷⁵

The Civilian Conservation Corps undertook further reconstruction of the Mabton Siphon in 1939. when it replaced deteriorated buried wood-stave pipes with creosote continuous wood-stave pipes. A trench was also excavated under the pipe to prevent future degeneration.⁷⁶

Prosperity in the Tieton Division forced changes in its system in 1926. High returns from orchards and improved cultivation methods resulted in demands for increased water supply. Those demands could not be met by the existing Tieton Canal. Reclamation installed pipe lines to conserve water and changed the rotation system to provide more economical use of changed water.⁷⁷

A portion of the Tieton Canal was replaced by an elevated concrete flume in 1941. The

74. Carmondy, D. L. "Reconstruction of the Zillah Wasteway, Yakima Project, Washington," *The Reclamation Era*, January 1928, p. 5.

75. Ball, David E. "Replacement of Portion of Mabton Siphon, Sunnyside Division, Yakima Project, Washington," *The Reclamation Era*, July 1928, p. 103.

76. Mannick, Alfred. "CCC Enrolls Reconstruct Portion of Mabton Siphon," *The Reclamation Era*, July 1939, p. 181.

77. R.G. 115, Box 343, vol. 10, 1926, p. 18.

original canal design necessitated crossing ravines at right angles. Pre-cast segments on earthfill landings were required to accomplish this feat. Over time, the earthfill landings and segments settled due to disintegration of the rock and washing out of the fine material by leakage. The CCC replaced 160 degrees of curvature by constructing a concrete flume across the draw.⁷⁸

Installation of underground pipelines to replace open irrigation ditches began in 1945. By 1948, six out of ten farms on the Yakima Project contained pipeline deliveries. Concrete pipe buried 18 inches in the ground eliminated several thousand feet of winding open ditches. Modern farm machinery became more efficient because fields were not cut up by ditches. Another advantages included the minimization of waste accumulated (weeds, gravel, etc) in pipelines and control of water flow at all times.⁷⁹

Settlement of Project

The Yakima Project was a success almost from inception. The rich soil of the Yakima Valley and the easy diversion of the many rivers and streams made for prosperous farming for those up to the task. Farmers quickly learned to diversify the crops they grew in order to run a profitable farm. Cooperation between Reclamation and the irrigation districts furthered the growth of the valley.

Profitability in the Yakima Project is best exhibited by the continued expansion and reclamation of lands in the valley. Private irrigation watered 120,000 acres of land in 1902. By 1939 Reclamation's projects expanded the total acreage to 420,000.⁸⁰ Upon completion of the Kennewick Division in 1957, the Yakima Project included 464,000 acres. The success of the early divisions on the project paved the way for expansion into four new districts in 1925-1950.

Apples, pears, peaches, and other fruit orchards covered the valley once irrigation began. By 1914, 3,300 farms with a population of 9,100 used irrigation water on the project. Of a total

78. Ball, D. E. "Portion of Tieton Main Canal on Rock Fill Replaced by Elevated Concrete Flume Section," *The Reclamation Era*, March 1941, p. 87.

79. Farmer, W. H. "The Water Goes Underground," *The Reclamation Era*, April 1948, p. 77.

80. R.G. 115, Box 345, vol. 7, 1921, p. 13.

crop value of \$3,331,355 on the project, \$1,855,650 was apples.⁸¹

The 1921 crop figures reveal the growth and early success of the project. Total crop value increased to \$10,963,409 with apples bringing in about half of that figure. Forty-three hundred farms in Sunnyside and Tieton with a population of 14,900 farmers experienced steady growth and financial success.⁸² Improved land with paid up water rights increased in value from \$250 in 1914 to \$400 in 1921.⁸³ These values remained steady and the total value of the project increased each year as new units were added and more land was reclaimed. By 1976 the total gross annual value of crops in the Yakima Project was \$239,923,746. Apples and other fruits combined to contribute \$126,455,088 of this total.

Relations between Reclamation and the irrigation districts were good except for a few isolated incidents. The West Side Irrigation Company attempted to break the settlement of water rights in the Sunnyside Division in 1916. As mentioned previously, Reclamation insisted upon settlement of all existing water claims in the valley before it would undertake an irrigation project. The West Side Irrigation Company, serving west Kittitas Valley, entered into an agreement with the United States to comply with Reclamation's stipulation. The agreement stated the irrigation company would limit its appropriation to 80 cubic feet per second in order to avoid litigation, to encourage the storage of water, and to secure the indirect benefit derived from further irrigation through Federal enterprise.⁸⁴

The company broke the agreement and tried to acquire more water than they were appropriated, resulting in the United States filing suit to limit the water allotment and uphold the water rights established in 1905. The courts upheld the original agreement. This was considered a great victory for Reclamation and it disposed of any further attempt to break up the settlement of water rights in the Yakima Valley.⁸⁵

81. R.G. 115, Box. 345, vol. 6, 1918, pp. 228-35, 310-8.

82. R.G. 115, Box 345, vol. 7, 1921, pp. 134, 203-10.

83. R.G. 115, Box 345, vol. 6, 1918, p. 230; R.G. 115, Box 345, vol. 7, 1921, p. 142.

84. "Law Notes by Chief Counsel. Settlement of Water Rights in Yakima Valley," *The Reclamation Era*, March 1916, p. 110.

85. *Ibid.*

The Federal Government and local organizations offered assistance to farmers in solving agricultural problems. Reclamation made available to farmers a agronomist during the formative years of some of the divisions. He promoted better farm practices by giving advice and assistance in crop planning, land use, economic application of irrigation water, and control of noxious weeds.⁸⁶

Early farming success produced abundant crops, but farmers were not prepared to ship their products efficiently to bring the highest returns. Diversification of crops and better storage and distribution facilities were the solutions to these dilemmas. Cold Storage capacity increased from a capability of filling 2,627 carloads in 1919 to 9,000 in 1928. Transportation of crops through the production plants was an important factor in controlling operating cost and efficiency. Plant architects designed elevator and conveyor systems to transport fruit efficiently to plant openings for quick delivery of perishable items.⁸⁷

Farmers also realized if they did not rely on only one major cash crop their farms would be successful. They strove to diversify the crops they grew, and the most successful farms included some form of livestock.⁸⁸

Perhaps the most significant example of the prosperity of the Yakima Project occurred in 1946. Landowners on the Tieton Irrigation District voted to accept a contract for the District to take over operation and maintenance of the irrigation system in March of 1947. Therefore, 36 years after the completion of initial construction, the Tieton Division thus became the first Reclamation construction project to pay off its entire construction obligation, \$3,449,114, to the government.⁸⁹

Care and operation of the distribution systems in the Kittitas Division were assumed by the Kittitas Reclamation District in 1934 and the Easton Diversion Dam and Kittitas Main Canal

86. Mannick, A. "Roza Division of Yakima Project Makes Good Start," *The Reclamation Era*, September 1941, p. 237.

87. "Cold-Storage Facilities in the Yakima Valley, Washington," *The Reclamation Era*, August 1928, p. 121.

88. R.G. 115, Box 345, vol. 7, 1921, p. 13.

89. R.G. 115, Box 329, 1974, p. a8; U.S. Department of the Interior, Bureau of Reclamation, *Repayment of Reclamation Projects*, (Washington: United States Government Printing Office, 1972), p. 529.

in 1960. In 1945, the operation and maintenance of the Sunnyside Division was turned over by Reclamation to a board of control representing the seven irrigation districts. In 1958, the of maintenance of systems in the Kennewick Division was transferred to the Kennewick Irrigation District. The Roza Irrigation District assumed control of operation of its distribution system in 1961. As is typical, Reclamation still operates and controls storage facilities on the Project.⁹⁰

Uses of Project Water

Stored and diverted water in the Yakima Valley is used for irrigation, hydroelectric power, and recreation. Reclamation of the arid lands in the valley made these benefits possible.

Irrigation made Yakima County one of the country's largest apple producers as well as a major producer of mint and hops. Diversified farming has made the project profitable. A wide variety of crops including pears, peaches, apples, alfalfa, potatoes, vegetables, forage, and hops are grown throughout the valley. Forage is grown to provide food for livestock and dairy farms.

Hydroelectric power is supplied from the Chandler Power Plant. The Chandler Power Plant generates 12,000 kilowatts of power for irrigation in the Kennewick Division and sends its surplus energy to the Bonneville Power Administration for municipal use.

The Roza Power Plant also supplies hydroelectric power to the Project. The plant generates 11,250 kilowatts of power for pumping irrigation water to high lands in the Roza Division.

The six reservoir lakes are used for recreation. Camping, boating and fishing facilities dot the Reclamation's scenic dam works. Bumping, Rimrock, and Clear Creek Lakes are located in Snoqualmie National Forest, while Cle Elum, Kachess, and Keechelus Lakes are in Wenatchee National Forest.⁹¹

Conclusion

The buoyant success of the Yakima Project is significant to the reclaiming of arid western lands. The transformation of almost one half million acres of sagebrush covered lands to

90. R.G. 115, Box 329, 1974, pp. 53-69.

91. *Project Data*, p. 1342.

profitable agricultural lands can be attributed directly to the efforts of Reclamation. Without Reclamation's involvement the abundant orchards and farms of the Yakima Valley would be largely non-existent.

Cooperation between Reclamation and the various irrigation districts in the valley virtually guaranteed the success of the project. Mutual desire to see the fertile soils of the valley planted and cultivated was the motivation behind this cooperative effort. Reclamation's improvements of private irrigation efforts led to further expansion into untapped portions of the valley. The Yakima Project exemplifies what the government intended when it decided to reclaim the American West in 1902. Combined effort by Reclamation and irrigation districts lead to the successful agricultural growth of a previously underdeveloped area.

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