

Chief Joseph Dam Project

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Chief Joseph Dam

Constructed by the U.S. Army Corps of Engineers in 1955, Chief Joseph Dam, on the Columbia River in north-central Washington, is a key structure on the comprehensive development of the Columbia Basin. At the time of its construction it was the world's second largest hydroelectric generating dam, next to Grand Coulee, also on the Columbia River. Although not originally designed for irrigation purposes, Chief Joseph Dam shortly provided the water and power revenues which made possible the expansion of irrigation agriculture along this section of the Columbia River and its tributaries. With authorization of its multiple divisions beginning in the late 1950s, the Bureau of Reclamation began construction on the Chief Joseph Dam Project. Its four divisions provide irrigation water to nearly 30,000 acres of orchards and farmlands in central and northern Washington. The Chief Joseph Dam Project was yet another development that contributes to the Columbia River basin as one of the most extensively irrigated and economically successful areas in the West.

Project Location

The first maps of the Pacific Northwest referred to the Columbia River as the “River of the West”; in 1765, British Major Robert Rogers called it “Ouragon,” a possible reference to the Ouisconsink River, now known as the Wisconsin River.¹ As the largest river in the Pacific Northwest, the Columbia River begins its 1,243 mile-long course in Canada and flows in a southerly and westerly direction through Washington

¹ Center for Columbia River History, “Columbia River,” www.ccrh.org/river/history.html (accessed May 2008).

before emptying into the Pacific Ocean. The river meanders through a physiographic region known as the Plateau, bound by the Cascade and coastal ranges to the west and the Rocky Mountains to the east. The Columbia Basin is the lowest landform in the region, and best characterized by aridity a result of the shadow effect of the Cascades.²

On its westerly march to the sea, the Columbia River drops in elevation creating an ideal scenario for the production of hydroelectricity, while the climate and fertile land of the Plateau are nearly perfect for agriculture. Euro-American settlers recognized the potential for both, but the difficult topography—pumping water up from the river to the plateau—and the rather small market for electricity thwarted efforts to bring the river to its full potential. During the twentieth century, the Columbia River basin saw tremendous gains in water resources development, beginning with construction of Grand Coulee and Bonneville dams in the 1930s. Water resources development began in earnest after World War II, and Chief Joseph Dam became one of over a dozen mainstem dams on the Columbia River and its major tributaries that served both agriculture and hydroelectric production.

Authorized as an irrigation project, the Chief Joseph Dam Project distributes water from the Columbia River to project lands along the middle stretch of the Columbia River and its tributaries. Revenues for hydropower produced in the dam's powerplant offset the project's high irrigation costs. Reclamation planners divided the project into four units: the Foster Creek Division, the Greater Wenatchee Division, and the Chelan Division on the Columbia River, along with the Okanagan-Similkameen Division on the Okanagan River. The soil and climate allow orchard agriculture to thrive on these project

² Deward E. Walker, Jr., editor., *Plateau: Handbook of North American Indians*, vol. 12, William C. Sturtevant, general editor (Washington, D.C.: Smithsonian Institution, 1998), 29-32.

lands, helping to make central Washington a leader in apple production. For example, Lake Chelan Valley boasts productive orchards and agriculture, partly because of hybrid climate produced by the lake, which moderates temperature during the winter and summer months.³ *The Encyclopedia of Practical Horticulture*, published in 1914, explained why central Washington is ideally suited for orchard production:

[First,] the latitude is in the great apple producing belt of the world. Even where the latitude would seem not to be far enough north the altitude of the hills and mountain ranges often compensates for the distance south, and gives cool nights, and a temperature favorable for the growing of the best fruits. Second, in a large part of this country there is during the day a bright sunshine and at night a cool air, both of which tend to give color and flavor to the apple. Third, the character of the volcanic ash soil, o[n] which a large portion of this region is built, is favorable for the growth of the apple tree and its fruits.⁴

The Bureau of Reclamation and area irrigators saw the Chief Joseph Dam Project as an important resource toward stabilizing this important economic feature of eastern and central Washington.

Historic Setting

The middle Columbia River basin was the ancestral homeland of the Middle Columbia River Salishans, which consisted of several tribes: Sinkayuse, Wenatchee, Entiat, Chelan, Methow, Southern Okanogan, Nespelem, and Sanpoil. All groups settled along the Columbia River; the Sinkayuse occupied the area east and south of the river, and the other groups primarily congregated west or north of the river and its tributaries. The Salishans traded with coastal native peoples, hunted, and fished salmon and trout in

³ Washington Apple Country, "History of Wenatchee," "Chelan," Washington Apple Country History, <http://www.appleorchardtours.com/history.htm> (accessed May 2008).

⁴ Quoted. in Washington Apple Country, "The History of Apple Growing in Washington," Washington Apple Country History, <http://www.appleorchardtours.com/hist08.htm> (accessed May 7, 2008).

the rivers. Central Washington was generally too arid for native peoples to grow crops, and aridity hampered most Anglo settlers until the introduction of small-scale irrigation development in the nineteenth century.⁵

Europeans arrived into the Columbia River basin on two fronts pushing eastward from the Pacific Ocean and westward from the continental United States. In 1805, Meriwether Lewis and William Clark and the Corps of Discovery descended the Columbia River searching for a viable trade route to the Pacific Ocean. David Thompson, a mapmaker in the employ of the Northwest Company, traversed the length of the river in 1811—the same year David Stuart of the Astor Company built Fort Okanogan. The Northwest Company also established several trading posts throughout the area. These initial forays into an area previously inhabited solely by Native Americans were the opening salvos of a larger European-American conquest, migration, and settlement. This Anglo incursion disrupted and transformed the traditional way of life for the Salishans and other native groups throughout the Columbia River basin. For instance, with the introduction of the fur trade the Indian tribes spent more time hunting, becoming more ingratiated into the new trading economy, and disconnecting them from traditional lifestyles. Moreover, contact with Europeans, directly or indirectly, introduced Native Americans to diseases to which they had no immunity that led to devastating epidemics in the 1770s, 1830s, and 1850s.⁶

In 1818, Daniel McKenzie of the Northwest Company built an irrigation system at Fort Nez Perce on the confluence of the Walla Walla and Columbia rivers. The first

⁵ Walker, *Plateau: Handbook of North American Indians*, 253, 255.

⁶ *Ibid.*, 255, 266.

major Anglo settlement began in 1835, when Samuel Parker settled on the Columbia plain. Though Parker noted the fertile upper prairies, few settlers made the trek. However, the area proved to be fertile ground for converting the Indians to Christianity. The Whitman and Spaulding missions were established a year later in 1836. In 1847, relations with the local Native Americans came to a head with the Whitman Massacre and the Cayuse War. Both events served to discourage settlement.

Up to that time the British and Americans jointly occupied what was known as the Oregon Country until 1846, when a treaty between the two countries established the boundary between the United States and Canada became at the Forty-ninth Parallel. Americans gained possession of the Oregon Territory, which was soon divided at the Columbia River into the Oregon and Washington territories. These political developments coincided with the demise of the fur trade and the subsequent influx of American missionaries, military men, and settlers traveling west on the Oregon Trail.⁷

Discovery of gold near Fort Colville in the Washington Territory quickened settlement though it remained sporadic. To deal with the Indians in the area, the United States brokered a treaty in 1855 and established the Colville Reservation in 1872, later to be reduced in size in 1892 and 1905 to exclude Indians from the fertile Colville Valley. To the west was the federal government established the Columbia Reservation in 1879. By 1883 the reservation had dissolved and most of the Indians on this reservation moved to the Colville Reservation, although some were allowed to acquire lands within the former reservation. An example is the Chelan leader Long Jim and his family who settled at the mouth of Okanogan Reservation near present-day Chief Joseph Dam. Chief

⁷ Ibid., 143-44; Howard R. Lamar, editor., *The New Encyclopedia of the American West* (New Haven and London: Yale University Press, 1998), 1181.

Joseph of the Wallowa band of the Nez Perce moved with some of the remaining members of his band to the Colville Reservation in 1885 following defeat in the Nez Perce War of 1877.⁸

At the end of the Civil War there were still few settlements east of the Cascades. During the last decades of the nineteenth century, the state of Washington underwent major changes. Foremost in this transition was the completion of the Northern Pacific Railroad in 1883, followed by James J. Hill's Great Northern Railroad ten years later. A series of hard winters in the 1880s also shifted the economic base of the region from cattle ranching to wheat farming. As the years progressed, residents began to eye the Columbia River for irrigation development.⁹

Lieutenant Thomas Symons of the U.S. Army, who surveyed the upper Columbia Basin in 1882, wrote of central Washington: "It is a desert pure and simple, an almost waterless, lifeless desert....With irrigation properly conducted, it is safe to say that every foot of land now classed as desert will be found as productive as the regions more favored by rain." Indeed, his vision of an irrigated empire in the arid valley of central Washington proved remarkably resilient. The first large-scale irrigation project had been built in 1859 in the Walla Walla River valley. In Chelan County the first irrigated orchards were likely planted in the early 1880s, after which farmers and local developers developed more elaborate irrigation systems. For instance, in the Wenatchee Valley the Highline Canal, built in 1902, transported water from the Columbia River into Douglas County.¹⁰

⁸ Walker, *Plateau: Handbook of North American Indians*, 163, 266-7.

⁹ Lamar, *The New Encyclopedia of the American West*, 1181.

Eastern Washington's principal economies—agriculture and lumbering—fell upon hard times following World War I and during the Great Depression. Agriculture prices sharply declined, lumber production dropped, and unemployment rose during these years. Then, beginning in the 1930s, the construction of hydropower dams on the Columbia River and its tributaries provided jobs and revenue to the depressed state economy. In 1933, private power companies completed Rock Island Dam, and in 1935, the federal government funded construction of the mainstem dams at Bonneville and Grand Coulee, which produced government-subsidized hydroelectric power for the Northwest. The construction of hydroelectric dams that fueled war production plants during the Second World War was a major reason the economy of the Pacific Northwest shifted from agriculture and lumbering to manufacturing.¹¹

In 1942 the Bureau of Reclamation began its own investigations of the middle Columbia River basin, conducting surveys and eventually recommended building a dam on Foster Creek, near the site of the future Chief Joseph Dam, to serve both power and irrigation interests. However, in 1942 the House Committee on Rivers and Harbors requested the Corps' chief of engineers to produce a report on possible water resources development at Foster Creek in the Columbia River basin. The chief's report recommended construction of a dam and power plant at Foster Creek for the primary purpose of power generation. In 1946 the project was authorized by the River and Harbor Act, and the name of the dam changed to honor the nineteenth-century Nez Perce leader by the River and Harbor Act of 1948. Actual construction of Chief Joseph Dam

¹⁰ Symons quotation from "Irrigation," Columbia River History
<http://www.nwcouncil.org/history/Irrigation.asp> (accessed May 8, 2008).

¹¹ Lamar, *The New Encyclopedia of the American West*, 1182; Marc Reisner, *Cadillac Desert: The American West and Its Disappearing Water* (New York: Viking, 1986), 164-5.

began in 1949 and completed in 1955. Within three years of the completion of the dam and intake structure, sixteen turbine units had been put into operation. Eleven more units had been added by 1979. When completed by the Corps of Engineers in 1955, Chief Joseph Dam was the nation's second largest hydroelectric power-producing dam.¹²

Although the Columbia River's newest dam's primary function was to generate hydropower, most recognized the possibility of providing other benefits such as agriculture, flood control, and recreation. Indeed, completion of the dam made the irrigation project known as the Chief Joseph Dam Project possible.

Project Authorization

The middle Columbia River basin had a long history of land use and agriculture prior to the authorization and construction of the Chief Joseph Dam Project. In the Lower Okanogran Valley lands had been grazed, dry farmed, and irrigated. In the early twentieth century, tree farmers at Bridgeport Bar had attempted irrigation but failed. In the first decade of the twentieth century, the Washington Board of Geological Survey began a mapping project to determine the feasibility of an irrigation project in Quincy Valley. Its study proposed diverting water from the Wenatchee River via a canal to the Quincy Valley area. About a decade later, in 1921, state hydraulic engineer Evan E. Goodneur picked up where the report left off by investigating the irrigation potential of the Greater Wenatchee area. The following year his reconnaissance study led to the formation of the Greater Wenatchee Irrigation District which eventually proposed an irrigation system to water 29,000 acres of land. The district had made plans to divert

¹² U.S. Army Corp of Engineers, Chief Joseph Dam, "History of the Dam," <http://www.nws.usace.army.mil/PublicMenu/Menu.cfm?sitename=cjdam&pagename=history> (accessed May 30, 2008).

water from the Wenatchee River, but for one reason or another never followed through. In the Oroville-Tonasket area, the Main Canal had been built in 1916, four years after the organization of the West Okanogan Valley Irrigation District. The district subsequently enlarged the irrigation system over the next several decades. The Whitestone Reclamation District had been originally organized in 1918 to serve 10,000 acres in north central Washington just a few miles south of the United States-Canadian boundary.¹³

By the time the federal government took an active role in planning irrigation projects in the vicinity of present-day Chief Joseph Dam, the existing water systems were in a state of disrepair. When the chief of engineers recommended construction of a dam and powerplant at Foster Creek in 1946, Oscar L. Chapman, acting secretary of the interior, heartily supported the proposed dam and plant, but instead of a single-use project, recommended a multiple-use project with an irrigation component built by Reclamation. Chief Joseph Dam was not Reclamation's project, but in the mid-1940s the Bureau began to look into the possibility of rehabilitating and expanding the existing water system. It raised the possibility of "irrigation development in the Lower Okanogran Valley and [a] power plant at Brewster Flat."¹⁴ For five years prior to starting on the actual construction of the irrigation system it classified orchard lands in the vicinity of Chief Joseph Dam. In 1951 Reclamation completed a reconnaissance of

¹³ "Project History Chief Joseph Dam Project, Greater Wenatchee Division," Vol. 1, 1959, 6-7, in RG 115, Records of the Bureau of Reclamation, Office of the Chief Engineer, Project Histories 1910-1990, Box 71, National Archives and Records Administration, Denver, Colorado; hereafter cited RG 115; "Project History, Chief Joseph Dam Project, Okanogan-Similkameen Division," Vol. 1, 1965-66, 47, in RG115, Project Histories 1910-1990, Box 30; "Project History, Chief Joseph Dam Project, Whitestone Coulee Unit," Vol. 1, 1967-68, 1-3, in RG115, Project Histories 1910-1990, Box 58.

¹⁴ "Project History, Chief Joseph Dam Project, Foster Creek Division," Vol. 1, 1955, 3, in RG 115, Project Histories 1910-1990, Box 32; Columbia River at Foster Creek, Washington. Letter from Secretary of War, Transmitting ... (U.S.: GPO, 1946), xiii, in RG 115, Project Reports 1910-1955, Accession No. 8NN-115-85-019, Box 220.

irrigation possibilities in the Okanogan River Basin, which included lands along the Columbia River upstream and downstream from the mouth of the Okanogan River. Based on the reconnaissance study, and with the assistance of the Corps, Colville Indian Agency, U.S. Soil Conservation Service, and U.S. Fish and Wildlife Service, Reclamation conducted a more detailed investigation of the Foster Creek area. The feasibility study of 1951-52 mentioned the irrigation potential on the East Canal Unit, Shoreline Pumping Unit, and Bridgeport Bar Unit.¹⁵

Commissioner Wilbur Dexheimer submitted the final report on the irrigation project at the Foster Creek Division to the secretary of the interior on December 21, 1953. Among the minor modifications to the plan was the elimination of Indian lands from the project, as requested by the Bureau of Indian Affairs. This eliminated all units within the Colville Reservation (Monse Bench, North Gravity and South Gravity) and the Monse Gravity Unit from the project plan, as well as the East Canal from Chief Joseph Dam.¹⁶ In the entire commissioner estimated the project had the potential to irrigate about 75,000 acres at a cost of about thirty-three million dollars, of which roughly a third would be repaid by irrigation and the rest by power revenue. After receiving the report from the commissioner, Secretary of the Interior Douglas McKay recommended authorization of the project by Congress in part because agricultural production “would tend to stabilize and balance the economy of the area.”¹⁷

¹⁵ “Project History, Chief Joseph Dam Project, Foster Creek Division,” Vol. 1, 1955, 3-4, in RG 115, Project Histories 1910-1990, Box 32; Appendix D, Plans and Estimates, Foster Creek Project, Washington, 118, in RG 115, Project Reports 1910-1955, Box 219.

¹⁶ “Supplement to Appendix D (Plans & Estimates), Foster Creek Project, Washington, July 31, 1953,” in RG 115, Project Reports 1910-1955, Box 220.

The next year, 1954, the commissioner approved the Definite Project Report, and local water interests formed the Brewster Flat Irrigation District in anticipation of the project authorization. On July 27, 1954, Congress authorized the Foster Creek Division of the Chief Joseph Dam Project by Public Law 83-540 (68 Stat. 568). The act authorized construction of irrigation facilities to supply water to roughly 6,000 acres in the vicinity of Chief Joseph Dam. Congress noted that irrigators were unable to repay the total construction costs and allowed for power revenues from the dam to offset the irrigators' ability to pay. The act also recognized that the secretary of the interior would add other units to the project expanding the scope of the Chief Joseph Dam Project.¹⁸

One such future project was the Greater Wenatchee Division. In 1945 Fred M. Berry, of the Columbia Basin Project's Ephrata, Washington, office, proposed several options for water development in the Greater Wenatchee area. Among other things, he estimated that 20,323 acres could be irrigated by pumping directly from the Columbia River. Boyd Austin, of Reclamation's planning office in Salem, Oregon, and later area engineer of a new office at Walla Walla, Washington, also worked on the preliminary studies of the Greater Wenatchee area. His report, released in 1950, found the proposed project infeasible due to the inability of the district to repay the cost of pumping the water from the river to the project lands. This problem was not rectified until 1952 when Congress passed Public Law 577 authorizing the secretary of the interior to conduct and report studies on possible irrigation projects in connection with Chief Joseph Dam. The

¹⁷ Bureau of Reclamation, United States Department of the Interior, *Bureau of Reclamation Project Feasibilities and Authorizations* (Washington, D.C.: Government Printing Office, 1957), 291-4.

¹⁸ "Project History, Chief Joseph Dam Project, Foster Creek Division," Vol. 1, 1955, 4-5, in RG 115, Project Histories 1910-1990, Box 32; United States Department of the Interior, Bureau of Reclamation, *Federal Reclamation Laws without Annotations*, Volume II, April 30, 1947–September 2, 1958 (Washington, D.C.: Government Printing Office, 1959), 302-3.

act allowed the secretary, when considering irrigation projects, to utilize revenues from the powerhouse at Chief Joseph Dam to lessen the burden from construction costs to project beneficiaries. This law, more than others, allowed the Chief Joseph Dam Project to move forward.¹⁹

In 1954 and 1955 subsequent Reclamation reports outlined the plan for irrigation at Foster Creek Division and the Greater Wenatchee Division. For the Greater Wenatchee Division, it recommended construction on seven units—for a total of 10,852 acres—but later whittled down to four with the elimination of the North Pateros, South Pateros, and Antoine Creek units. Irrigation districts formed to demonstrate local support for the plan. On May 5, 1958, Congress authorized construction of four units of the Greater Wenatchee Division, including the Moses Coulee Unit, which was later delayed indefinitely due to “lack of interest by present land owners.” Congress stipulated that project repayment formulas would follow power revenue provision set down in Section 2 of the Act of July 24, 1954. Congress also appropriated \$10,280,000 for the 6,700 acre project of classified 4-F land suitable for irrigation.²⁰

During 1955 and 1956, Reclamation continued the expansion of the Chief Joseph Dam Project conducting reconnaissance, feasibility, and land classification on what became known as the Okanogan-Similkameen Division. The Okanogan-Similkameen Division consisted of three separate units; each authorized individually. Reclamation designed the Oroville-Tonasket Unit, authorized October 9, 1962, to deliver water to

¹⁹ “Project History, Chief Joseph Dam Project, Greater Wenatchee Division,” Vol. 1, 1959, 7-9, in RG 115, Project Histories 1910-1990, Box 71.

²⁰ “Project History, Chief Joseph Dam Project, Greater Wenatchee Division,” Vol. 1, 1959, 9-12, in RG 115, Project Histories 1910-1990, Box 71; “Project History, Chief Joseph Dam Project, Greater Wenatchee Division,” Vol. 3, 1961, 3, in RG 115, Project Histories 1910-1990, Box 71; USDOJ, BR, *Federal Reclamation Laws without Annotations*, 527.

8,450 acres of land in Okanogan County, as well as provide measures for conservation and development of fish and wildlife resources. The Whitestone Coulee Unit, authorized September 18, 1964, for the purpose of providing water to 2,550 acres, conservation and development of fish and wildlife resources, and improvement of public recreation facilities in Okanogan County.²¹ In hearings on the Whitestone Coulee Unit before the House Committee on Appropriations, congressmen questioned Reclamation officials about the reportedly large federal investment on the Whitestone Coulee Unit of \$2,030 per acre of which irrigators' obligation was only \$328. Commissioner Floyd Dominy justified the subsidy "because it is a specialized agriculture. It is an existing economy that would fail completely if we do not move in and perform this project." Moreover, he noted that "power revenues will pay the difference," meaning there was no out-of-pocket project costs to the taxpayer. The answer apparently satisfied members of the House committee. The final unit of the Okanogan-Similkameen Division was the Oroville-Tonasket Unit Extension, authorized September 26, 1976, designed to replace the Oroville-Tonasket Irrigation District's deteriorating irrigation system.²²

Finally, Reclamation carried out a feasibility investigation and several other studies prior to the authorization of the Manson Unit of the Chelan Division by Public Law 89-557 on September 7, 1966 (80 Stat. 704). Reclamation designed the project to

²¹ United States Department of the Interior, Bureau of Reclamation, *Federal Reclamation and Related Laws Annotated*, Volume III of Three Volumes 1959-1966, Richard K. Pelz, editor (Washington, D.C.: United States Government Printing Office, 1972), 1695-6, 1803-4; "Project History, Chief Joseph Dam Project, Whitestone Coulee Unit," Vol. 1, 1967-68, 4, in RG 115, Project Histories 1910-1990, Box 58.

²² House Committee on Appropriations, Hearings before the Subcommittee on Public Works Appropriations, 88th Cong., 2nd sess., Part 2 (Washington, D.C.: Government Printing Office, 1964), 116; House Committee on Appropriations, Hearings before the Subcommittee on Public Works Appropriations, 89th Cong., 1st sess., Part 2 (Washington, D.C.: Government Printing Office, 1965), 157-58; "Project History, Chief Joseph Dam Project, Whitestone Coulee Unit," Vol. 1, 1967-68, 4, in RG 115, Project Histories 1910-1990, Box 58.

provide irrigation to 5,770 acres, of which 1,405 acres were not then irrigated, as well as fish and wildlife resources and recreation enhancements. Similar to the Oroville-Tonasket Unit Extension, the Manson Unit primary purpose was to upgrade existing facilities. However, this project did not get its start until 1970, the only new Reclamation project start in the 1970 fiscal year budget.²³

Construction History

As noted above, the Chief Joseph Dam Project consisted of four, individually authorized divisions, which geographically extended as far south as Moses Lake in Grant County to Oroville, Washington, just miles from the international border with Canada. Based on how the annual project histories were recorded, the following construction history is organized by division, although there was some overlap in construction.

Foster Creek Division

The Bureau of Reclamation designed the Foster Creek Division into two separate units: Bridgeport Bar Unit and Brewster Flat Unit. Initially the Bridgeport Bar Unit plans included outlet works connecting Chief Joseph Dam to a main canal with thirty inch steel pipe to run down the sloping face of the intake channel and siphon. Reclamation planned a lined or unlined main canal in sections depending on the soil composition. This plan was later deferred, and instead Reclamation constructed a pumping plant on the Columbia River located five miles below the dam. The distribution system consists of pressurized laterals for sprinkler irrigation. Although Reclamation first considered using

²³ USDO, BR, *Federal Reclamation And Related Laws Annotated*, Vol. III, 1884-5; "Project History, Chief Joseph Dam Project, Chelan Division, Manson Unit," Vol. 1, 1971, 18-19, in RG 115, Project Reports 1910-1955, Box 214.

hydraulic-driven pumping plants, it settled on electric pumps closer to project lands. At the Brewster Flat Unit the Bureau of Reclamation faced the difficult task of pumping water from the Columbia River up to project lands. Reclamation planned to construct a river pumping plant, a booster pumping plant, a relift pumping plant, two steel reservoirs, and a closed-pipe distribution system.²⁴

Having completed field data on the project features in April, on June 6, 1956, Reclamation awarded the first contract on the Foster Creek Division to the Harold Kaeser Company from Seattle, Washington, for the Bridgeport Bar Unit. Mother Nature hampered construction as high water on the Columbia River did not recede until August, slowing progress on the Bridgeport Bar pumping plants and distribution system. Another difficulty the contractor encountered was water leakage into the excavation area for the main pumping plant, which necessitated a hose and pump to return the sand and water to the Columbia River. The threat of high Columbia River waters flooding the excavation led Kaeser to work through the cold winter months on the pumping plant. Despite these problems, the contractor completed construction of the pumping plant, the 100,000 gallon steel water tank, distribution pipe, and electrical transmission system within a year of issuance of the contract.²⁵

On December 12, 1956, Reclamation awarded the \$841,548.40 contract for the Brewster Flat Unit to the joint venture of Ward Construction Company and Alton V. Phillips of Seattle, Washington. The contract included earthworks, river pumping plant

²⁴ United States Department of the Interior, Water and Power Resources Service, *Project Data*, (Denver: United States Government Printing Office, 1981), 233; Chief Joseph Dam Project, Wash., East Canal, Shoreline Pumping, and Bridgeport Bar Divisions, Appendix D, Plans and Estimates, Foster Creek Project, Wash., 1, 5, 16, 20, 30, 107, in RG 115, Project Reports 1910-1955, Box 219 .

²⁵ "Project History, Chief Joseph Dam Project, Foster Creek Division," Vol. 2, 1956, 5, 17, 43, 46; Vol. 3, 1957, 6, in RG 115, Project Histories 1910-1990, Box 32.

with four units and total capacity of 46.7 cubic feet per second (c.f.s.), booster pumping plant with four units and total capacity of 39 c.f.s., relift pumping plant and steel bridge, two switchyards, steel discharge pipe lines, steel water tank, steel surge tank, alarm control system, and two transmission lines. Reclamation also awarded several supply contracts for the pumping units, motor control equipment, and power transformers for switchyards. The first project was the river pumping plant, which had to proceed quickly before the annual rise of the Columbia River flooded the site. In 1957, after the access roads had been graded, the contractor began work on the booster pumping plant. That year the contractor laid the thirty-six inch steel pipe line from the plant and built the storage tank; relift pumping plant, and discharge and transmission lines.²⁶

The contract for the distribution system for the Brewster Flat Unit went to Hanning and Gonzales of Portland, Oregon. The contractor started work in the spring of 1957 and made excellent progress on the earthwork for piping, concrete valve structures, steel pipe and accessories, asbestos cement pipe, and drain valves and meters. Reclamation continued to award minor contracts for modifications to existing features and miscellaneous project features such as an operation and maintenance building and a domestic well and a pumping unit at the well. Other contracts awarded included: furnish and install sunshields on the motor control enclosures at the main & booster pumping plants at the Bridgeport Bar Unit, modify the vertical turbine pumping units and pipe distribution systems, and rehabilitate Lateral I-5 on the Brewster Flat Unit. By 1957

²⁶ "Project History, Chief Joseph Dam Project, Foster Creek Division," Vol. 2, 1956, 20; Vol. 3, 1957, in RG 115, Project Histories 1910-1990, Box 32.

Reclamation had completed most of the major components of the project with water deliveries to project lands²⁷

Greater Wenatchee Division

The Bureau of Reclamation planned the Greater Wenatchee Division to service 6,700 acres of land on three units: East Unit on a high terrace adjacent the Columbia River just east of the town of East Wenatchee in Douglas County; Brays Landing Unit on a series of terraces about halfway between the communities of Orondo and Chelan in Douglas County; and Howard Flat Unit in Chelan County about five miles from Chelan. The East Unit would pump water up 677 feet to a small reservoir from which pumps conveyed the water in pressurized pipes to the lands for sprinkler irrigation. Brays Landing Unit included a main pumping plant, discharge line, main regulating reservoir, closed-pipe lateral system, and four small pumping plants and reservoirs. Howard Flat Unit consists of a three-unit river (well pump) plant and a river booster plant, which pumps the water to the Reservoir Re-lift Pumping Plant. Initially plans called for gravity-type distribution system at Howard Flat, but engineers in the Chief Engineer's Office in Denver changed it to the closed-pipe, sprinkler-type system similar to the other two units.²⁸

Work began on the Greater Wenatchee Division with personnel relocated from the Foster Creek Division in Bridgeport to the new headquarters in East Wenatchee,

²⁷ "Project History, Chief Joseph Dam Project, Foster Creek Division," Vol. 3, 1957, box 32; Vol. 6, 1963-64, 5-6, in RG 115, Project Histories 1910-1990, Box 2.

²⁸ Water and Power Resources Service, *Project Data*, 235-36; "Project History, Chief Joseph Dam, Greater Wenatchee Division," Vol. 1, 1959, 1, box 71; Vol. 2, 1960, 7, in RG 115, Project Histories 1910-1990, Box 71.

across the Columbia River from Wenatchee.²⁹ Reclamation awarded the principal contract on the East Unit to the joint venture of Jensen-Rasmussen & Co. and BECK Corporation. Plans called for the construction of a river and booster pumping plant, discharge line, and 2-million gallon reservoir, and the installation of machinery and electrical systems. Supply contracts provided for the pumping units, motor control equipment, power transformer and interrupter switch and disconnecting fuses for switchyard. The contractor made a good start on the pumping plant but delays in construction resulted from the late delivery of the forty-two inch discharge line pipe. Workers erected a cofferdam for construction of the plant on the bank of the river, but problems arose when the excavation site leaked requiring electric pumps to move water back into the river. While pumps dewatered the excavation site, the contractor was able to place the concrete before the river rose in late summer. After the river flow receded, workers placed a second dike in preparation for dewatering the rip rap placement.³⁰

Also on the East Unit, the Kehne-Crabtree Electric Co., Inc. of Spokane, Washington, received the contract to install the 13.8 KV supply lines, electrical distribution and control system, and Reclamation awarded the contract to construct the earthwork, pipelines, pumping plants, Laterals 1 through 10 and sublaterals to the Frank Coluccio Construction Co., Inc. In addition, the East Unit had several supply contracts for the pumping units, motor control equipment, power transformer and interrupter switch and disconnecting fuses for the switchyard.³¹

²⁹ "Project History, Chief Joseph Dam, Greater Wenatchee Division," Vol. 1, 1959, 16, in RG 115, Project Histories 1910-1990, Box 71.

³⁰ "Project History, Chief Joseph Dam, Greater Wenatchee Division," Vol. 2, 1960, 12-14; Vol. 3, 1961, 5-7, and unnumbered pages with photographs, in RG 115, Project Histories 1910-1990, Box 71.

At the Howard Flat and Brays Landing units, Reclamation planned to pump water from deep wells into a storage reservoir instead of pumping directly from the Columbia River. Reclamation awarded the contract for the water supply test well to Pioneer Drillers of Tacoma, Washington, and the contract for exploratory pilot holes to Haden Drilling Co. of Pasco, Washington. Another contract was awarded for furnishing and delivering motor driven pumping units for the plant. Reclamation also obtained approval from the Federal Aviation Administration to construct the project facilities, since the city of Chelan owned and maintained a gravel-surfaced air field at the southwest corner of the unit.³²

Reclamation continued to award contracts for the Greater Wenatchee Division through 1965, but most were minor or supply contracts. In 1962, for instance, these contracts included: drilling water supply wells to H. O. Meyer Drilling Co. of Kirkland, Washington; installing electrical distribution and control lines to Sierra Electric Co.; building river booster plants to R. J. McCarthy Co. of Seattle; drilling water supply well to Haden Drilling Co. of Pasco, Washington; constructing an operator's residence to Leingang Construction Co. of Yakima, Washington; fabricating a lateral system to B & B Plumbing and Heating, Inc., of Anacortes, Washington.³³ By the end of 1965, the Greater Wenatchee Division primary project features essentially had been completed. The main exception was work done by Armstrong & Armstrong. In October 1965 the project

³¹ "Project History, Chief Joseph Dam, Greater Wenatchee Division," Vol. 3, 1961, 8-9, in RG 115, Project Histories 1910-1990, Box 71.

³² "Project History, Chief Joseph Dam, Greater Wenatchee Division," Vol. 3, 1961, 10-15; Vol. 4, 1962, 22, in RG 115, Project Histories 1910-1990, Box 71.

³³ "Project History, Chief Joseph Dam, Greater Wenatchee Division," Vol. 4, 1962, 15-16, 24, in RG 115, Project Histories 1910-1990, Box 71.

construction engineer sent the company a list of fifteen “items of work [that] have yet to be performed before the Government can accept all work under the contract.” The next year the project engineer sent a second notification to ensure that the valves at Pumping Plants 1, A, and B at Brays Landing Unit were in good working order. It took several years before Reclamation and the contractors who supplied and installed the pumping units identified the problem and repaired the faulty valves.³⁴

Okanogan-Similkameen Division

On the Okanogan-Similkameen Division Reclamation engineers designed a plan to rehabilitate the existing irrigation works with an up-to-date concrete canal, siphon, and pumping plants. The two units combined would serve a total of 11,700 acres (7,500 acres were under irrigation prior to the rehabilitation). The Oroville-Tonasket Unit, located along the Similkameen and Okanogan Rivers in north-central Washington near the Canadian border, would include new headworks, replacement of the Upper Okanogan Siphon with a thirty-inch-diameter concrete-cylinder pipe, rehabilitation of six miles of main canal, and three new pumping plants. The main features of the Whitestone Coulee Unit, which encompasses a narrow strip of land that runs west from the Okanogan River, are the Toats Coulee Diversion Dam, concrete pipe supply canal, and an outlet structure and pumping plants at Spectacle Lake. In addition, the Oroville-Tonasket Unit Extension gave a second make-over to the irrigation works by replacing the gravity irrigation

³⁴ “Project History, Chief Joseph Dam, Greater Wenatchee Division,” Vol. 6, 1964-65, 21, 27-28, box 14; Vol. 7, 1966-67, 28-31, 38-44, in RG 115, Project Histories 1910-1990, Box 43.

system—canals, flumes, and diversion dam on the Similkameen River—with a pressure-pipe distribution system.³⁵

Personnel from the Greater Wenatchee Division did the preconstruction surveys on the Oroville-Tonasket Unit in 1965. When the Wenatchee project office closed, the new headquarters opened at Oroville, Washington.³⁶ The contract for the headworks went to Roger E. Holmes of Olympia, Washington, who began placing earthwork and concrete in 1965 and completed the work in March 1966. In May 1965 the federal government issued the contract for the new siphon to B & B Contracting Corporation of Anacortes, Washington, in May 1965 for \$284,065.70. As the siphon would be below surface and require sub-water construction, the contractor decided to “[preassemble] the pipe on shore, [float it] into position over a previously excavated trench and [sink] it into its final location.” This procedure ran into problems when the pipe filled with air on the west end which caused the steel cylinder to burst. Nevertheless, the contractor repaired the rupture and replaced the pipe, completing all work by April 1966. A second leak occurred later that year, and the Oroville-Tonasket Irrigation District made the repairs.³⁷

On the main canal, the contractor, A & B Construction Company of Helena, Montana, dismantled the existing flume and excavated for the eighty-four inch diameter siphon. It then began work on the concrete bench flume and concrete-lined canal. By April 1967, after water had been turned into the canal for the irrigation season, only about

³⁵ USDOJ, BR, *Project Data*, 236-7; “Chief Joseph Dam Project, Okanogan-S. Division, Oroville-Tonasket Unit,” Vol. 1, 1965-66, 1, 48, in RG 115, Project Histories 1910-1990, Box 30.

³⁶ “Chief Joseph Dam Project, Okanogan-S. Division, Oroville-Tonasket Unit,” Vol. 1, 1965-66, 2, in RG 115, Project Histories 1910-1990, Box 30.

³⁷ “Chief Joseph Dam Project, Okanogan-S. Division, Oroville-Tonasket Unit,” Vol. 1, 1965-66, 55-56, in RG 115, Project Histories 1910-1990, Box 30.

112 feet of elevated flume and 1,650 feet of bench flume remained to be done. By early next year all work on the contract had been accepted as completed. The contractor that worked on the three pumping plants completed its work in mid-1968.³⁸

Construction on the unit continued well into the next decade, and in 1972, the Okanogan River flooded destroying the Ellis Siphon. The Office of Emergency Preparedness provided funds to replace the siphon. Reclamation used the Midway Pumping Plant, eight miles south of Oroville, to pump water directly from the river to the distribution system. Flooding also caused extensive damage to the aging distribution system at the Oroville-Tonasket Unit. The water system, first constructed in the early twentieth century, was inefficient, expensive, and in danger of system-wide failure, which would have been a damaging blow to the agricultural industry in that area. Moreover, there was a need to remove or modify Enloe Dam to protect the anadromous fish in the Okanogan River system. The need for rehabilitation of the distribution system and fish protection led to the authorization and construction of the Oroville-Tonasket Unit Extension in 1976. The unit extension consists of six pumping plants that distribute water to a closed pipe distribution system, and fifteen relift pumping plants that provide sprinkler irrigation on to higher lands.³⁹

In 1967 Reclamation began the rehabilitation of the irrigation system at the Whitestone Coulee Unit of the Okanogan-Similkameen Division. Part of this entailed

³⁸ “Chief Joseph Dam Project, Okanogan-S. Division, Oroville-Tonasket Unit,” Vol. 1, 1965-66, 56-57, in RG 115, Project Histories 1910-1990, Box 30; Vol. 2, 1967-68, 4-5, in RG 115, Project Histories 1910-1990, Box 57.

³⁹ U.S. Department of the Interior, Bureau of Reclamation, “Chief Joseph Dam Project, Washington,” <http://www.usbr.gov/dataweb/html/chiefjoseph.html>; U.S. Department of the Interior, Bureau of Reclamation, *Final Environmental Statement: Proposed Oroville-Tonasket Unit Extension, Okanogan-Similkameen Division, Chief Joseph Dam Project, Washington* (Boise, Idaho: Regional Office, Pacific Northwest Region, 1976), 1-3.

expanding the holding capacity of Spectacle Lake from 3,800 to 6,250 acre-feet. Reclamation awarded two large contracts for a diversion dam and siphon and enlargement of the lake and dike outlet works to the A & B Construction Co. of Helena, Montana.⁴⁰ A & B Construction Co. proceeded “unhampered” on the diversion dam and siphon until mid 1969 when “inclement weather, county road load restrictions and contractor’s crews diverted to [other] work” slowed progress. Accordingly, Reclamation granted the company a sixty-three day extension. Reclamation encountered several other setbacks before it accepted contractors work. For instance, the water meters furnished by the Badger Meter Company needed repairing, while crews patched a leak at the outlet structure on the siphon. In addition, local farmers complained that construction activity kicked up dust which settled on the orchards adjacent to the dirt access roads. Laying pipe for the siphon caused traffic delays, specifically the transport of fruit from the orchards to nearby warehouses. Reclamation worked with the contractor(s) and eventually found satisfactory solutions to each of these problems. In the meantime, the A & B Construction Co. finished its work on the enlargement of Spectacle Lake and the dike and outlet works.⁴¹

The Whitestone Coulee Unit also included contracts for the construction of the Whitestone Flats and North Branch Pumping Plants. This work entailed completion of the distribution system and installation of steel liner plate in the stilling well of the Spectacle Lake Outlet. Contracts also called for furnishing a fourteen-inch sleeve valve

⁴⁰ “Chief Joseph Dam Project, Okanogan-Similkameen Division, Whitestone Coulee Unit,” Vol. 1, 1967-68, 5, 9, in RG 115, Project Histories 1910-1990, Box 58.

⁴¹ “Chief Joseph Dam Project, Okanogan-Similkameen Division, Whitestone Coulee Unit,” Vol. 2, 1969-70, 12-14, 19-20, 29-30, in RG 115, Project Histories 1910-1990, Box 85.

and hoist, removal of the old twelve-inch sleeve valve and installation of a new fourteen-inch valve, and drilling the well on the McDaniel property to supply winter stock water.⁴²

Chelan Division

Similar to the Whitestone Unit, Reclamation designed the Manson Unit of the Chelan Division to rehabilitate existing irrigation works dating back to the early twentieth century. In 1908, local irrigation interests organized the Wapato Irrigation Co., which in turn sold its water rights and facilities to the Lake Chelan Water Co. Attempts to improve the irrigation system over the next several decades generally proved frustrating due to low water supply and expense. Water shortages compelled the water company to build Antilon Reservoir in 1913 and then expanded “the supply line to capture additional water.” Later the Lake Chelan Reclamation District, organized in 1920, took over irrigation operations from the water company but struggled with heavy debt due to the continual need for improvements to the existing water system. By 1944, the district had amassed a \$578,000 debt. So when the Bureau of Reclamation began investigating the possibility of improving irrigation works stemming from the completion of Chief Joseph Dam, the district welcomed government aid to rehabilitate the existing features and construct the following new ones: the Lake Chelan Pumping Plant, eight relift pumping plants, four booster pumping plants, thirteen regulating tanks, and a pressure pipeline distribution system. Instead of increasing the storage capacity of Antilon Reservoir,

⁴² “Project History, Chief Joseph Dam Project, Okanogan-Similkameen Division, Whitestone Coulee Unit,” Vol. 3, 1971, 36, in RG 115, Project Histories 1910-1990, Box 214; Vol. 5, 1973, 7, in RG 115, Project Histories 1910-1990, Box 58.

Reclamation decided to pump water directly from Lake Chelan, leaving the reservoir the only original project feature not modified.⁴³

Surveyors and a drill crew arrived at the project site in 1968. The next year Reclamation transferred personnel to the Manson Unit and established the Manson Field Division, and two years later moved the headquarters of the Chief Joseph Dam Project from Oroville to Manson.⁴⁴ There, construction progressed swiftly. First, Reclamation issued the survey contract, then the construction contract for the Lake Chelan Pumping Plant, discharge line and tank. Reclamation awarded the latter contract to Bovee & Crail of Paramount, California. Following the groundbreaking ceremony at the pumping plant site on February 15, 1972, subcontractors began work on excavation, pipeline, electrical work, painting, and the erection of the tank. In 1972 Reclamation also awarded to Mountain States Construction Co. & Associates of Sunnyside, Washington, the contract for Lake Chelan Laterals, Lateral A, Manson Pumping Plants No. A & B, Lake Chelan and Manson A and B Switchyards, Regulating and Forebay Tank A and Regulating Tank B.⁴⁵

The Bovee and Crail Construction Company finished the concrete placement and installation of the pumping units in 1972 and in 1974 completed the electrical installations and painting of the plant. Mountain States Construction Co. completed all work that year except for the installation of ten pumping units and control centers for the pumping

⁴³ USDOJ, BR, *Project Data*, 237; “Project History, Chief Joseph Dam Project, Chelan Division, Manson Unit,” Vol. 1, 1971, 1-2, 5, in RG 115, Project Histories 1910-1990, Box 214.

⁴⁴ “Project History, Chief Joseph Dam Project, Chelan Division, Manson Unit,” Vol. 1, 1971, 14, in RG 115, Project Histories 1910-1990, Box 214.

⁴⁵ “Project History, Chief Joseph Dam Project, Chelan Division, Manson Unit,” Vol. 1, 1971, 126, in RG 115, Project Histories 1910-1990, Box 214; Vol. 2, 1972, 59, in RG 115, Project Histories 1910-1990, Box 195.

plants. Armstrong and Armstrong, Inc., which had received a contract in 1973 for the Manson Unit distribution system, nearly finished laying the pipeline but a plumbers strike in mid-summer 1974 caused delays. In 1975, it only had ten out of thirty-five miles of pipe left to place. In 1974, the district pumped the water to 500 acres through the newly constructed distribution system, which replaced the old method of diverting water twenty miles away from the mountains. In 1975, it delivered water to 4000 acres.⁴⁶

In 1975 Battermann Engineering and Construction, Inc. received the contract for construction of buried pipe drains and structures. The contractor began to process the filter material and install the drains in July. At the end of the year the contractor had completed 7.1 miles of the 8.8 miles of drain pipe. However, the work on the drains was not without difficulty. The contractor encountered considerable trouble working in areas with a high water table. In addition, several local residents of the Lake Chelan area believed that the runoff from the drains presented a threat to water quality of Lake Chelan, into which the water would drain. Reclamation assured the landowners that it would closely examine the levels of contamination in the drain water. Still, as was pointed out by Reclamation officials in a meeting held in September 1975, “we [Reclamation] were rehabilitating existing drains in all but three cases, and should, by all standards, improve the water quality being discharged into the various lakes. That looking at it realistically, all waters being discharged through the drains would ultimately reach the Lake through subsurface movement down the slopes.”⁴⁷

⁴⁶ “Project History, Chief Joseph Dam Project, Chelan Division, Manson Unit,” Vol. 3, 1973, 40, in RG 115, Project Histories 1910-1990, Box 195; Vol. 4, 1974, 1, 21, in RG 115, Project Histories 1910-1990, Box 195; Vol. 5, 1975, 1, in RG 115, Project Histories 1910-1990, Box 196.

⁴⁷ “Project History, Chief Joseph Dam Project, Chelan Division, Manson Unit,” Vol. 5, 1975, 13-14, 17-18, 24, in RG 115, Project Histories 1910-1990, Box 196.

Post-Construction History

For a relatively small project the Bureau of Reclamation required cooperation with other federal entities to ensure the project's success. Reclamation entered into a cooperative agreement with the Corps of Engineers for the use of Chief Joseph Dam facilities, such as the project office and maintenance of project vehicles and equipment. Reclamation also worked out an agreement with Bonneville Power Administration (BPA) for mechanical service and supplies and for power transmission. The arrangement with BPA for the Greater Wenatchee Division called for BPA to carry power from the Bonneville substation at Keokuk to the East Unit pumping plant station. Although Foster Creek Division had a similar arrangement with BPA for power transmission, it later entered an agreement with Douglas County Power Utility District No. 1 for the repair and maintenance of its 13.8-KVA power lines. The Okanogan Public Utility District provided power for the pumping plants at the Okanogan-Similkameen District.⁴⁸

Once completed, Reclamation transferred operation and of the divisions as follows: Brewster Flat Irrigation District and Bridgeport Bar Irrigation District at the Foster Creek Division, Greater Wenatchee Irrigation District at the Greater Wenatchee Division, Oroville-Tonasket Irrigation District and Whitestone Reclamation District at the Okanogan-Similkameen Division, and Lake Chelan Reclamation District at the Chelan Division. Each unit of Chief Joseph Dam Project had a ten-year development period before the districts' repayment obligation commenced. At Foster Creek Unit, for

⁴⁸ "Project History, Chief Joseph Dam Project, Foster Creek Division," Vol. 3, 1957, 5, in RG 115, Project Histories 1910-1990, Box 32; Vol. 4, 1958, 5, in RG 115, Project Histories 1910-1990, Box 71; Vol. 5, 1957-62, 5, in RG 115, Project Histories 1910-1990, Box 72; "Project History, Chief Joseph Dam Project, Greater Wenatchee Division," Vol. 1, 1959, 3, in RG 115, Project Histories 1910-1990, Box 71; "Project History, Chief Joseph Dam Project, Okanogan-Similkameen Division, Oroville-Tonasket Unit, Vol. 1, 1965-66, 2, in RG 115, Project Histories 1910-1990, Box 30.

example, Reclamation delivered the first water in January 1958, which meant the ten-year development period ended on December 31, 1967.⁴⁹ Revenues from hydroelectric generation on the Columbia River covered a substantial portion of construction costs, because of the specialized agriculture involved and the irrigator's ability to pay. Moreover, the districts received a substantial subsidy in purchasing electricity at a price, according to one estimate, "twenty-seven times cheaper than wholesale" in order to power the pumping units. Heavily subsidized hydroelectricity made the Chief Joseph Dam Project possible.⁵⁰

As is the case on every irrigation project, the irrigation districts annually repaired and modified the project features. In 1963 on the Greater Wenatchee Division, the district tested the machinery prior to the irrigation season and found four faulty hydraulic valves, contracted Chapman Valve Co to repair the equipment. It also repaired the unit motor on Booster Plant No. 3, took steps to protect the electrical equipment in the motor to avoid another failure, and modified the motor controls for the East and North relift pumping plant and other equipment. The district continued to award contract work out or to do the repair work itself.⁵¹

The most common and perhaps serious problem on the project was silt buildup in the distribution system. The Columbia River generally flowed clear and sediment free, at least in the project area, making it ideal for irrigation use. Nevertheless, sediment buildup threatened the operation of the irrigation works and the delivery of water to the project

⁴⁹ "Project History, Chief Joseph Dam Project, Foster Creek Division," Vol. 4, 1958, 6, in RG 115, Project Histories 1910-1990, Box 71.

⁵⁰ Blaine Harden, *A River Lost: The Life and Death of the Columbia* (New York: Norton, 1996), 119.

⁵¹ "Project History, Chief Joseph Dam Project, Greater Wenatchee Division," Vol. 5, 1963, 19-23, in RG 115, Project Histories 1910-1990, Box 71.

lands. At the Bridgeport Bar at Foster Creek Division, Reclamation personnel—who in 1959 alone made about forty trips to the district for inspection and repair on project facilities—found silt and sand buildup at pump wells and intake channel and storage reservoir at the river pumping plant. In 1959, Reclamation removed the silt and sand, replaced the graded gravel filter bed, restored the protective riprap blanket, and installed six drain pits. This alleviated but did not entirely eliminate the problem. The Bridgeport Bar Irrigation District insisted that Reclamation solved the silt problem prior to the 1961 irrigation season, since the silt and sand in the pipes created low pressure in the sprinkler heads. The district achieved this by making repairs to the booster pump unit at the pumping plant and doing as C. E. Withers of the Denver office recommended, “intertie the end of lateral 7 with the end of lateral 9.”⁵²

Similar corrective measures alleviated the impact of sediment build up in project distribution systems of all the project divisions. The districts also faced concerns regarding water quality, environmental impacts to fish and wildlife, and inclement weather. Heavy storms and floods sometimes caused extensive damage requiring repair. For instance, the Okanogan River flooded in 1972 and destroyed the Ellisford Siphon on the river. This was replaced by the Midway Pumping Plant, located about 8 miles south of Oroville. On the Chelan Division, a heavy storm hit the area on July 7, causing damage to over 100 acres of orchard in the project area. Also on the Chelan Division the silting problem remained a serious concern on the Tonasket-Oroville Unit. Eventually the local water district filed a \$55 million claim against Reclamation maintaining that the system was not “constructed adequately.” To alleviate the controversy, Reclamation

⁵² “Project History, Chief Joseph Dam Project, Foster Creek Division,” Vol. 5, 1957-62, 9-18, 44, 46, 51-52, 69-70, 72, in RG 115, Project Histories 1910-1990, Box 72.

offered the district a title transfer of all project works. In 1997 the district accepted the proposal and Reclamation turned over title of the Tonasket-Oroville Unit to the district⁵³

Project Benefits

On project lands farmers planted new orchards and revitalized existing developments. Planting new orchards was capital intensive—in the 1960s it required about \$1200 per acre to develop orchards, not including land—and because of this, farmers were slow to plant orchards, though they had a much higher value per acre than alfalfa. At the Brewster Flat Irrigation District only about half of the irrigable lands had been converted to apple orchards. Nevertheless, the districts made every attempt to encourage planting of fruit trees on project lands.⁵⁴

In 1983, the total irrigated acreage on the four divisions of the Chief Joseph Dam Project was 25,644. In 1992 actual irrigated acreage was 28,200 acres producing crops valued at \$142,929,887.⁵⁵

Conclusion

Although the dams on the Columbia River and its tributaries provide a great deal of electric power, they also contribute to what is still a viable and significant agriculture

⁵³ USDOJ, BR, *Project Data*, 237; “Project History, Chief Joseph Dam Project, Chelan Division, Manson Unit, Vol. 5, 1975, 1, in RG 115, Project Histories 1910-1990, Box 196; John W. Keys III, *Oral History Interview*, Transcript of tape-recorded Bureau of Reclamation Oral History Interviews, conducted by Brit Allan Storey, senior historian, Bureau of Reclamation, from 1994-2006, in Denver, Colorado; Boise, Idaho; Washington, D.C.; and Moab, Utah.

⁵⁴ “Project History, Chief Joseph Dam Project, Greater Wenatchee Division,” Vol. 5, 1963, 28, in RG 115, Project Histories 1910-1990, Box 71; “Project History, Chief Joseph Dam Project, Foster Creek Division,” Vol. 7, 1965-66, 10-11, in RG 115, Project Histories 1910-1990, Box 30.

⁵⁵ Reclamation: Managing Water in the West, “Chief Joseph Dam Project, Project Data,” <http://www.usbr.gov/dataweb/html/pnchiprjdata.html>.

industry in eastern Washington. The fruit that comes from its orchards, especially its apple orchards, is world famous and has been integral to central Washington's economy since the nineteenth century. The water impounded by Grand Coulee Dam irrigated over half a million acres of land in the Columbia River basin. The total acreage on the Chief Joseph Dam Project is considerably less—no more than 30,000 acres—but a nevertheless significant contribution to the agricultural economy of the state of Washington.⁵⁶

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⁵⁶ Lamar, *The New Encyclopedia of the American West*, 1183.

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