

Mancos Project

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The Mancos Project

Montezuma County, Colorado, contains some of the most famous Anasazi cliff dwellings in the United States. The Anasazi resided in Mesa Verde until about the thirteenth century A.D. The spectacular cliff dwellings remain as monuments to their existence in Montezuma County, and to the skills of their builders. Two hundred structures occupy Mesa Verde, and the magnificent Cliff Palace housed about 400 people. Now the structures memorialize those who built them.¹ The irrigated fields associated with the cliff dwellings preserved in Mesa Verde National Park juxtaposed with the structures of the Mancos Project provide a time warp of irrigation engineering and construction practices. The water supplied to Mesa Verde by the Mancos Project offers a more tangible connection between the two, and intertwined the park with the project for years.

Project Location

The Mancos Project lies in Montezuma County, in the southwest corner of Colorado. The West Mancos River provides the project with its main water supply. The town of Mancos is the project's nearest community. Historic Mesa Verde National Park lies southwest of the Mancos Project, and receives some of its water from project facilities. Jackson Gulch Dam, north of Mancos, is the project's primary structure. Facilities and lands of the Mancos Project sit in the mountains at elevations ranging from 6,400 to 7,200 feet. The Mancos Project's growing season runs between 105 and 125 days a year. Temperatures on the project average between -15 and -25 degrees minimum and 90 degrees maximum.²

Historic Setting

Permanent settlement of the area by white Americans started in the mid-1870s. John Moss led an expedition of gold prospectors into the La Plata Mountains in 1874. The Ute Indians of the region granted Moss mining rights to thirty-six square miles of the mountains.

1. Ira S. Freeman, *A History of Montezuma County, Colorado: Land of Promise and Fulfillment* (Boulder, Colorado: Johnson Publishing, 1958), 13, 15.

2. Water and Power Resources Service, *Project Data* (Denver: Government Printing Office, 1981), 603, 605; Bureau of Reclamation, *Annual Project History, Mancos Project, 1942*, Record Group 115, 73; Frank C. Merriell, "Western Slope Surveys, Colorado, The Mancos Project, May 1, 1937," *Project Reports*, Record Group 115, box 480, A. Hereafter Record Group 115 cited as RG 115.

Seven members of the party, Dick Gelis, James Ratliff, A. L. Root, Ed Merrick, Harry Lee, John Brewer, and Fred Franks; bowed out of mining and settled the Mancos Valley in 1876.

Irrigation started in the Mancos Valley shortly after original settlement. The Mancos area prospered from 1892 to 1905, but Forest Service imposition of grazing restrictions in 1906, for the Montezuma National Forest, caused the livestock industry to decline. A decline in the region's lumber industry coincided with the livestock reduction.³

Project Authorization

Reclamation engineer Chester C. Fisher studied possible San Juan Basin project sites in 1925, but determined none to be economically feasible at the time. Unfavorable transportation conditions and a depressed agricultural economy made the Mancos Project unfeasible.

Reclamation returned, and started investigating reservoir sites for the Mancos Project in 1936. Locals favored a reservoir at the Weber site, several miles east of the eventual dam site, while Reclamation preferred the Jackson Gulch location, to the west. The Bureau looked at both areas, but reasoned the Weber site would require diversion of both East Mancos River and Horse Creek, with some diversion from the Middle Mancos River. The Jackson Gulch Reservoir would only divert water from the West Mancos River.⁴

Congress authorized the Mancos Project under the Water Conservancy and Utilization Act of August 11, 1939, and provided \$1.6 million. President Franklin D. Roosevelt approved the project on October 24, 1940, as the eighth "work relief" Reclamation project, using Civilian Conservation Corps (CCC) and Work Projects Administration (WPA) forces in construction.⁵ The federal government intended for work relief projects to stabilize the agricultural industry in the projects' areas. Reclamation signed a contract with the Mancos Water Conservancy District

3. Fern D. Ellis, *Come Back to My Valley: Historical Remembrances of Mancos, Colorado* (Cortez, Colorado: Cortez Printers, 1976), 1, 3; Reclamation, *Project History, Mancos Project, 1942*, 78.

4. Frank C. Merriell, "Western Slope Surveys; May 1, 1937," 13; Frank C. Merriell, "Western Slope Surveys, Colorado, Mancos Project; A Report Supplemental to the Mancos Project Report of May 1, 1937," *Project Reports*, Record Group 115, box 480, B, 14.

5. Reclamation, *Project History, Mancos Project, 1942*, 46; Bureau of Reclamation, *Annual Project History, Mancos Project, 1946*, RG 115, 6; "Mancos Project, Colorado, Approved for Construction," *The Reclamation Era*, December 1940, 353. The Work Projects Administration was formed May 6, 1935 as the Works Progress Administration. It changed to the Work Projects Administration on July 1, 1939.

for repayment of \$680,000 over forty years.⁶

Construction History

Albert W. Bainbridge, the Resident Engineer, supervised the project as construction commenced. Reclamation started work on two CCC camps, BR-93 and BR-94, on July 24, 1941, in preparation for dam construction by force account. Two CCC companies transferred to BR-93 and BR-94 in October 1941. WPA workers on the Project came from Mancos and the surrounding area, eliminating any need to provide housing for them. WPA workers built the water system for construction and for the CCC camps. The WPA provided labor for construction of Reclamation administration buildings because other work occupied CCC labor.⁷

The Jackson Gulch Reservoir site lay off-stream from the West Mancos River. This required construction of Inlet and Outlet Canals for filling and distributing water from the reservoir. The WPA, and CCC crews from BR-93, BR-94, and NPS-13, began work on the dam and reservoir site in October 1941. Work crews deposited material stripped from the dam site along the sides of the canyon and near the location for the dam's lower toe. They used bulldozers to strip the steep sides of the canyons not suitable for draglines. The dozers then moved the material to points within reach of draglines.⁸

Workers from BR-93, BR-94, and NPS-13 cleared portions of the east abutment in November and December of 1941, and, despite the United States' entry into World War II, work continued into January 1942. The Colorado winter of 1941-42 took a heavy toll on Mancos Project CCC forces. Many fell ill due to poor camp conditions, and a large number of enrollees deserted the camps. Adverse weather conditions halted work for several months. Reclamation engineers aired complaints about the youth and low education levels of the CCC workers that they felt resulted in less than satisfactory work performance.⁹

The arrival of spring weather and improved working conditions raised the recruits'

6. "Mancos Project, Colorado, Approved for Construction," 353; Reclamation, *Project History, Mancos Project, 1946*, 7.

7. Reclamation, *Project History, Mancos Project, 1942*, 40, 47, 49.

8. *Ibid.*, 61-2.

9. Reclamation, *Project History, Mancos Project, 1942*, 2, 21, 59, 62.

morale considerably, but the CCC disbanded BR-94 on March 25, 1942. Enrollees from defunct National Park Service camps NPS-5 and NPS-13 transferred to BR-93 in March and April 1942, respectively. The remaining workers cleared much of the west abutment between February and June 1942. Work slowed again when Congress dissolved the WPA in June 1942. Stripping operations resumed on May 13, 1942, as workers attacked portions of the reservoir site above the east abutment. Clearing continued until July 10, 1942, when the federal government eliminated the CCC in the interest of the war effort.¹⁰

The loss of the CCC and WPA programs and workers effectively halted work on the Mancos Project. Seeking another way to complete work, suggestions about establishing a camp to house and employ conscientious objectors, on the project, arose by the end of July 1942. Inadequate rain during the year prompted Montezuma County residents to clamor for conscientious objector labor, in order to finish construction of Jackson Gulch Dam and Reservoir. Judge Clifford H. Stone, Director of the Colorado River Conservation Board, corresponded with Wesley Nelson, Reclamation's Chief Engineer in Washington D.C., about the establishment of a conscientious objector camp.¹¹

Stone inquired about a "side camp" of Japanese internees to work on the Mancos Project.¹² Reclamation rejected the use of War Relocation Authority (WRA) labor outright. The Japanese internees would only be available in the winter months, when weather conditions halted most project work. In November 1942, the War Production Board (WPB) ordered construction of the Mancos Project stopped, but within three weeks WPB Vice Chairman F. Eberstadt changed his mind. Eberstadt informed Secretary of the Interior Harold Ickes that construction could continue. The WPB also authorized the use of conscientious objector labor on the Mancos

10. *Ibid.*, 54, 58, 60, 62.

11. "Chief Engineer, Bureau of Reclamation, Denver office, to Bureau of Reclamation Commissioner John C. Page, August 18, 1942," *Engineering Correspondence*, RG 115, box 727; "Assistant Secretary of the Interior Harry W. Bashore to Chief Engineer of Bureau of Reclamation, Denver office, July 31, 1942," *Engineering Correspondence*, RG 115, box 728; "Mayor Roy Dean and Board of Trustees, Town of Mancos to Judge Clifford Stone, Director of the Colorado River Conservation Board, August 7, 1942," *Engineering Correspondence*, RG 115, box 727; "Judge Clifford H. Stone, Director of the Colorado River Conservation Board, to Wesley Nelson, Chief Engineer, Bureau of Reclamation, Washington D.C. office, September 8, 1942," *Engineering Correspondence*, RG 115, box 728.

12. "Clifford Stone to Wesley Nelson, September 8, 1942."

Project.¹³

The WPB and the Selective Service System established Civilian Public Service (CPS) camp 111 in the summer of 1943. Reclamation transferred Charles F. Thomas from the Boulder Canyon Project to manage CPS-111. The conscientious objectors (COs) continued the clearing operations started by CCC and WPA forces in July 1943. Reclamation staff felt many of the COs belonged to pacifist organizations, espousing political, rather than religious, objections to World War II. In fact, they felt COs had few religious connections. Reclamation supervisors claimed most COs were uncooperative and extremely selfish. The *Project History* for 1943 said, "Many of these men are well educated, or rather over educated, narrow minded, and very contentious. They object to any kind of regulations."¹⁴

A few of the COs belonged to the "peace churches," and did cooperate with the supervisors.¹⁵ However, they objected to managing others, including small work crews. The CO's required close supervision, some because of inexperience, but most because of their uncooperative nature. Despite these conditions, Reclamation engineers considered work progress good. By the end of 1943 the camp housed 182 COs, who worked on the project. They completed 90 percent of the clearing work for Jackson Gulch Dam.¹⁶

As on the reservoir site, workers used bulldozers for stripping the dam foundation because of the steep topography of the abutments. The bulldozers cleared surface material from the top, depositing it on a shelf 100 feet below. Draglines or shovels deposited the material on trucks for removal to the waste dumps at the dam's lower toe. In preparation for excavation, the CO's began clearing the location of the Inlet Canal in August 1943. The removal of brush, and black and yellow pine trees constituted much of the clearing operation. Workers stripped bark

13. "Bureau of Reclamation Commissioner John C. Page to Judge Clifford H. Stone, Director of the Colorado River Conservation Board, September 19, 1942," *Engineering Correspondence*, RG 115, box 728; "Vice Chairman F. Eberstadt, War Production Board, to Secretary of the Interior Harold Ickes, December 4, 1942," *Engineering Correspondence*, RG 115, box 728; "Bureau of Reclamation Commissioner John C. Page to Judge Clifford H. Stone, Director of the Colorado River Conservation Board, December 26, 1942," *Engineering Correspondence*, box 728.

14. William F. Crabtree, "Design and Construction Report, Jackson Gulch Dam and Inlet and Outlet Canals, Mancos Project, Colorado," Durango, Colorado, 1952, *Project Reports*, RG 115, box 480; Bureau of Reclamation, *Annual Project History, Mancos Project, 1943*, RG 115, 6-7, 12.

15. Reclamation, *Project History, Mancos Project, 1943*, 7.

16. *Ibid.*, 7, 24.

off the logs and transported them to local saw mills for processing into lumber.¹⁷

During 1943, the CO workers began excavating the trench for the concrete cutoff wall, on the west abutment. They pushed the material from the abutment with bulldozers and dropped it to the dam foundation. Shovels loaded the earth onto trucks for removal. At the same time, crews began excavating for the outlet works. Test pit explorations revealed the outlet works would need a large amount of excavation for the concrete to sit on rock or hard shale. Two draglines, one on each side of the excavation, made the thirty-two foot wide cut for the outlet works.¹⁸

Reclamation contracted to obtain materials from a borrow pit on the land of Ira E. and Mary C. Kelly. The pit supplied concrete aggregates for Jackson Gulch Dam. Reclamation contracted with the National Park Service in 1942, for the use of a trommel plant to crush, wash, and screen the aggregates. The trommel was a cylindrical screen into which coarse ore was fed. The trommel filtered fine material out of the coarse material and deposited the ore out of the other end. Reclamation retained possession of the plant, even though the Bureau never used it. Reclamation decided in 1943, to build its own plant. Mancos Project engineers selected the site, and the building materials arrived by the end of the year.¹⁹

Reclamation resumed excavation of the cutoff trench in March 1944, after the winter layoff. Crews again used bulldozers for moving most of the material. Workers only excavated about 100 feet of trench on the east abutment of the dam site. They started excavating the cutoff wall footing in June 1944. Part of the trench excavation went through a mixture of shale and rock. Reclamation sprayed the sections with a "Bitumuls Special HRM Emulsified Asphalt" to seal them and prevent slaking, crumbling of the material due to air exposure.²⁰

Excavation of the outlet works resumed in May 1944. The crews laid the concrete for the gate chamber base on December 8, 1944, using two work shifts. The workers heated the mixing

17. *Ibid.*, 26-7.

18. *Ibid.*, 27.

19. Reclamation, *Project History, Mancos Project, 1942*, 50; Reclamation, *Project History, Mancos Project, 1943*, 28; Sybil B. Parker, ed, *McGraw-Hill Dictionary of Scientific and Technical Terms, 4th Edition* (New York: McGraw-Hill, 1989), 1972.

20. Bureau of Reclamation, *Annual Project History, Mancos Project, 1944*, RG 115, 35-6.

water to 148 degrees during the day and 160 degrees at night to guard against freezing. In addition, they heated the sand. A shelter of tarps and poles protected the work against the cold during placement. Clearing of the site continued, and workers finished 85 percent of the clearing by the end of 1944. Reclamation hoped to start placement of the earthen embankment in 1944, but determined that was unfeasible. Instead, work crews continued the work started in 1943 on excavation of the Outlet Canal, which started in 1943.²¹

Work on the cutoff wall commenced in May 1945. Laborers sandblasted the footing and chipped the loose edges for grouting. They placed the grout directly before laying the cement, to form a solid seal. The workers removed the forms two to three days after placement and applied Daraseal as a curing agent. In September, the use of Daraseal ceased, and Reclamation used water to cure the concrete. Crews finished 520 feet of the cutoff wall and 76 feet of the footing by the end of the work season. Cracks appeared in the wall footing at approximately sixty foot intervals. Workers put two inch pipe into holes they drilled in the footing. They washed the cracks out by pumping water through the pipes at forty pounds of pressure, then ran grout through the pipes to seal the cracks.²²

Work on the outlet works, running through the base of the dam, resumed in April 1945. Workers had to clean out material, which washed into the pipe during the spring thaw, before continuing construction. They followed the clean up with construction of the horseshoe shaped outlet conduit. Crews placed the concrete in twenty-eight and one half foot sections with four foot segments in between. They finished the twelve main sections by the end of July 1945, and completed laying the four foot closing sections in August. Workers finished the circular pressure segment upstream from the gate chamber in October 1945.²³

Work crews used an Osgood shovel to continue excavation of the Inlet Canal. Several rock ledges delayed excavation work on the canal. Where width permitted, excavation went around the ledges, but in narrow areas, workers backed the shovel up to allow drilling and

21. Reclamation, *Project History, Mancos Project, 1943*, 28; Reclamation, *Project History, Mancos Project, 1943*, 34-7, 52.

22. Bureau of Reclamation, *Annual Project History, Mancos Project, 1945*, RG 115, 2, 29-30.

23. *Ibid.*, 31.

blasting of the rocky segments.²⁴

Use of Conscientious Objectors to work on the project resulted in some problems. In the early years of their employment, the COs proved unskilled and, at times, irresponsible. Even so, close supervision and inspections helped workers achieve satisfactory results.²⁵ After the surrender of Japan, difficulties increased. Acts of vandalism occurred in the camp area of CPS-111. Men cut the flag rope three times, in the last six months of 1945, forcing camp administrators to lower the flagpole and replace the rope. Some emptied anti-freeze from truck radiators, and replaced it with plain water. "U.S. Slave Camp" and "C.F. Thomas, Gestapo Chief" appeared on camp buildings.²⁶ All the incidents happened at night, so camp administrators never knew who carried them out. Some COs intentionally slowed down work on the project. The Selective Service System released the final CO assignees on February 20, 1946.²⁷

Loss of the CO forces once again stopped work on the Mancos Project. In 1946, Reclamation started converting the buildings of CPS-111 into government housing. Reclamation opened bids for the remaining construction on Jackson Gulch Dam and the Inlet and Outlet Canals. Vinnell Company, Inc. of Alhambra, California had the low bid of \$1,925,904, but Reclamation Commissioner Michael Strauss authorized the rejection of all bids as too high. Vinnell announced it could delay in receiving the contract. Proposed elimination of budget carry-overs threatened the project in 1946, but in February 1947, Senators Ed C. Johnson and Eugene D. Millikin, of Colorado, assured Montezuma residents construction of the project would continue. Reclamation approved Vinnell's bid, and the company received the contract on April 17, 1947.²⁸

Vinnell started work on the dam in June 1947, when the first of their forces arrived.

24. *Ibid.*, 36-7.

25. Reclamation, *Project History, Mancos Project, 1944*, 53.

26. Reclamation, *Project History, Mancos Project, 1945*, 20, 28.

27. Reclamation, *Project History, Mancos Project, 1945*, 28; Bureau of Reclamation, *Annual Project History, Mancos Project, 1946*, RG 115, VII.

28. Reclamation, *Project History, Mancos Project, 1946*, VII; "Vinnell Firm Low on Bid," *The Denver Post*, 9 July 1946, p. 2; "Completion of Mancos Dam Project Assured," *The Denver Post*, 12 February 1947, p. 32; Bureau of Reclamation, *Annual Project History, Mancos Project, 1947-48*, RG 115, X.

They started preparing the dam foundation for placement of the earth embankment. The work involved cleaning the abutments to ten feet beyond the cutoff wall on both sides. Vinnell's laborers cleaned the sandstone on the east abutment by hand. They used a bulldozer beyond the first ten feet, reverting to hand cleaning when the sandstone became uneven. Cleanup operations finished in July 1947.²⁹

The Inlet Canal had two bench flumes and the Outlet Canal had one. The bench flumes sat above ground on ledges of steep slopes, eliminating the need to excavate canal ditches in areas prone to slides. Vinnell poured the concrete for the bases and the walls of the flumes separately, with the connecting joints at the bases' levels. Vinnell then built forms to pour concrete covers for the Inlet Canal's flumes. The covers protected the flumes against damage from slides. Soil from minor slides, which fell across the covers, provided more protection for the flumes.³⁰

Vinnell Co., Inc., started laying the first earthfill, in the dam embankment, in July 1947. With the trommel plant out of operation, workers only laid the heavy clay "zone one" material, on the dam site because it did not need screening. Dump trucks hauled the clay to the site where crews spread and rolled it. Rollers made twelve passes over each layer of fill, compacting them to six inches or less. Vinnell also used air powered tampers to compress the earthfill near the cutoff wall, where rollers could not do the job. The contractor asked permission to cease using the tampers, and just use the more labor efficient rollers. Reclamation allowed the company to experiment with the rollers. They did not compress the fill, near the wall, as completely as the rest of the embankment. Reclamation ordered Vinnell to continue work with the tampers.³¹

On the upstream side of the cutoff wall, an outcrop of cracked sandstone, along the west abutment, prevented effective rolling and power tamping. Reclamation decided to puddle the area. Workers laid a section of fill along the abutment. They then dug a twelve inch wide trench against the rock and filled it with water to puddle the fill. Workers rolled the layer as close to

29. Reclamation, *Project History, Mancos Project, 1947-48*, 13.

30. *Ibid.*, 44, 47, 49.

31. *Ibid.*, 52-3.

the abutment as possible at a parallel angle. The rollers forced the puddled earth into the cracks and fissures.³²

The contractor began placing the dry, coarse "zone two" material in October 1947. Soon after that work began, heavy rains flooded the upstream section of zone two material, and threatened to overtop the zone one clay. The company used three 2 inch pumps to prevent overtopping, but it took several days to pump the water out of the construction area. Frost buildup began causing problems by early November. Vinnell ran two long shifts to avoid shutting down operations during the night and early morning. The first shift stretched from 6:00 p.m. to 5:00 a.m. The second went 5:00 a.m. to 3:30 p.m. The company used the 3:30 p.m. to 6:00 p.m. time slot to service equipment and clear the trommel plant.³³


The schedule allowed placement of the embankment through the night to keep frost out of the fill. Temperatures at the site dropped from 42 degrees during the day to 15 degrees at night. As temperatures fell, the contractor decreased the work area to what laborers could keep thawed. They worked the remainder when it warmed in the sun. The trommel plant broke down on November 6, 1947. The halt allowed the whole area of zone two material to freeze. Vinnell reverted to one eight hour shift, and only laid zone one material. On November 13, the contractor stopped work for the winter.³⁴

Vinnell began screening concrete aggregate in August 1947, but by November the trommel plant showed signs of failing. The company excavated the embankment behind it to relieve pressure on the back wall. Finally Vinnell decided to build a new plant instead of repairing the old one, and received permission from Reclamation to proceed. They salvaged the electrical and metal equipment from the old plant, and constructed the new plant on the same site.³⁵

Vinnell started the final work on the cutoff wall in August 1947. The contractor used grout to make a continuous curtain underneath the entire wall to stabilize it. The company went

32. *Ibid.*, 53-5.
33. *Ibid.*, 55.
34. *Ibid.*, 55-6.
35. *Ibid.*, 17, 19.

on to finish two remaining open sections in the cutoff wall. In October, Vinnell's crews finished the portions of the wall, east of the gate chamber and on the west abutment. Careless spraying of a curing compound by the COs covered the reinforcement bars. The contractor found it necessary to sandblast some of the reinforcing steel before laying concrete in the stilling basin and outlet works.³⁶

Government forces built the trashrack, the circular concrete conduit between the trashrack and the gate chamber, the intermediate section of the gate chamber, and the horseshoe section of the outlet conduit from the gate chamber. The force account laborers used a neutralized vinsol resin to entrain air in the concrete. Air entrainment reduced surface tension of water in the mix and improved the concrete's properties. Vinnell completed the outlet works in 1948. Government workers excavated much of the Inlet and Outlet canals in 1947. Vinnell finished the common and rock excavation, and the excavation for structures in 1948. The contractor placed a three foot layer of riprap on the bottom and sides of the Outlet Canal. A Vinnell driller, working on a rock bluff on the Inlet Canal, fell over a cliff to his death on June 14, 1948. He was the only fatality in Mancos Project construction.³⁷ 

Before construction resumed in 1948, spring runoff in the reservoir area became impounded by the embankment and flowed over it. No significant erosion occurred from the flooding, but Vinnell found it necessary to pump the standing water out of the reservoir area before beginning work. Workers installed toe drains and cleaned the area along the east abutment, cutoff wall, to solid rock. The company laid a "filter blanket" of fine material over the embankment.³⁸ The material did not prove impervious to seepage. Workers placed a cobblestone layer, consisting of three to eight inch diameter rock, two and one half feet thick and the width of the channel; to the downstream toe of the filter blanket. They laid a thin layer of the filter blanket over the cobbles to prevent the zone two material from seeping through the

36. *Ibid.*, 26-8.

37. Reclamation, *Project History, Mancos Project, 1947-48*, 32, 36, 38, 68; Parker, *McGraw-Hill Dictionary of Scientific Terms*, 50.

38. *Ibid.*, 57-8.

stones.³⁹

The cobblestone supply began falling short of Reclamation's requirements for the dam by July 1948. Enough stones remained to complete the downstream slope and most of the upstream slope of the embankment. Reclamation made allowances for a shortage of cobblestones. If another material proved necessary, it would lie beneath dead water storage on the upstream slope. The eventual shortage of 2,800 cubic yards of cobbles upon completion, was not acute. As a substitute, Vinnell laid a dense, fine grained, gray sandstone riprap on the upstream face of the dam to finish the contract. Reclamation accepted all of the work on December 16, 1948. Vinnell accomplished the work in 582 (51 percent) of the 1,150 days allowed in the contract.⁴⁰

Government forces built several components of the dam's outlet works including the trashrack, the circular concrete conduit between the trashrack and the gate chamber, the intermediate section of the gate chamber, and the horseshoe section of the outlet conduit from the gate chamber. The force account laborers used a neutralized vinsol resin to entrain air in the concrete. Government workers also excavated much of the inlet and outlet canals in 1947. After receiving the dam contract in 1947, Vinnell took over work from the government forces. The company completed the outlet works in 1948. Vinnell finished the common and rock excavation, and the excavation for structures in 1948. The contractor placed a three foot layer of riprap on the bottom and sides of the outlet canal. On June 14, 1948, the Mancos Project suffered its only construction fatality. A Vinnell driller, working on a rock bluff on the inlet canal, fell over a cliff to his death.⁴¹

On March 18, 1949, Reclamation diverted the first water from West Mancos River to Jackson Gulch Dam. Montezuma County held dedication ceremonies for the dam on July 9, 1949. Frank C. Merriell, Secretary of the Colorado River Water Conservation District; Judge Clifford H. Stone, Director of the Colorado River Conservation Board; Representative Elizabeth Pallett of Rico, Colorado; District Judge James M. Noland, of Durango, Colorado; E. O. Larsen,

39. *Ibid.*, 58.

40. *Ibid.*, 58, 62, 68.

41. *Ibid.*, 32, 36, 38, 68.

Regional Director of Reclamation's Salt Lake City office; Walter Halpin, of Vinnell Co.; Jesse L. Nusbaum, of the National Park Service; Robert H. Rose, Superintendent of Mesa Verde National Park; and Julia Knous; mother of Colorado Governor Lee Knous; attended the ceremony. Ira E. Kelly, President of the Mancos Water Conservancy District, was the Master of Ceremonies. The morning activities consisted of releasing the first irrigation water from the dam. Cooks barbecued two steers, raised on the project, for lunch. In the afternoon, those in attendance unveiled a monument marker on the dam.⁴²

G. J. Nielson and Sons of Dolores, Colorado, received the contract to build the Chicken Creek Turnout, on the Outlet Canal, in August 1949. The turnout supplied water to lands which could not be served from Mancos River diversions. Nielson and Sons started work on August 25, 1949. The wet ground, at the chute location, forced the firm to try different methods of drainage. Nielson and Sons settled on excavating to the shale foundation. They laid a gravel blanket on the shale, forming a porous layer; then backfilled the gravel. Nielson and Sons stopped for the winter, but encountered no difficulties when work resumed in spring 1950. The firm completed the turnout on May 19, 1950.⁴³

Jackson Gulch Dam is zoned earthfill standing 180 feet high with a top width of 35 feet and a maximum base width of 920 feet. The crest length extends 1,900 feet. The outlet works consist of a concrete conduit leading to an emergency gate chamber. The gate chamber has a thirty six inch steel pipe controlled by two 24 inch hollow jet valves. Jackson Gulch Dam is unusual because it is an off-stream storage facility. Consequently the dam does not have a spillway. Jackson Gulch Reservoir has a total capacity of 10,000 acre-feet. The Inlet Canal stretches 2.6 miles, and the Outlet Canal travels 2.2 miles.⁴⁴

Post Construction History

Shortly after the first storage of water in March 1949, leaks developed in the west

42. Bureau of Reclamation, *Annual Project History, Mancos Project, 1949*, RG 115, 43; Bureau of Reclamation, *Official Report: Dedication of Jackson Gulch Dam, Mancos Project, Colorado, July 3, 1949*, Mancos, Colorado.

43. Reclamation, *Project History, Mancos Project, 1947-48*, 10; Reclamation, *Project History, Mancos Project, 1949*, 13, 15; Bureau of Reclamation, *Annual Project History, Mancos Project, 1950*, RG 115, 7.

44. Water and Power Resources, *Project Data*, 605.

abutment of Jackson Gulch Dam. Reclamation released water into the Outlet Canal on May 10, and again June 25 through June 30, to allow repairs on the abutment. Morrison-Knudsen Co., Inc., of Boise, Idaho, contracted to repair the leak. The company drilled and grouted the leaking section from June 1 until August 30, 1949. In addition, on April 19, 1949, a leak appeared in an expansion joint of the inlet chute. Reclamation used a plastic joint to replace the bad joint.⁴⁵

Reclamation turned water into the Inlet Canal in 1949, to partially stabilize the unseasoned earthwork. Heavy rains in June 1949, forced Reclamation to divert the West Mancos River away from the Inlet Canal's intake to avoid damage, and to keep debris from flowing in. Previously, debris had blocked both openings of the intake structure. The preventive measures helped to an extent, but the rushing water still washed away some of the riprap on a wasteway in the Inlet Canal.⁴⁶

The west abutment of Jackson Gulch Dam continued springing small leaks in 1950, one on April 11, and one April 18. A leak developed in the east abutment on May 11. Reclamation repaired all the leaks. Reclamation used a dragline to excavate an open drainage ditch, to carry water away from the cobblestones on the downstream face of the dam. The Soil Conservation Service, formerly the Farm Security Administration; enlarged, consolidated, and re-aligned existing irrigation ditches. In addition, they installed headgates and measuring devices on the ditch systems. In 1950, Reclamation completed a pipeline to Mesa Verde National Park to supply it with water. They started water through the pipeline May 15, 1952.⁴⁷

Reclamation raised a fence around the project's permanent facilities in April 1951. The Bureau hanged chains across the chutes in the spring. They attached ropes to the chains, which dangled in the water, in the event someone fell into a chute, they could pull themselves out. Reclamation built a bridge across the intake structure of the inlet canal to provide access to both sides of the canal, and both sides of the river.⁴⁸

45. Reclamation, *Project History, Mancos Project, 1949*, VIII, 27.

46. *Ibid.*, 27, 29.

47. Reclamation, *Project History, Mancos Project, 1950*, 2, 17-8, 23; Bureau of Reclamation, *Annual Project History, Mancos Project, 1976-78*, RG 115, 40.

48. Bureau of Reclamation, *Annual Project History, Mancos Project, 1951*, RG 115, 9-10.

High precipitation in 1952, saturated the ground above one of the inlet canal's bench flumes. Resulting slides damaged the flume. Reclamation made permanent forms, for the repair of the flume, in preparation for similar damage in the future. They did not repair the flume until after Jackson Gulch Reservoir filled. Reclamation also had to dig more open drains and collection ditches to remove water leaking from the west abutment. Seepage continued through both abutments for years, but decreased greatly by 1967. An earthquake on January 4, 1976, rocked the Mancos Project, but caused no discernible damage to Jackson Gulch Dam.⁴⁹

Settlement of the Project

Settlement on the Mancos Project was never great. At the beginning of the project in 1940, Mancos, the project's main community, had 750 people. Project farms had an estimated population of 680. Mancos only increased by 28 people by 1950, and the farm population dropped to 318. In the next ten years the farm population gained 22 people, and Mancos grew to 832. By the mid-1980s, part time farmers increased the Project's population to 714, but only 201 farmed full time. In 1991, 210 people farmed full time, and the Mancos Project had 715 part time farmers. Mancos had a population of 842 in the 1990 census.⁵⁰

Relations between the Mancos water users and Reclamation did not always proceed smoothly. With the intention of lowering the project farmers' financial burden, Senator "Big Ed" Johnson asked Michael Strauss to re-evaluate the costs of the Mancos Project; including conscientious objector labor, facilities for supplying water to Mesa Verde, and facilities for wild bird conservation. Instead, Secretary of the Interior Julius A. Krug executed an amendatory contract in December 1947, increasing the repayment total from \$680,000 over forty years to \$900,000 over sixty years.⁵¹

49. Bureau of Reclamation, *Annual Project History, Mancos Project, 1952*, RG 115, 10, 13, 20; Bureau of Reclamation, *Annual Project History, Mancos Project, 1953*, RG 115, 12-3; Bureau of Reclamation, *Annual Project History, Mancos Project, 1967*, RG 115, 14; Reclamation, *Project History, Mancos Project, 1976-78*, 2.

50. Reclamation, *Project History, Mancos Project, 1942*, 86; Reclamation, *Project History, Mancos Project, 1950*, 38; Bureau of Reclamation, *Annual Project History, Mancos Project, 1960*, RG 115, 69; Bureau of Reclamation, *Annual Project History, Mancos Project, 1985*, RG 115, 112; Bureau of Reclamation, *Annual Project History, Mancos Project, 1991*, RG 115, 145; Department of Commerce, Bureau of the Census, *Twenty First Census of the United States, 1990: Population and Housing*, Bureau of the Census, 1990, CD-ROM.

51. "Colorado Fights Mancos Costs," *Rocky Mountain News*, 24 January 1947, p. 19; Reclamation, *Project History, Mancos Project, 1947-48*, 4-5.

The Mancos Project, and other events, brought many changes to Montezuma County. World War II boosted area prosperity by increasing demand and prices for cattle and farm products. The Rio Grande Southern Railroad abandoned its narrow gauge line in 1951. The move effectively cut off rail service to Mancos. The railroad's last run between Durango and Mancos occurred on December 27, 1951. In spite of such economic setbacks, residents of the Mancos Project showed initiative and ingenuity in business. John Nelson remodeled Vinnell's construction camp and opened it as Lake Mancos Lodge on June 15, 1953. Other Montezuma residents caught up with Nelson in business, while the Mancos Water Conservancy District took over operation and maintenance of the Mancos Project from Reclamation in 1958.⁵²

Uses of Project Water

Jackson Gulch Dam supplies irrigation water to farms in Montezuma County as its main function. Farmers started growing alfalfa by 1890. The crop went on to account for about half of the irrigated acreage of the Mancos Project. Irrigated pasture land comprised most of the other half. Many of the remaining acres grew wheat, barley and oats. A few orchards grew small fruits and apples for local consumption, and farmers devoted some land to potatoes.⁵³

Crop values, for approximately 10,000 irrigated acres, reached over \$400,000 in 1950. Valued at \$46.57 per acre, alfalfa proved the big money crop in 1957. The average crop value reached almost \$100 per acre a few times in the 1970s and 1980s. The drought of 1977, made that year the exception, when crop value averaged only \$38.08 per acre. The drought slowed production in 1978, to just over \$70 per acre. In 1987 crop values averaged \$124.77 per acre. Crop value dropped to \$103.90 per acre in 1991.⁵⁴

Livestock served as the main source of revenue on the Project, with a total value of

52. Reclamation, *Project History, Mancos Project, 1946*, 29; Josie Moore Crum, *The Rio Grande Southern Railroad* (Durango, Colorado: San Juan History, 1961), 363; Bureau of Reclamation, *Annual Project History, Mancos Project, 1953*, RG 115, 15; Reclamation, *Project History, Mancos Project, 1976-78*, 41.

53. Reclamation, *Project History, Mancos Project, 1942*, 71, 73.

54. Reclamation, *Project History, Mancos Project, 1950*, 19; Bureau of Reclamation, *Annual Project History, Mancos Project, 1957*, RG 115, 40; Bureau of Reclamation, *Annual Project History, Mancos Project, 1960*, RG 115, 21; Reclamation, *Project History, Mancos Project, 1976-78*, 33; Bureau of Reclamation, *Annual Project History, Mancos Project, 1985*, RG 115, 13; Bureau of Reclamation, *Annual Project History, Mancos Project, 1986*, RG 115, 12; Bureau of Reclamation, *Annual Project History, Mancos Project, 1987*, RG 115, 13; Bureau of Reclamation, *Annual Project History, Mancos Project, 1991*, RG 115, 13.

\$535,768 in 1950. Dairy and beef cattle comprised most of the livestock on the project. Hogs, pigs, sheep, chickens, and turkeys accounted for the rest. Farmers pastured livestock in adjacent uncultivated areas and the Montezuma National Forest in the summer months. During the winter, they pastured and fed the livestock in the valley.⁵⁵

Reclamation limited recreation activities on Jackson Gulch Reservoir to swimming and fishing. Fearing pollution because the reservoir supplied some domestic water, water users requested the Bureau ban boats. Jackson Gulch Reservoir supplied water for Mesa Verde National Park's needs. Colorado's Fish and Game Department stocked the reservoir with fingerling trout in 1950. In 1958, Reclamation relaxed its position, and issued the first boating permits for Jackson Gulch Reservoir.⁵⁶

Conclusion

The Mancos Project is by no means a large operation, serving less than 2,000 people on Project lands. Reclamation and the local water users maintain as cordial a relationship as on any other project. The conflicts, which appeared, involved that most quarrelsome of subjects-- money. The project's supply of water to Mesa Verde National Park serves the many visitors the park receives each year. In 1993, Mesa Verde received 666,100 recreational visitors.⁵⁷ As such the Mancos Project provides for more than just residents of Project lands.

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55. Reclamation, *Project History, Mancos Project, 1942*, 73-4; Reclamation, *Project History, Mancos Project, 1950*, 20.

56. Reclamation, *Project History, Mancos Project, 1950*, 18-9; Reclamation, *Project History, Mancos Project, 1976-78*, 41.

57. Phone interview, National Park Service, Office of the Regional Director, Denver.

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