The Arnold Project

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Table of Contents

The Arnold Project

The Arnold Project is situated southwest of Bend, Oregon in Deschutes County. Located in central Oregon, Deschutes County boasts an irrigation season of 93 days with an annual rainfall of 12.25 inches. Originally a private development, the primary purpose of the Arnold Project is to provide irrigation to a small group of local farmers.

Project Location

Though it is considered to be its own project, Arnold is closely tied to the Deschutes River and by extension the Deschutes Project; the Arnold Project uses the water of the Deschutes River for irrigation. Water is diverted from the Deschutes River a short distance above Lava Island Falls. Originally, the Arnold Project was merely an off-shoot of the Deschutes Project. In addition, all initial construction on Arnold was coordinated through the Deschutes Project office. In 1952, four years after work began, Arnold became its own Project. Moreover, the Arnold Irrigation District helped in the rehabilitation of the Crane Prairie Dam in exchange for storage space in the reservoir.[1]

Historic Setting

Originally, the Deschutes River was known by the Klamath tribe as, *Kolamkeni Koke,* or "place where the wild root kolam grows." Many years later Lewis and Clark, referred to the river by another Indian name *Toworenhiooks* after sighting it on October 22, 1805. On their return trip the river was renamed Clarks River in honor of William Clark. A little more than a decade later the river was again renamed, this time essentially for good. When the area was trapped by French-Canadian fur traders, the river's proximity to the falls of the Columbia River earned it the name *Riviere des Chutes,* or River of the Falls. The French place name was then

1. United States Department of Interior, Water and Power Resources Service, *Project Data* (Denver: U.S. Government Printing Office, 1981), 13.

shortened by the following generation of English-speaking pioneers into what we know the river as today, Deschutes.[2] After the Civil War the Deschutes River Basin was settled primarily by ranchers who then used the Deschutes grasslands as pasture for their cattle during the summer months. The ranchers were succeeded by the timber men, who proceeded to make Bend, Oregon, the logging capital of Central Oregon. Between 1893 and 1908, a number of private ditch and irrigation companies claimed water rights from the Deschutes and its tributaries. The work of the ditch and irrigation companies prompted a shift in the local economy. The emphasis went from ranching to farming with the introduction of water. All of the local irrigation efforts succeeded in bringing state and Federal attention to under-irrigated Deschutes County. In 1914 and 1922 comprehensive surveys of the Deschutes Basin were released, by the State of Oregon and the Federal Government, most notably the United States Reclamation Service (USRS) in 1922. The second survey resulted in a $500,000 Federal appropriation for a storage works located at Benham Falls, eight miles south of Bend. After meeting with Arthur Powell Davis, then Director of the USRS, the land owners rejected Reclamation's plan because under the province of the Reclamation Act all land over 160 acres would have to be sold at the government appraisal price.[3]

Even without federal help, small irrigation efforts were well underway. In 1922, the North Unit Irrigation District under terms of the Carey Act, which allowed for state supported irrigation efforts, built the Crane Prairie Dam. Located southwest of Bend, Crane Prairie is a log-crib, rockfill dam. The dam was responsible for irrigation of 40,000 acres in the Central Oregon, Arnold, and Lone Pine irrigation districts. Crane Prairie Dam was troubled by leaks and

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2. Lewis A. McArthur, *Oregon Geographic Names*, (5th ed.), (Portland, Ore.: The Press of the Oregon Historical Society, 1982), 218-9.

3. Denver, Colorado, National Archives and Records Administration: Rocky Mountain Region, Records of the Bureau of Reclamation, Record Group 115, "Annual Project History, Deschutes Project,", Vol. 1, 1938, 7-8; Norman Delmar Kimball, *The Impact of Economic and Institutional Forces on Farmer Adjustments in the North Unit Deschutes Project*, (unpublished Ph.D. thesis, Oregon State University, Corvallis, 1961), 16.

due to poor financing repairs were obstructed.[4]

The present Arnold Irrigation District was first organized as the Arnold Irrigation Company on December 27, 1904. The organization became official when incorporation papers were filed with the State of Oregon on January 9, 1905. In addition to the Arnold Irrigation District, three other small irrigation companies, the Pine Forest Ditch Company, the Bend Company, and the North Irrigation Company, diverted water through the main canal. The three irrigation companies were later absorbed by the Arnold Irrigation Company. Water was diverted from the Deschutes River a few miles south of Bend, Oregon, through the Arnold Canal for the lands to be irrigated south and east of that city.

The Arnold Diversion Dam is a wing type dam, which extends a short distance into the river from the east bank. The main structure of the distribution system is the one-mile long Arnold Flume which connected to the Arnold Canal. Originally, the main Arnold Canal was seventeen miles long, however since rehabilitation it has been reduced in length to about eleven miles. At the diversion, the Canal has a capacity of 120 cubic feet per second. The Project lands are served by approximately twenty-five miles of laterals.[5]

The canal system was built so that water could be delivered to lands selected by the stockholders; the result was an extended canal to serve scattered farms. The Deschutes River Decree of February 10, 1928, by the Circuit Court of Deschutes County, as modified by the Oregon Supreme Court, allotted to the Arnold Irrigation Company a diversion right of 150 c.f.s. for irrigation of 9,392 acres. Not all this acreage was under cultivation, however. Longtime residents on the Project estimate the maximum area under irrigation at any one time was about

4. Kimball, 1.
5. *Project Data*, 11.

5,000 acres.[6] In 1960 there were 3,416 acres under irrigation rotation out of a total of 4,292 acres eligible for full irrigation service.

The Company was reorganized in 1936 as the Arnold Irrigation District (AID) and it assumed all obligations and accounts of the Arnold Irrigation Company.[7]

Project Authorization

The Arnold Irrigation System consists of the Arnold Diversion Dam, Arnold Flume and Canal, and approximately twenty-five miles of laterals. Water is diverted from the Deschutes River through the Diversion Dam and into the Flume and Canal; from there water is delivered by way of the laterals to the Project lands. Privately owned and maintained, the Arnold Irrigation System was constructed independently of the Deschutes Project. Originally a primarily wood structure, by 1948 the Arnold Flume was in serious danger of collapse, threatening destruction of most of the irrigated crop land throughout the district. Unable to accept the financial burden of rehabilitating the Flume and Diversion dam, AID turned to the Bureau of Reclamation for help and funding, both of which the Bureau provided. Construction began after the Interior Department Appropriation Act, 1948 (61 Stat. 460, 474; July 25, 1947) authorized rehabilitation of the Arnold Project diversion works.[8]

Construction History

Rehabilitation of the Crane Prairie Dam

The contractor, Vernon Brothers, of Boise, Idaho, began rehabilitation of the Crane Prairie Dam, including the installation of a new spillway, on August 24, 1939. The new dam was to be approximately 230 feet upstream from the existing structure. Not surprisingly the

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6. Denver, Colorado, National Archives and Records Administration: Rocky Mountain Region, Records of the Bureau of Reclamation, Record Group 115, "Annual Project History, Arnold Project--Oregon," Vol. 1, 1952-1960, 1.
7. "Annual Project History, Arnold Project--Oregon," Vol. 1, 1952-1960, 1.
8. *Project Data*, 13.

original timber and rockfill structure did not retire without a fight. The Contractors were forced to dynamite the dam in order to remove its component parts.[9]

Crane Prairie Dam now stands 36 feet high with a crest of 285 feet. The Reservoir has a capacity of 55,300 acre-feet, which covers 4,940 acres. Six-inch layers of a clay, sand, and gravel mixture form the core of the embankment and nearby spillway. Rockfill finishes the downstream face while the upstream side is covered with twenty-four inches of rock riprap. An uncontrolled weir allows water to flow through the refurbished spillway, an eighty-feet wide channel carved through the rock of the left abutment. The outlet works, off the right abutment, consists of a fish screen, an outlet control structure, a horseshoe-shaped conduit, and a stilling basin. Additionally, twelve steel fish screen panels are housed in a twelve-sided, twenty-nine-feet tall tower overlooking the project; the movement of the panels is controlled by a crane. In the fall of 1940, the new Crane Prairie Dam went into service.

Rehabilitation of the Arnold Works

Due to its imminent collapse the Flume was the first part of the Project to be rehabilitated. The original wood Flume was replaced by a semicircular steel Flume. In addition, new concrete headworks were installed. Three years were required to complete the wood to steel transition/rehabilitation of Arnold Flume. Most of the work was done by private contract, with Bureau funding. However, the Bureau did excavate and pour footings for the Flume at the same time that the new Flume was being erected. The major reconstruction of the Flume occurred in 1948. The initial 4,628 feet of the Arnold Irrigation District Flume were completed and accepted on April 25, 1948.[10] In 1949, the final 782 feet of the flume were built. The contract was awarded to, and carried out by, R. P. Syverson. Work began on October 7, 1949 and was

9. L. R. Brooks, "A New Crane Prairie Dam," in *The Reclamation Era*, (April, 1942), 90.
10. "Annual Project History, Deschutes Project," Vol. 11, 1948, 63.

accepted as complete on December 31, 1949.[11]

The repairs to Arnold Diversion Dam were undertaken by A. Wilson Benold and begun on November 8, 1950, with an expected completion date of March 3, 1951. By the end of the year only 22% of the work had been accomplished with 59% of the time elapsed.[12] However, repairs were completed and accepted on January 26, 1951, well in advance of the contract completion date.[13]

Post-Construction History

On May 13, 1953, a major break occurred in the main Canal Flume. With the assistance of Bureau personnel form the Bend office and operation maintenance forces from the North Unit at Madras, Oregon, the Flume was successfully repaired. Net cost of repairs totaled, $1,386.57 obtained from emergency funds.[14] The Flume remains intact since the completion of repairs. Overall the repairs to the Arnold works have been successful; no further rehabilitation has been necessary. The Arnold irrigation system remains in operation by the Arnold Irrigation District.

Uses of Project Water

The primary use of Arnold Project water is irrigation. In 1952 the Project irrigated 195 farms for a total of 2,712 acres. The total farm units on the Project in 1952 numbered 205 for a total of 4,343 acres. Alfalfa, grain, grass hay and pasture comprise the primary crops grown on the Project. Additionally, some dairy and beef cattle, and truck farming can also be found on the Project. Markets for the products grown have been found in the neighboring communities, ranging as far north as Portland.

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11. "Annual Project History, Deschutes Project," Vol. 11, 1949, 55.
12. "Annual Project History, Deschutes Project," Vol. 13, 1950, 48.
13. "Annual Project History, Deschutes Project," Vol. 14, 1951, 32.
14. "Annual Project History, Arnold Project--Oregon," Vol. 1, 12.

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Index