Central Utah Project, Vernal Unit

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On a mild afternoon in late August 1958, shops closed early in Vernal, Utah and citizens gathered in anticipation of the largest parade in the city's history. A visit by Utah Governor George D. Clyde and the announcement of the first appropriation to begin the Central Utah Project's (CUP) Vernal Unit motivated the Vernal Chamber of Commerce to organize the celebration. The Governor led the parade, seated along with the members of the Utah Water and Power Board in a large river raft christened the *S.S. Flaming Gorge*. Uintah Water Conservancy District (UWCD) Board Members followed in their own raft, the *S.S. Steinaker*. Floats, Bands, and celebrating citizens in cars, on tractor and horseback stretched four miles behind the Governor. Speeches and square dancing awaited the revelers at the end of the parade route. The CUP's Vernal Unit is a relatively modest reclamation project. But, the show of enthusiasm demonstrates both the importance of the water to the community and a celebration of the successful struggles to secure authorization and appropriations.[1]

Project Location

The Vernal Unit takes its name from the city of Vernal, Utah. Vernal is the seat of Uintah County, and the project serves the city, along with the nearby communities of Masear and Naples, with irrigation and municipal supplies. The settlements are located in the Ashley Valley of northeastern Utah. The valley is located in the Uinta Basin, a geologic depression bounded by the Uinta Mountains to the north and the Book Cliffs of the Colorado Plateau to the South.

The Uinta Mountains are the only major range running east and west. Several rivers and streams drain off of the south slope, and flow into the Duchesne River which drains through the Uinta Basin from west to east into the Green River. Ashley Creek and Brush Creek at the eastern edge of the range drain directly into the Green River. Ashley Creek and its main

tributary Dry Fork Creek originate in the small glacial lakes at the base of March Peak (elevation 12,219 feet).

The project's primary feature is an off stream reservoir in the Steinaker Draw. The area is named after the family which settled the area. During investigations and early project history, the name was rendered "Stanaker," reflecting an error originating on 1906 United States Geological Survey (USGS) maps. USGS perpetuated this error for several years, but in response to petitions from local citizens USGS changed the name to reflect the family spelling of the name, "Steinaker."[2]

Historical Setting

Ages ago, an inland sea teeming with aquatic life covered most of what is now the Uinta Basin. Dinosaurs prowled the tropical swamps. Today, the one-time abode of the dinosaurs has been set aside by the Federal Government as the Dinosaur National Monument where paleontologists pick away to free rock-embedded bones. Rich deposits of coal, gas, oil, and oil shale are found in the area. Two billion tons of small shells and bones—the remains of marine life in the ancient sea—are deposited only 15 miles away in a pile that constitutes one-twentieth of the world's known mineable phosphate reserves.[3]

Archeologists believe that from 10,000 or more years ago, until A.D. 400, the human inhabitants of Utah practiced a single common culture termed the Desert Archaic. Characterized by hunting-gathering, the flexible, highly adaptive lifeway mirrored most of man's worldwide history. However, beginning around A.D. 400 a new unique culture began to emerge throughout most of Utah. The Desert Archaic culture emerged as the people archeologists now refer to as the Fremont blended their historic gathering practices with the new ideas and technologies transmitted across the Southwest from Mexico. Specifically, the Fremont adopted the cultivation

of corn, squash, and beans; the making of pottery; and the concept of permanent housing. South of the Colorado River, archeologists have found little evidence of the Fremont culture; thus, they conclude the river seems to form a sharp southern boundary between the Ancient Puebloan (formerly known as Anasazi) and the Fremont. However, a recently revealed Fremont site suggests that a greater interaction may have existed between the Ancient Puebloan and the Fremont. Like the Ancient Puebloan, archeologists have found no evidence that Fremont inhabited their settlements after A.D. 1250-1300.[4]

While the issue remains debated, most archeologists agree that a combination of war and drought-induced famine forced the Fremont to relocate. Upon the disappearance of the Fremont in the Thirteenth Century A.D., the Numic-speakers (Piute, Gosiute, and Ute) took over the territory. They practiced the Archaic lifeway that had remained characteristic of the Intermountain West (except Utah) from the beginning. It seems that the Shoshoni-speakers who were in possession of Utah upon first white contact were migrants from Southern California and Nevada. They may have been a factor in the disappearance of the Fremont, or they may have expanded eastward into a territory already empty of human occupants by the Fourteenth Century. Linguistic evidence has confirmed the time and direction of expansion of the Numic-speakers; what is lacking is knowledge of the nature of the contact, if any, with the Fremont.[5]

The expedition of Franciscan Friars Francisco Dominguez and Silvestre Velez de Escalante contained the first Euro-Americans known to visit the Uinta Basin. Traveling from Santa Fe, the group arrived at the Uncompahgre Plateau in Western Colorado in August. While there they met two Utah Utes of the *Tumpanuwac* or Timpanogos band—known to the Spaniards as Lagunas—who were visiting the Uncompahgre lodges. They convinced the two men they named Silvestre and Joaquin to help guide the expedition. The party crossed the Green River

near present-day Jensen, Utah, on September 13, 1776. The Uintah Basin had been the home of the Uinta Band of the Western or Utah Utes. The Spaniard's expedition opened trade with the Utes and introduced both the horse and the slave trade. These developments forced the consolidation of the small family units into social units living in the Uinta Basin and their withdrawal to "safer, less accessible territory" with the *Tumpanuwac* near Utah Lake.[6]

Some years later, the basin became an important area to the fur trade. Following the route of Dominguez and Escalante, Etienne Provost and other trappers from Taos operated in the area during 1824. The following year, General W. M. Ashley, owner of the Rocky Mountain Fur Company, and a party of trappers visited the area, giving his name to the creek and valley. Recognizing the importance of the area as a crossroads, William Reed, James Reed, and Denis Julien established a trading post at the confluence of the Uintah and Whiterocks Rivers in 1828. Four years later, Antoine Robidoux, who had established a successful trading post near present day Delta, Colorado, purchased the operation from Reed and his partners.[7]

Fort Robidoux operated successfully for a number of years until 1844 when Utes burned the fort during a confrontation. The destruction of the fort and the decline of the fur trade in the 1840's resulted in a temporary withdrawal of Euro-Americans from the Uinta Basin. However, the first wave of Mormon pioneers reached the Salt Lake Valley in the nearby Great Basin in 1847. Under the direction of Brigham Young, the settlers began colonizing the region spreading out primarily along the north-south axis of the Wasatch Range.

As the Mormons spread they strained their cordial relations with the Utes. The growing tensions resulted in the Department of the Interior's Secretary Caleb B. Smith recommending the removal and consolidation of the Utah Utes to a reservation in the Uintah Basin. By executive order, President Abraham Lincoln established the Uintah Reservation in October 1861. During

the later summer, before Lincoln acted on Smith's recommendation, Brigham Young sent an expedition into the Uintah Basin to investigate its potential for Mormon settlement. Perhaps unduly influenced by the dry, brown grass of the late summer, the party reported the area to be "one vast contiguity of waste." In 1864 the Utes signed a treaty ceding their traditional lands and agreeing to relocate to the reservation in exchange for just compensation for their lands, agricultural assistance, and education for their children. However, after they moved onto the reservation, the Senate refused to ratify the treaty leaving them without the promised compensation and assistance.[8]

The growth of mining in Western Colorado, and the friction between the Native Americans and miners precipitated the Meeker Massacre in 1877. As a result of the incident, Federal authorities pressured the Colorado Utes to accept a treaty for removal to a reservation. By treaty, the Government moved the White River Utes onto the Uintah Reservation. In January 1881 President Chester A. Arthur issued an executive order creating the Ouray Reservation on adjacent lands for the resettlement of the Uncompahgre Utes. By August, the Uncompahgres had all been moved to their new home. The reservations excluded the Ashley Creek and Brush Creek drainages.[9]

White settlement of the Ashley Valley began in 1873 when Pardon Dodds, an Indian agent from the Uintah-Ouray Indian Agency, established a ranch in Ashley Creek. The first ranches were devoted to livestock which utilized the grazing resources adjacent to the valley. Between 1873 and 1880, a number of livestock men located in Ashley Valley and in 1878, the present town of Jensen was settled by Mormon colonists. Uintah County was organized March 3, 1880. In 1894 officials moved the county seat four miles from Ashley to Vernal.[10]

A number of factors led the settlers of the Ashley Valley to specialize in cattle ranching. A mining boom in Utah led to an increased demand for red meat, and the distance to markets limited the profitability of other farm products. Additionally, the scarce amount of water late in the growing season made these crops difficult to grow. Instead the cattlemen primarily grew additional cattle feed. Pardon Dodds was the first to use Ashley Creek for irrigation, diverting water for his pasture lands. In 1879 a number of farmers united to build the Ashley Central Canal. The three and a half mile canal irrigated 9,000 acres in the Vernal area. Within four years the canal doubled in size and had appropriated one third of the stream flow of Ashley Creek. Settlers created a second canal company later that year to construct the Ashley Upper Canal. The canal soon stretched twelve miles, and the company also claimed one third of the river's flows.[11]

Other canal companies followed, and by 1897 the rights to the entire flow of Ashley Creek had been claimed. In November of that year a district court decree divided the flows between the major canal and ditch companies operating in the valley. The court only slightly reduced the claims of Ashley Upper and Ashley Central Companies. The balance of the water was divided between the Rock Point Canal and smaller Union, Turner, Dodds, Island, Steinaker and Colton Ditches Companies.[12]

These companies utilized the direct flows of Ashley Creek, but they recognized the need for reservoirs to store the spring floods. They investigated the prospects for enlarging several natural high mountain lakes into reservoirs, but their small size and remote location limited these prospects. The new century, and the formation of the Bureau of Reclamation (at that time known as Reclamation Service) brought hopes for needed reservoir storage. In September 1903

Howard S. Reed conducted preliminary surveys of potential dam sites in the Uinta Basin. The following year he conducted a more thorough investigation.

Reed observed that "In no portion of Utah are there better opportunities for agriculture than in the northeastern section, where the Green River flows uninterrupted for many miles through virgin soil, the productiveness of which is well demonstrated on lands bordering the banks of its many affluents."[13]

After his survey, Reed concluded that a dam at the mouth of Ashley Canyon and an offstream site in the Steinaker Draw were the best locations. He noted that a low ridge separated these two sites, which could be used in conjunction to the dam in Ashley Canyon facilitating the diversion of water into Steinaker. [14]

Despite Reed's strong recommendations, Reclamation chose to construct the Strawberry Valley Project as its first in Utah. As a result, Ashley Valley residents began exploring other options to build a storage reservoir at the Steinaker site. In the fall of 1906 the members of the State Land Board and Utah State Engineer Caleb Tanner visited the site and reported favorably on its prospects. The newspaper report of the prospect prompted Howard Reed to write Chief Engineer Fredrick H. Newell.

> I am sorry that the work is not to be done under the auspices of the Reclamation Service for I firmly believe that there existed one of the best small projects that could be found within the arid district and it would have been a fine opportunity for a demonstration of the immense amount of good small projects constructed at little cost, comparatively, would do, especially when situated and surrounded …by people who would endorse any solution of their irrigation problem.[15]

Because of limited funds, the State Land Board chose to fund other projects it deemed of higher priority. The canal companies attempted to increase the water available during the later irrigation season by constructing small storage reservoirs on the upper reaches of the streams in 1917 and 1922. The severe drought which struck Utah and the West in 1934 stimulated the next

attempts to construct reservoir storage. Irrigation companies filed with the Forest Service for permits in 1934. The Ashley Valley Irrigation Company finished construction on the Oaks Park Dam on Brush Creek. It created a reservoir with a capacity of 6,700 acre feet. The company then constructed a transmountain canal to divert the water from Oaks Park Reservoir to Ashley Creek.[16]

Project Authorization

During the same period that local irrigators undertook construction of the Oak Park Reservoir, the Reclamation undertook investigations of potential projects in Utah cooperatively funded by the Utah Water Storage Commission. Reclamation conducted these investigations in conjunction with a survey of potential projects in the Upper Colorado River Basin authorized by the Boulder Canyon Project Act. The Boulder Canyon Adjustment Act of 1939 provided additional funding for the surveys.

A sub-office of Reclamation was established in Vernal in September 1938 to undertake preliminary investigations of Ashley Valley. One of the projects investigated by Reclamation was construction of the long-contemplated dam across Steinaker Draw. This would be the major feature of the Vernal Project which would provide supplemental irrigation to farms in the Ashley Valley. During World War II, Reclamation considered Steinaker Dam a "Food for Victory" Project. The Government, probably the War Production Board, rejected this proposal, recommending instead post-war construction. Subsequently, Reclamation included the Vernal Project in the comprehensive list of projects in the Upper Colorado River Basin, published as part of its report on the river at the conclusion of World War II. Reclamation hoped that Congress would authorize many of the projects in an effort to provide jobs and homes for returning veterans.[17]

At this point, Reclamation conceived the Vernal Project as a stand alone project. However, as planning proceeded on developing a comprehensive scheme for development of the Upper Colorado River Basin after the war, the project became a part of the plans for the CUP. Under the ultimate phase of the CUP, Reclamation planned on diverting into the Strawberry Reservoir the entire flows of all the major streams and rivers draining off the southern face of the Uinta Mountains. This water would then be diverted into the Bonneville Basin for use along the Wasatch Front and central Utah. Steinaker Reservoir would have provided storage and regulation of water delivered from the Green River to replace water diverted at higher elevations to Strawberry.

In 1949, officials at the Region 4 offices in Salt Lake City completed a detailed planning report on an independent Vernal Project. The report outlined the construction of the Steinaker Dam, a feeder canal to divert water from Ashley Creek into the off-stream reservoir, and a new service canal to connect the reservoir to existing canals. In addition to irrigation water, Reclamation now planned on providing municipal water to Vernal and adjacent communities by facilitating an exchange between the city and irrigators using water from Ashley Springs.[18]

Reclamation determined that the project had a cost benefit ratio of three to one, but that it would take irrigators eighty-four years to repay the full costs at an affordable rate. Similar situations throughout the Upper Basin led Regional Director Eugene O. Larson to propose a repayment formula similar to that authorized by the Pick-Sloan plan on the Missouri River. The Pick-Sloan authorization had provided that the sale of hydroelectric power from the large dams could be used to repay a portion of the irrigation projects. The plan became the Colorado River Storage Project (CRSP).

CRSP included plans for several large storage reservoirs on the Colorado and its principal tributaries. The "mainstem" dams would also produce vast quantities of hydroelectric power which Reclamation would sell to offset the costs of numerous "participating [irrigation] projects" throughout the Upper Basin States. The largest project in size and cost was the CUP, but the inclusion of projects to benefit all the Upper Basin States helped build support for the package in Congress. Additionally, the mainstem reservoirs would provide holdover storage to meet the obligations to the Lower Basin States under the Colorado River Compact.[19]

The successful negotiation of the Upper Colorado River Compact in 1948—which divided the Upper Basin's share of the Colorado River on a percentage basis—cleared the way for the introduction of the CRSP. Despite the support for CRSP among the Upper Basin States, the opposition of President Truman, along with congressional politics, and a large price tag, combined to cause strong opposition to the legislation. After the election of President Dwight D. Eisenhower, who supported the CRSP, Utah Senator Arthur V. Watkins reintroduced CRSP in 1952.

A tough political battle ensued. Much of the controversy now centered on the proposed dams within Dinosaur National Monument at Echo Park. Utahns generally strongly supported the Echo Park Dam as it was perceived to be in their best interest and a critical part of the CUP. Despite local support for the Dam, national opposition to the dam at Echo Park continued to sour the debate over CRSP. In addition to the opposition of conservationists to the Echo Park Dam, an array of other interests plotted against the legislation. Efforts to secure passage of the CRSP stretched out over several years.

The turning point came in 1955 when Colorado Congressman Wayne Aspinall, chairman of the House Interior Committee, removed the Echo Park Dam from the House version of CRSP.

Aspinall had supported the dam, but felt the passage of the entire CRSP package was more important than including the dam at Echo Park. In exchange for dropping plans for a dam within the National Park System, conservationists, led by the Sierra Club's David Brower, agreed to support the new legislation which would build the dam at an alternate site, Glen Canyon. With the major opposition neutralized, CRSP finally passed Congress, and on April 11, 1956, President Eisenhower signed the bill. The bill included the initial phase of CUP as the largest single participating project. Reclamation divided the initial phase into four units. It planned for three of these units—Vernal, Jensen, and Upalco—to enhance irrigation supplies within the Uinta Basin. They designed the fourth unit, the Bonneville, which was the largest and most complex, to provide irrigation water for the Uinta Basin *and* to collect, store, and divert water from the Uinta Basin into the Bonneville Basin.[20]

Construction History

Following the passage of CRSP, which authorized the Vernal Unit, local interests moved quickly to organize a water conservancy district to act as a repayment agency. Under Utah law water conservancy districts are created by the State's District Court Judge under petition of property holders within the proposed district boundaries. Throughout the summer, members of the chamber of commerce-Hugh W. Colton, Bryce.H. Stringham, and Laurence Y. Siddoway-who had been active in lobbying for passage of CRSP collected the necessary petition signatures. By mid-September Colton, the group's attorney, filed the petition with the District Court. As no one filed an objection during the mandated sixty-day waiting period, Utah Fourth District Court Judge R. L. Tuckett signed the court order creating the UWCD on November 27, 1956. The court subsequently appointed the seven board directors on December 18. That evening the board met for the first time and selected L. Y. Siddoway to act

as Temporary Secretary. Later, the Board retained Siddoway as the District's General Manager and as Secretary of the Board.[21]

During this same period, Parley Neely and the staff of the Central Utah Area Office worked to complete the Vernal Unit Definite Plan Report (DPR). In May 1957 the Regional

Figure 1. In late April 1958, Uintah Water Conservancy District officials meet with Reclamation attorneys to work out details of the Vernal Unit repayment contract. StandingBack: B.H. Stringham, state senator and President of UWCD board of directors; Lester Miracle, Vernal City Mayor; and Leon Christensen, Vernal City Surveyor. Seated Front: Claud Niffziger, BOR attorney; Tom Parker, solicitor's office, Department of Interior, Salt Lake City; Hugh Colton, UWCD attorney; Parley Neeley, BOR Central Utah Project Planning Office, Project Engineer; and Laurence Siddoway, General Manager, UWCD. Used by permission, Uintah County Regional History Center, all rights reserved.

Director submitted the completed DPR to Commissioner Wilbur Dexheimer who approved the document on August 2, 1957. A short time later, Acting Secretary of the Interior Fred G. Aandahl gave his approval.[22] With the DPR complete, Reclamation and UWCD began to prepare a repayment contract. After lengthy negotiations, the UWCD Board approved a repayment contract with Reclamation on May 6, 1958. Secretary of the Interior Fred A. Seaton approved and signed the contract in Washington on June 10. Subsequently the UWCD scheduled a special election for voters to approve the contract on July 8. Voters demonstrated extremely high support, overwhelmingly approving the contract with a vote of 1317 to 22. The affirmative vote cleared the way for the official signing of the contract at a special meeting on July 14, 1958. Utah's Fourth Judicial Court validated the contract on November 25, 1958.[23]

During this same period of time, water district officials worked with Utah's Congressional delegation to secure appropriations for the project. Obtaining the necessary appropriations proved to be a daunting challenge. In the wake of the launch of the Soviet satellite "Sputnik," the Bureau of the Budget proposed withholding funds for new Reclamation projects in order to increase spending on a military missile program. Consequently the Bureau of the Budget failed to recommend funds for the Vernal Project in fiscal year 1959. Undaunted, water district officials doubled their efforts. Utah Senator Arthur V. Watkins succeeded in adding funding for the project in the Senate version of the budget bill. After several weeks of conference, the final version included a $1 million appropriation for the Vernal Unit. As mentioned above, Vernal citizens celebrated the news with a massive four mile long parade led by Utah Governor George D. Clyde on August 22, 1958.[24]

Figure 2. Governor George D. Glyde (far left) and members of the Utah Water and Power Board prepare to lead a parade in Vernal Utah to celebrate the first appropriations for the Vernal Unit and the continued construction of Flaming Gorge Dam Used by permission, Uintah County Regional History Center, all rights reserved.

Steinaker Dam

With appropriations secured, Reclamation completed the final project specifications and prepared a bid package for Steinaker Dam. The Assistant Commissioner and Chief Engineer issued invitations for bids on February 13, 1959. On April 1, a crowd of 200 gathered in the courtroom of the Uintah County Courthouse in Vernal as Reclamation officials opened fourteen bids. The low bid by Morrison-Knudsen (M-K) of Salt Lake City—$705,000 below the engineer' estimate—was no April fools joke. M-K beat out the second low bidder—R. A.Heintz Construction of Portland Oregon by only $2,088. A third bid was also below the Engineer's estimate.[25]

The 162 foot (structural height) Steinaker Dam is the main physical feature of the Vernal Unit. Located adjacent to U.S. Highway 191 approximately three and one half miles north of the center of Vernal, the dam enclosed the Steinaker Draw and created an off-stream storage basin. The reservoir stores upwards of 38,000 acre-feet. Reclamation issued two separate contracts for the other principal features of the Vernal Unit. The first contract was for the diversion and conveyance system which delivers water to the off-stream Steinaker Reservoir. The Fort Thornburgh Diversion Dam redirects water from Ashley Creek into the three mile Steinaker Feeder Canal which supplies Ashley Creek water to Steinaker Reservoir. The second contract was for the Steinaker Service Canal. After being released through the six foot outlet works tunnel in the right abutment, the twelve mile canal delivers reservoir water to existing canals in the valley through the Steinaker Service Canal. Additionally, Reclamation issued contracts for three secondary physical features, laterals, drainage, and a municipal waterline. In a few locations, short laterals connect the Steinaker Service Canal to the existing irrigation canals. Following completion of the primary project features, the UWCD and Reclamation officials determined a drainage program would be needed. Finally, Reclamation partnered with the UWCD and the local communities in the construction of a 17.3 mile water line to supply culinary water.[26]

Approximately 1,500 people gathered for the ground breaking ceremony held May 14, 1959. Stores and schools closed and busses transported students to the construction site. Assistant Secretary of the Interior Fred G. Aandahl gave the keynote address. Other local and state officials, including Governor George D. Clyde and Senator Frank Moss, participated in the program as well. The program honored 86 year old local rancher Joe Steinaker whose family

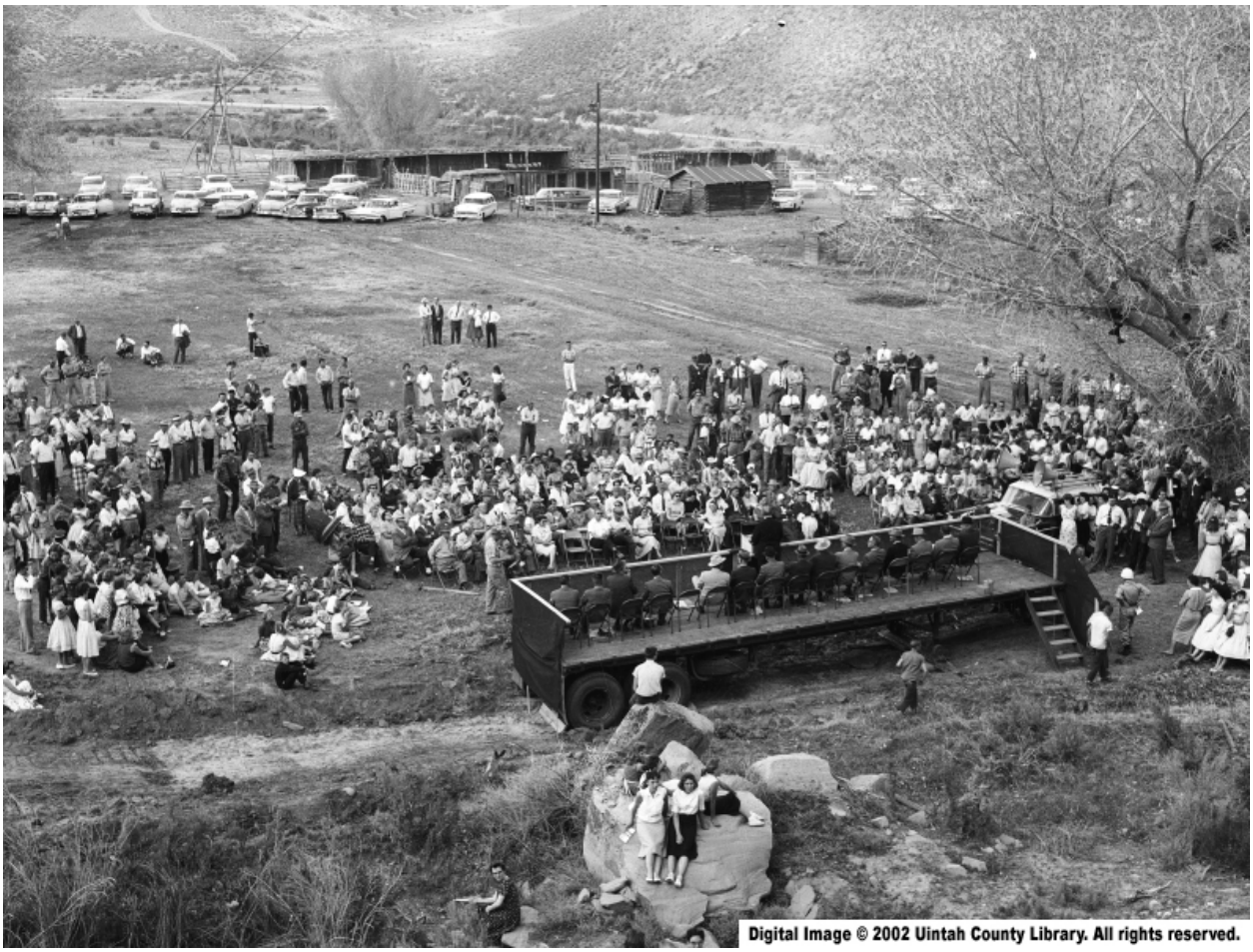

Figure 3. A portion of the crowd of 1,500 gathered for the groundbreaking of Steinaker Dam may 14, 1959. Used by permission, Uintah County Regional History Center, all rights reserved.

farm had comprised the bulk of the reservoir site. The official ground breaking occurred when the dignitaries signaled a massive Euclid scrapper and bulldozer which plowed into the earth.[27]

M-K crews began excavating the foundation on May 25, 1959, and continued through the summer. As they continued their excavation, placement of embankment material in Zone one began on July 23, 1959, and continued through September when the crews caught up with the excavators. On October 12, they began placement of Zone 3 materials. During the summer other crews began work on the outlet works. Excavation of the inlet portal began in June, and tunnel excavation commenced August 13 from the upstream portal. After excavating

Figure 4. The guest of honor, Joseph Steinaker, for whom the dam was named, watches as a massive Euclid Scraper turns the earth during the groundbreaking ceremony for Steinaker Dam. Mr. Steinaker had operated a farm and ranch for about sixty years at this site. Used by permission, Uintah County Regional History Center, all rights reserved.

past the area which would become the gate chamber, work began from the downstream portal on September 30. Work progressed quickly, and crews completed the 168 foot section to connect to their previous work three weeks later. Another week was required to excavate the gate chamber and access shaft. Concrete crews began lining the outlet tunnel in November.[28]

Simultaneous with the work on the dam and outlet works, other crews began work on the Spillway. Concrete crews placed the first load of concrete in the spillway on August 24. As M-K's crews worked on the dam, numerous other contractors worked on relocating the highway and utilities from the reservoir area. The Vernal Sand and Gravel Company began relocating the highway in April, and traffic moved off the old section by July 9. County road crews worked to

relocate a half mile section of county road in the same area during June and July. Crews from the Mountain States Telephone and Telegraph Company removed their line from the reservoir area in June while the Wasatch Line Construction Company relocated 3.5 miles of a Forest Service Telephone line during August. The Moon Lake Electric Association also completed the relocation of its lines in August. This left the lines of the Utah Power and Light Company. The company had awarded a contract, but the work was held up because the Government had not completed acquisition of the new right of way.[29]

Favorable weather through the fall allowed the contractor to make good progress on the dam. They competed excavating the downstream section on October 11. Moderate temperatures and dry conditions allowed work to progress through November. By the end of the month, however, frost conditions forced the contractor to shut down placement of embankment materials on December 1. Concrete work continued however, and by the end of the year M-K had completed 27 percent of the contract.[30]

On the afternoon of November 20, skeletal remains of a human were unearthed during excavation of the left abutment. Further excavation partially revealed the remains of two other humans. James H Gunnerson, Curator, Museum of Anthropology, University of Utah visited the site on November 25, and concluded they were the remains of Native Americans of undetermined antiquity. Officials on the site subsequently gave the remains to the University. [31]

Over the winter months workers continued their work on the outlet tunnel and had installed the outlet works high pressure gates. The contractor had scheduled their installation during more favorable fall weather; however, a nationwide steel workers' strike delayed the gates construction. The contractor finished the outlet works by the end of March. M-K resumed

Figure 5. Crews work in the outlet tunnel arch form the first week in January, 1960. Left to right are Alton H. Peterson, Bureau of Reclamation project construction enginier; Owen Bodily, contract worker; Walter Bush contract worker; SterlingRasmussen, contract worker; Ray Gardiner, BOR inspector; Gene Tuttle,BOR geologist. Used by permission, Uintah County Regional History Center, all rights reserved.

placement of Zone 3 embankment material on April 5, 1960, and Zone 1 on April 22, 1960. The contractor used Euclid S-18 and TS-24 scrapers to excavate and transport material from the Reservoir Borrow Area for Zone 1. A fleet of twenty trucks hauled material for the Zone 3 embankment from the Ashley Creek Borrow Area to the dam. The high water table limited the amount of material that could be taken from this area. Water proved problematic throughout construction. During excavation of the foundation, the contractors encountered water pockets at

various depths which required exploratory trenches and a dewatering program. The problem proved to be minor and the contractor's efforts quickly solved the problem.[32]

However, a lack of soil moisture in the Reservoir Borrow Area created a bigger problem. As excavation of Zone 1 material began in May 1960, M-K found the material below three feet was too dry. Despite efforts to irrigate the material, the contractor had difficulty keeping the moisture content correct. This required constant and rigid inspection. On several occasions during the summer, the contractor had to rework some material on the embankment that did not have the right moisture content.[33]

With the onset of favorable weather during the summer, the contractor accelerated the pace of construction. The concrete subcontractor completed its work in June. The same month, M-K changed Zone 1 placement operations to two nine-hour shifts working six days a week. M-K placed rolling operations on an intermittent twenty-four hour per- day schedule. With the embankment growing daily, M-K began preparing to riprap quarry on July 18. The riprap quarry was located 20 miles north on Forest Service land. As the contractor completed preparations for riprap placement, Commissioner Floyd Dominy visited the construction site on August 1. Riprap placement began the following day. After two weeks the contractor increased riprap placement to a two shift, six day per-week operation. The contractor encountered some difficulty with the quarry operations as it proved difficult to get the required rock size without a lot of waste.[34]

M-K finished Zone 1 placement on October 24, and completed the embankment, except for the riprap, on November 4. On December 22, 1960, the contractor finished riprapping and completed Steinaker Dam on January 4, 1961, one week ahead of schedule.[35]

Fort Thornburgh Diversion Dam and Steinaker Feeder Canal.

On May 24, 1960, Reclamation opened the bids for the diversion and conveyance system which delivers water to the off-stream Steinaker Reservoir. The Fort Thornburgh Diversion Dam on Ashley Creek redirects flows during the non-irrigation season and high flows during the spring runoff into the three mile Steinaker Feeder Canal which connects Ashley Creek to Steinaker Reservoir. The joint venture of L. C. Stevenson Construction Company and Hansen Construction Company of Altamont, Utah, submitted the low bid. Reclamation awarded the contract to Stevenson-Hansen on June 29. The contractor received the notice to proceed on July 21 and started work on July 23, 1960. Fort Thornburgh is a rockfill overflow diversion structure. The contractor placed 7,000 cubic yards of material to create a 9 foot high and 1,564 foot long dam on Ashley Creek. Work progressed very rapidly and the contractor completed the structure by the end of August.[36]

Excavation work on the feeder canal continued through the fall of 1960, spring of 1961, and was ready for initial testing and use for the spring runoff season. Reclamation accepted the work as complete on May 6, 1961. Reclamation began diverting the first flows, at a rate of 33 cubic feet per second (cfs) into the canal on May 27. Despite being designed for 400 cfs, the low flows washed out a main portion of the backfill surrounding the concrete drop wall on three drops and was threatening a fourth one within the first 12 hours. It also caused the subsidence of the 36-inch riprap immediately below the wall on 23 of 25 drops. Temporary repairs were completed by June 5, and Reclamation made diversions ranging between 5 to 9 cfs through the first weeks of June. As the spring runoff came to an end, Reclamation reduced the flow to 2 cfs on June 20 for the remainder of the year to “season” the canal.[37]

Reclamation awarded a contract to Hansen Construction for permanent repairs on October 2. Hansen began repair work after the end of the irrigation season. They removed and replaced the backfill material at the drops and replaced the riprap. Cold weather extended the time needed, but Hansen completed the work on January 6, 1962. Because of the repair work, fall and early winter flows from Ashley Creek could not be diverted into the reservoir and several thousand acre feet of water was lost downstream that could have been delivered during 1962.[38]

With the repair work completed, the canal was ready for priming. Reclamation opened the contracts on March 13, 1962, and awarded the contract to the low bidder, Hansen Construction. To prime the canal, the contractor placed temporary sand bag dikes at each of the drops to pool the water in April. During the process one of the dikes failed. The sudden discharge caused each of the dikes below to fail and the rush of water caused up to six feet of subsidence in the riprap on the downstream sides of the drops. Repair work was done in June and the Type 2 drops were primed that month. With the repairs complete, filling of the Steinaker Reservoir resumed and the canal performed as designed.[39]

Steinaker Service Canal

On February 21, 1961 Reclamation opened bids for construction of the Steinaker Service Canal. This twelve mile canal delivers reservoir water to existing canals in the project service area. On March 7 Reclamation awarded a contract to low bidder A&B Construction of Helena, Montana. The company commenced work on March 21. By the end of the first year the project was 92 percent complete. Work proceeded slowly during 1962, taking longer than expected. Reclamation accepted the Service Canal as complete on December 21, 1962. The initial priming

of the Service Canal began on April 6, 1963. The priming was completed on May 23 and Reclamation made the initial delivery of water from the canal on June 17, 1963.[40]

Municipal Supply

During the non-irrigation season in winter, ranchers continued to divert flows from Ashley Creek into their canals for stock watering. In order to maximize the water available for storage in Steinaker, Reclamation planned a more efficient stock watering pipeline. As planning progressed, Reclamation altered its plans in response to local preference (or desire) to use the line for domestic purposes as well. As a result, Reclamation agreed to pay $400,000, one-third of the costs of the Ashley Valley Water System. Following a bond election on April 18, 1961, Vernal City issued bonds for $650,000. The community of Maeser contributed $51,000 and the service connection fee of $550 each on 223 homes raised approximately $123,000.

Vernal City contracted with the consulting engineering firm of Nielsen, Reeve and Maxwell of Ogden, Utah, to design the system. The city opened bids for the project on June 29, 1961. The work was split into two jobs and contracts were awarded to two companies on July 26. L. C. Stevenson of Altamont constructed the pipeline systems consisting of 45.2 miles of pipe ranging from 24 to 4 inches. Turner Building Supply completed a desanding unit, chlorination station, and three concrete reservoirs. Construction proceeded rapidly, but Reclamation objected to bedding and backfilling techniques which did not meet specifications, resulting in the renegotiation of the contract signed August 29, 1961, stating Reclamation would not share any operation and maintenance (O&M) expenses attributable to failure to follow requirements.[41]

L. C. Stevenson installed the last segment of pipe on July 20, 1962. Subsequently, the lines were pressure tested and sterilized with strong chlorine. The three reservoirs were also

flushed and sterilized. The system was the first in Utah in which a city provided water service to an area outside its city boundaries. The system had an immediate impact on the community as it provided culinary water to 250 homes for the first time. Previously these homeowners relied on wells and cisterns, and they experienced frequent water shortages.[42]

Recreation

Completion of the reservoir provided a new and much anticipated recreation venue for the Vernal area. As the reservoir began filling, the Utah Department of Fish and Game planted 25,000 rainbow trout in September 1961. The following spring they reported the fish had grown considerably. In anticipation of the recreation demand, the UWCD announced in late April the opening of the reservoir to boating on Saturday, May 19, 1962, using the abandoned portion of State Route 44 as a boat ramp.[43] On May 29 the National Park Service opened bids at their Albuquerque Office for the construction of a public use area, which included a boat ramp, parking and picnic areas. Nelson Brothers Construction of Murray, Utah, submitted the low bid. On May 9, 1963, Reclamation and the Utah State Park and Recreation Commission signed a Memorandum of Understanding, allowing the Commission to assume administrative control of the reservoir for recreation and wildlife purposes.[44]

Usage of the reservoir remained high throughout the summer. The heavy use created some problems with enforcing boating regulations and cleaning up litter. Also, the park experienced a problem with vandalism. Increased night patrols by the county sheriff and the stationing of a full time ranger by the State Parks Commission helped alleviate the problem.

Post Construction History

Project water deliveries began in 1963. During the first three years, Reclamation operated the project. Water users paid Reclamation an O&M fee. Operation of the project

during this early period proved to be complicated for two reasons: construction deficiencies and operational logistics. First, from a logistical standpoint, operations proved difficult as the personnel of Reclamation's Vernal Field Office interacted with six existing canal companies. Three of them operated below the project and three above. Additionally, these companies utilized water from three sources of water, direct diversion of water from Ashley Creek, water from three small reservoirs above the project, and project water. During periods of high flow in Ashley Creek in early spring, all water is diverted through the existing canals. As the flows drop, water is diverted from the creek into the canals above the service canal, and an exchange of water made to deliver project water below the service canal. Correlating the use of the water to implement the necessary water exchanges proved challenging and required establishment of a committee which met for the first time on March 27. Parley Neeley, Manager of the CUP Office in Provo, led a meeting with the officials from the six canal companies to negotiate a Memorandum of Understanding and coordinate the operation of the project with the existing operations of each canal. The committee met on other occasions to resolve all subsequent operational problems which developed on the Vernal Unit.[45]

A second logistical problem was changing past habits and irrigation patterns. It had been a widespread practice for individuals to obtain water from a canal at any hour and without any prior arrangements. Other inefficient irrigation practices included using small streams of water, letting water run on a field unattended, arbitrary delivery and shutoffs which would dry up a canal, and little or no maintenance on some of the laterals and ditches. Local Reclamation officials worked with the canal companies and sponsored classes to help educate the water users and alter habits.[46]

The second major operation problem was construction deficiencies on the Service Canal and Dam. During its first season of use, several small "glory holes" developed in the bottom of the Service Canal. The water flowing into these holes would then return to the surface, or "daylight," as far as 60 feet from the canal. These spots were excavated and filled with impervious materials. After fighting the problem for several years, it was decided these areas needed to be lined to prevent the continued problem. On February 21, 1967, Reclamation opened bids for the earth lining of 440 linear feet of the Service Canal. Reclamation awarded the contract to Asby, Child, and Barney of Woods Cross, Utah, on April 9. All work was completed on April 28, somewhat ahead of schedule. Only minor seepage occurred in the rest of the canal.[47]

Grouting Repair

A more significant problem developed at the dam. On November 27, 1962, with the reservoir more than half full, a 10 foot diameter hole about 6 feet deep appeared in the downstream face of Steinaker Dam. Fred C. Walker, Head of the Earth Dams Section of the Denver Office inspected the dam two days later. Maintenance crews filled the hole on Dec 1, however, the spot on the dam continued to settle. The area dropped a total of 8.66 feet in 1963 and was refilled on June 10 and November 12.[48]

On June 30, 1965, the reservoir reached its capacity of 38,194 acre feet. The full water condition resulted in an increase in the seepage through the left abutment. Dirty water, indicating the embankment was being eroded, discharged from the toe drain at rates as high as two csf. To solve the problem, Reclamation engineers determined a drilling and grouting program was needed.[49]

In preparation for grouting, Reclamation began drawing down the reservoir levels during the fall of 1965. After lowering the reservoir, maintenance personnel observed water entering

the left abutment rock at an elevation of 5497 feet, approximately 50 feet left of the end of the riprap. On October 14, they used Flourescein dye to test the seepage. The dye introduced into the hole in the abutment showed in the toe drain in an hour and dye introduced in the subsidence area appeared in the toe drain after 30 minutes.[50]

Reclamation opened bids for the grouting on November 9, 1965. Continental Drilling Company of Los Angeles, California, submitted the low bid. Reclamation awarded the contract on November 23. Continental Drilling crews began work on the site on December 9. The contractor used a two shift schedule after Christmas of 1965. Following the New Year's holiday, drilling went to three shifts through completion. The drill holes accepted more grout than anticipated resulting in increased costs and time. The contractor completed work on April 20, 1966, three weeks behind schedule. They drilled 4,327 linear feet of drill holes and pumped 29,399 sacks of cement grout into them.[51]

Before the contractor completed the repair work, Reclamation began diverting water from Ashley Creek back into Steinaker on January 19, 1966, to test the grouting. With the repair complete, high spring flows were diverted into the reservoir which refilled to capacity at 8:00 a.m. on May 27, 1966. On July 29 a new subsidence area, 12 feet in diameter and 20 feet deep, developed on the downstream face of Steinaker dam. After inspection, the hole was filled on August 4-6.[52]

In preparation of the transfer of O&M to the UWCD, Reclamation and UWCD jointly made an inspection of the project facilities on October 5 and 6. On January 1, 1967 Reclamation transferred the 'care, operation, and maintenance' of the facilities of the Vernal Unit to the UWCD. Reclamation employee Robert Polson, who provided maintenance on the project during the three-year development period voluntarily transferred to UWCD.[53]

Drainage

After project deliveries began during the development period of the project, Reclamation undertook an investigation of a drainage program. On February 5, 1965, it awarded a contract to Uintah Basin Drilling Company of Roosevelt, Utah, to drill exploratory test and observation wells. The contractor began drilling on February 11 and completed the work on April 29, 1965.[54]

Construction of the drainage portion of the Vernal Unit began in 1968. Reclamation awarded a contract on April 8 to Lee Johnson Construction Company of Rifle, Colorado, for the construction of the Vernal Open Pilot Drain in connection with the lining and rehabilitation of a portion of the Steinaker Service Canal. The contractor completed the work on the contract October 8.[55]

The following year Reclamation continued work on project drainage. On October 31, 1969, it awarded a contract to Ford Construction Co. in the amount of $16,436 for the construction of a closed pilot drain about 0.4 miles long. The contractor received his notice to proceed on November 10 and excavation of the pipe trench began on December 8. Work continued until Christmas Eve when a stop order was issued due to frozen ground and cold weather. Ford Construction resumed work on Feb 19, 1970, and completed the work on March 30, 1970. In addition to the work on the pilot drain, forty new water table observation holes were drilled bringing the total to 170. Reclamation opened bids for Block 1 Drains May 26, 1970, and awarded to W.C. James, Inc. of Vernal, Utah on June 5. The contractor completed the two drains by November 30.[56]

As work progressed on the initial drains, and Reclamation gathered data from the test holes, Reclamation developed a comprehensive plan for construction of drains to lower the water

table on drainage-deficient project lands. The project called for 21.2 miles of drains. In compliance with the new environmental legislation—the National Environmental Policy Act, signed by President Richard Nixon on January 1, 1970—Reclamation completed an environmental study of the proposed drainage project.

Regional Director David Crandall approved the Environmental Impact Statement for the Vernal Drains on March 12, 1971. Five bids for Block 2 drains opened on June 15. The low bid of $205,795 was over the engineer's estimate of $169,303. A contract was awarded to Pollard, Inc., of West Jordan, Utah, on June 30, 1971, to install 4.5 miles of closed drains.[57]

Pollard, Inc., completed all work under Vernal Block No.2 drains on April 28. After operating through the irrigation season, Block 2 drains began to show subsidence areas, along a half mile reach of the 30-A-1 drain and one localized area along the 26-A-2 drain. Excavation of the latter section revealed a pipe separation which was repaired. Investigations of the 30-A-1 drain showed that water was piping through the cobble and gravelly subsurface materials. Wet fall weather delayed the excavation and replacement.[58]

Over the winter of 1972-73 Reclamation and the UWCD cooperated on the investigation of Block 4 drains, the final block of the system. Title VII of the Reclamation Development Act, Public Law 93-493, signed by President Gerald Ford on October 27, 1974 authorized construction of additional drainage paid for by the CRSP Basin Fund, provided the UWCD furnished the right-of-way for the additional drains. The two agencies signed an amendatory contract dated November 26, 1975, formalizing the agreement. Reclamation opened six bids for Block No. 3 drains on April 27, 1976. Jay Tuft and Company of Sandy, Utah, submitted the low bid of $216,743, somewhat below the engineer's estimate of $251,304. Reclamation issued

notice to proceed on May 28, 1976. Jay and Tuft installed seventeen drains totaling 3.99 miles. They completed their work March 24, 1977.[59]

Stabilization of Steinaker Dam.

A Safety Evaluation of Existing Dams (SEED) Examination was conducted at Steinaker Dam on June 8, 1981. The evaluation found no significant problems, but the evaluators determined a moderate risk due to the potential for portions of the dam's foundation to experience liquefaction during an earthquake. While the nearest fault is over twenty five miles distant, Reclamation determined the risk merited mediation. Subsequently, Reclamation undertook an evaluation of potential solutions. The report, completed in 1989, determined the best solution would be to excavate and solidify the foundation at the toe of the dam using dynamic compaction and to construct a berm in that location. The plans called for a trench 150 feet wide, 550 feet long and 30 feet deep immediately downstream from the dam. After compaction, the trench would be refilled with a 10 foot wide filter drain against the dam and Zone 3 materials.[60]

Reclamation began the bidding process in the fall of 1992 utilizing a two-step bid process. The first step selected four qualified bidders who each submitted a bid in the second step. On January 19, 1993 Reclamation awarded a contract to Stimpel-Wiebelhaus Associates of Redding, California. The contractor started work on March 1 and subcontracted drilling work to Jensen Drilling Co. To facilitate the work, Jensen Drilling completed a dewatering system. Stimpel-Wiebelhaus crews began excavating the compaction area on April 2, using scrapers and bulldozers.[61]

During preconstruction, drilling workers found Fremont artifacts. On May 25 the contractor stopped all excavation to allow an archeological excavation to be made by the

Brigham Young University (BYU) Archeology Department. The BYU archeologists completed their study and moved off the jobs site on August 10 allowing the contractor to resume mass excavation the following day. Excavation continued until September 1, when crews reached the desired depth of thirty feet.[62]

Three weeks later the subcontractor for dynamic compaction, Lampson Crane Co. began erecting the "thumper." The thumper was a crane which dropped a seven-foot diameter, 30-ton weight from a height of 112 feet. After testing, the first phase of compaction began October 4 and continued through three phases ending on October 20. With compaction complete, the contractor began hauling in Zone 3 material on November 1 and continued through November 22, when winter weather forced the contractor to shut down.

For safety during construction, UWCD allowed the water levels in the reservoir to be drawn down. As the reservoir began to refill the following spring, a large crack was discovered on the upstream face. The crack was one foot wide and up to four feet deep running three hundred feet vertically down the dam's face. To repair the slump, the reservoir was drawn down a second time during the summer of 1994. The contractor completed the downstream stability berm on July 23 and began work on the upstream slump on August 3. Reclamation accepted the project as substantially complete November 23, 1994.[63]

Settlement of Project Lands

Early studies anticipated providing water for new lands, but because of the demands of existing farms and because the best lands within the project boundaries were already under cultivation, the project made no lands available for settlement. The project provides supplemental irrigation to 14,761 acres. In 1992, just over half of the acreage was utilized on

57 full-time farms. Another estimated 1,700 people lived on the 425 part-time farms comprising 5,933 acres.[64]

Uses of Project Water

The Vernal Unit fulfills its primary purpose by annually providing an average of 18,000 acre feet of supplemental irrigation water to14,761 acres in the project area. In 1992, the most recent data available showed 13,011 acres under cultivation with 92 percent of the acreage in production devoted to forage crops (alfalfa, pasture, and silage). Cereal grains—barley and oat—grew on just under 900 acres, with very small additional amounts devoted to corn and wheat. The gross value of all crops grown on project lands was approximately $2.3 million in 1992.[65]

In addition to providing supplemental irrigation water, the project provides 1,500 acre feet of municipal water to the communities of Vernal, Maeser, and Naples. This provides a significant portion of the municipal supply to nearly 12,000 people. This water is currently treated at the Ashley Valley Water Treatment Plant. Located in a strategic location on Doc's Bench above Steinaker Reservoir, the plant can be fed raw water from three sources—the Vernal Unit, the Jensen Unit, and Ashley Springs. The Central Utah Water Conservancy District, the repayment agency for the Bonneville Unit whose boundaries overlap the UWCD, paid for the construction of the plant, completed in 1985 by Clegg Construction Company of Provo, Utah. The plant significantly improved water quality during the spring when increased runoff created high turbidity and muddy water in residents' taps. [66]

The recreation facilities on Steinaker Reservoir remain popular. The reservoir is a popular venue for fishing, boating, swimming, water skiing, hiking, and camping. Utah State Parks utilized Reclamation funds and usage fees collected at the parks to upgrade the facilities in

1968. Reclamation funded the construction of a culinary water system and flushing toilets. Park fees funded the addition of the park's camping area. In 1983 Utah State Parks completed a renovation of the recreation areas. Together, Steinaker and nearby Red Fleet State Park (Jensen Unit) attract an average of 60,000 to 65,000 visitors each year. The Utah Division of Wildlife Resources (the successor agency to the Utah Department of Fish and Game) maintains the lake as a trout and bass fishery. In the fall of 1989 they treated the lake to remove bluegill, green sunfish, and white suckers that had been illegally introduced. While the project was not designed to provide flood control benefits, through coordinated operation and filling, the project has helped mitigate severe flooding on Ashley Creek on several occasions during its history.[67]

Conclusion

The CUP's Vernal Unit has a long history. Reclamation engineer Howard Reed first proposed a dam across Steinaker Draw in 1904. Ashley Valley farmers and ranchers enthusiastically supported the project looking forward to additional water supplies. The residents of the valley remained enthusiastic, and when Congress finally authorized funds to begin the project they organized the largest parade in the city's history. Constructed in the era of big dams, Steinaker is relatively small. But its size belies the reservoir's importance to the community it supplies. The Vernal Unit provides much needed water for municipal and supplemental irrigation. The reservoir also remains a popular recreational destination. The investment to stabilize the dam will insure that it continues to offer benefits for many years.

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