Snake River Ditch
(Oro Grande Canal No. 1)
Headgate on the Snake River near the town of Keystone; ending point at the Dillon Water Treatment Plant
Vicinity of Dillon
Summit County
Colorado

HAER No. CO-82

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
Rocky Mountain Regional Office
National Park Service
P.O. Box 25287
Denver, Colorado 80225-0287

HISTORIC AMERICAN ENGINEERING RECORD
SNAKE RIVER DITCH
(ORO GRANDE CANAL NO. 1)

I. INTRODUCTION

Location:	The Snake River Ditch (Oro Grande Canal No. 1) begins at a headgate on the Snake River, near the town of Keystone in Summit County, Colorado. The ditch runs in a generally westward direction for 7.37 miles to a point above the present town of Dillon at the Dillon Water Treatment Plant. The ditch has been obliterated in many places within the first two miles, in the vicinity of Keystone, but is highly visible for the remainder of its length.
Quad:	Keystone, Colorado 1958 (1987) 7.5 minute Frisco, Colorado 1970 (1987) 7.5 minute Dillon, Colorado 1970 (1987) 7.5 minute
UTM:	13/418860/4384180 (Beginning point at headgate) 13/411020/4387580 (Ending point)
Date of Construction:	1899
Present Owner:	U.S.D.A. Forest Service, Arapahoe-Roosevelt National Forest, 240 W. Prospect Rd., Ft. Collins, CO 80526 Summit County, P.O. Box 68, Breckenridge, CO 80424 Various private landowners
Present Use:	None; abandoned ditch
Significance:	The ditch was used to supply water to the Oro Grande Placer Mining Company's large placer gold mining operation on the Blue River near Dillon from 1899 to 1904. The company used a hydraulic elevator system for mining the placer deposits. From 1909 to 1927 the ditch supplied water to a hydroelectric power plant operated by the Summit County Power Company, which supplied electricity to the towns of Dillon and Breckenridge and to the surrounding mining area.
Historian:	Jonathon C. Horn, Alpine Archaeological Consultants, Inc., November 1994.

II. HISTORY

A. GENERAL

The Snake River Ditch, a portion of which was later known as the Oro Grande Canal No. 1, was constructed by the Oro Grande Placer Mining Company to supply water for placer gold mining along the Blue River northwest of the town of Dillon, Colorado. The present town of Dillon is in a new location as the original townsite, one mile to the south, was inundated by the waters of Dillon Reservoir in the 1960s. The Oro Grande Placer Mining Company and their sister company, the Gold Pan Mining Company of nearby Breckenridge, Colorado, were pioneers of large-scale and systematic placer mining of the Blue River drainage. Although placer gold deposits had been mined in the area over the previous 30 years, the massive, low-lying placer deposits along the Blue River had only been worked to a minimal degree. In 1899, nearly all of the placer deposits were acquired by large mining companies, and more recent technology was put to work in the form of hydraulic elevators and dredges.[1] One of these large companies was the Oro Grande Placer Mining Company. The company was organized in 1897 and owned 2,000 acres of claims along a 2-mile stretch of the Blue River. The main operations of the company were centered on placer gold mining using a hydraulic elevator system along the Blue River below the town of Dillon (Lakes 1903:242).[2]

Mining in the area was a seasonal venture, and one that was dependent upon sufficient water to be successful. The Snake River Ditch was the main source of water for the mining operation. It took water from the Snake River and transported it 10.7 miles to a point where the water was placed in a pipe. The pipe then ran about 0.75 mile down a steep slope to the mining operation on the Dillon (Anna) Placer where the water was delivered under about 400 feet of head. The water was used to operate up to three hydraulic elevators, several giants (i.e., hydraulic nozzles used to wash gravel and soil to the elevators), gold separating flumes, and an electrical power plant. The operation recovered 30¢ of gold per cubic yard of gravel washed.

---

[1]Charles W. Henderson, *Mining in Colorado: A History of Discovery, Development and Production.* U.S. Geological Survey, Professional Paper 138. (Washington, Government Printing Office, 1926), p. 242.

[2]Arthur Lakes, Summit County Placers. *Mines and Minerals: A Mining and Metallurgical Journal* 23(6), January 1903, p. 242.

In about 1902, the mining operation was apparently moved about 1½ miles upstream to the Arctic Placer. It was at that time that the water system seems to have been reconfigured somewhat, and the Snake River Ditch portion of the system renamed the Oro Grande Canal No. 1. The length of the canal was shortened to 7.3 miles and the water fed into a pipe at the present Dillon Water Treatment Plant. After attempting to improve the efficiency of the operation, the company failed in 1904. In 1908, the water delivery system of the Oro Grande Placer Mining Company was acquired by the Summit County Power Company. A new power plant erected at the terminus of the pipeline provided electricity to the surrounding communities until 1927.

B. CONSTRUCTION CHRONOLOGY

The route of the Snake River Ditch was filed by W. H. Foster on April 17, 1899, presumably upon completion of surveying the route.[3] At the same time, the Straight Creek Ditch was filed upon (Summit County Courthouse, County Clerk's Office, Pre Emption Book 14, Page 48).[4] The Snake River Ditch crossed Straight Creek, and the water from Straight Creek was added to the Snake River Ditch by diverting it above the ditch crossing into the Straight Creek Ditch and joining the two ditches almost immediately below the diversion. In fact, it appears that the Snake River Ditch and the Straight Creek Ditch may have been one and the same from the point of the diversion on Straight Creek. Concurrent with the filing for the ditches, a contract for construction of the Snake River Ditch was made with G. W. Wilson of Denver by W. H. Foster, stockholder in the Oro Grande Placer Mining Company, and engineer John H. Marks.[5] Eighty men and 40 teams were at work excavating the ditch beginning on the Snake River by late May 1899.[6] By August 26, 1899, the placer mining plant and an electric plant were reported to be operational and working night and day, probably from a preliminary water source, possibly Straight Creek, as water had not yet been turned into the Snake River Ditch.[7] By early September, all of the work that could be done with animal power was completed, and the teams of contractor G. W. Wilson were working on another project elsewhere. Work continued on the ditch by digging

---

[3]Summit County Courthouse, County Clerk's Office, Pre Emption Book 14, Page 48.

[4]*Ibid.*

[5]*Summit County Journal* 16(40), May 6, 1899, p. 1; 16(43), May 27, 1899, p. 1

[6]*Ibid.*, 16(43), May 27, 1899, p. 1

[7]*Ibid.*, 17(5), August 26, 1899, p. 8

through rock and shale by hand.[8] By September 16, 1899, the ditch was completed and began carrying water to the placer mining plant. It was reported that the water system developed 500 feet of head.[9]

On November 7, 1901, it was reported that several railroad carloads of 52-inch-diameter pipe had been received by the Oro Grande Placer Mining Company,and that the company was working around the clock to install a new pipeline.[10] This new construction seems to have been necessitated by the moving of the placer mining operation to the Arctic Placer in the NE¼ of Section 13, Township 5 South, Range 78 West. It may have been at this time that the configuration of the water system was changed. Water from the Snake River Ditch alone may have been utilized by shortening the ditch to 7.3 miles and terminating it at a pressure box where the water was put into the new pipeline at the present Dillon Water Treatment Plant. As a result, water from Straight Creek was not included in the new system at first. Drought conditions during the summer of 1902 resulted in insufficient water flows to properly operate the mining plant with water from the Snake River alone. To increase the quantity of water, the company began building a new ditch from Straight Creek to the existing pressure box at the end of the Snake River Ditch in July 1902. This ditch was to be 1½ miles long.[11] To further improve delivery of water to the placer plant, the Snake River Ditch was enlarged. Work began in late 1902 and was about half finished by April 18, 1903.[12] With the shortening and enlargement of the Snake River Ditch, its name was apparently changed to the Oro Grande Canal No. 1. The new ditch from Straight Creek was named the Oro Grande Canal No. 2. These names were not formalized until 1907, when the water system was passed to the Summit County Power Company and a plat was filed.[13]

---

[8]*Ibid.*, 17(5), September 2, 1899, p. 8

[9]*Ibid.*, 17(7), September 16, 1899, p. 8

[10]*Mining Reporter* 41(19), November 7, 1901, p. 369.

[11]*Summit County Journal* 22(51), July 12, 1902, p. 1.

[12]*Summit County Journal* 23(9), September 20, 1902, p. 1 and 23(39), April 18, 1903, p. 1.

[13]Summit County Courthouse, County Clerk's Office, Deed Book 92, Pages 244-249; Summit County Power Company, *Map*.

C. MINING BY THE ORO GRANDE PLACER MINING COMPANY

The January 5, 1899 *Mining Reporter* reported that the large placer deposits around the town of Dillon were expected to be developed by the Oro Grande Placer Mining Company. The company was reported to be building an 11-mile-long ditch to carry 4,000 miner's inches of water to their mining claims, where the water would be used to operate one or more Ludlum hydraulic placer mining plants.[14] T. B. Ludlum was the inventor of the Ludlum Hydraulic Rock and Gravel Lifter, a hydraulic lift operated by a 6-inch nozzle requiring 200 feet of head. The lift was manufactured by the Ludlum Hydraulic Mining Machinery Company of Denver.[15] The Oro Grande Placer Mining Company was capitalized with $100,000 by investors from Kansas City, Boston, and New York. In 1899, the Snake River Ditch and a pipeline were constructed to a hydraulic lifting plant on the Blue River. This plant was probably located in Section 1, Township 5 South, Range 78 West, on the Dillon (Anna) Placer at what is presently known as Blue River Ranch Lakes.[16] The water system was engineered to produce 400 feet of head for the operation of Ludlum hydraulic elevators. It was expected that the plant would be operational by September 1, 1899.[17] On June 3, 1899, it was reported that 30 carpenters would be at work the following week constructing flumes, a boarding house, bunkhouse and other buildings at the mining plant.[18] George E. West, secretary of a large biscuit company in Chicago, and F. R. Blount, owner and president of a large salt company in New York, were the managers of both the Gold Pan Mining Company and the Oro Grande Placer Mining Company;[19] John H. Marks was the engineer in charge.[20] An electrical plant was installed at the mining plant by A. E. Canedy.[21] The electrical plant was

---

[14]*Mining Reporter* 39(1), January 5, 1899, p. 15.

[15]*Ibid.*, 39(5), February 2, 1899, p. 17.

[16]Summit County Courthouse, County Clerk's Office Deed Book 79, Pages 518-520, and 551.

[17]*Summit County Journal* 16(43), May 27, 1899, p. 1.

[18]*Ibid.*, 16(44), June 3, 1899, p. 1.

[19]*Denver Times* October 19, 1899, p. 11, c. 3.

[20]*Summit County Journal* 16(43), May 27, 1899, p. 1.

[21]*Ibid.*, 17(5), August 26, 1899, p. 8.

important for providing lights so that mining could proceed night and day. With the water system operational in the middle of September 1899, the Ludlum elevators began digging down to bedrock.[22]

Before the placer mining plant was operational, W. H. Foster, a local investor instrumental in the construction of the Snake River Ditch and acquisition of mining property for the company, disposed of his stock in the Oro Grande Placer Mining Company at a good price.[23] Flush with the excitement of having the plant working and preliminary indications that the placer deposits became richer with depth, West and Blount began purchasing numerous mining claims in the vicinity. In all, they purchased about 3,000 acres of mining claims from September to November 1899. To purchase the claims, they offered part cash and part stock. Between 1,300 and 1,500 acres of the newly acquired claims were near Breckenridge and were to be mined by the Gold Pan Mining Company.[24] Management of the Oro Grande Placer Mining Company was apparently quick to use new, proven technology when it became available. This was demonstrated by their purchase of two placer testing drills for use on their placer holdings.[25]

On January 25, 1900, it was reported that the Oro Grande Placer Mining Company was planning to install another placer plant at their holdings near Dillon.[26] By April 1901, they were operating several giants, two hydraulic elevators, and were recovering 30¢ of gold per yard of gravel.[27]

George H. Evans had become consulting engineer and manager of the Oro Grande Placer Mining Company and the Gold Pan Mining Company operations by 1902. Evans was the inventor of the Evans hydraulic elevator, a more efficient variation of the Ludlum hydraulic

---

[22]*Ibid.*, 17(8), September 23, 1899 p. 8 and 17(10), October 7, 1899, p. 8; *Mining Reporter* 40(24):357.

[23]*Summit County Journal* 17(2), August 12, 1899, p. 1.

[24]*Ibid.*, 17(12), October 21, 1899, p. 1.

[25]*Ibid.*, 17(13), October 28, 1899, p. 1.

[26]*Mining Reporter* 41(4), January 25, 1900, p. 52.

[27]*Denver Times* April 1, 1901, p. 9, c. 3.

elevator.[28] In 1896, Evans was the general manager of the Golden Feather Mines in Butte County, California, where several of his elevators were in use.[29] Employment of Evans at the Oro Grande and Gold Pan plants and replacement of the Ludlum hydraulic elevators with Evans hydraulic elevators may have been an attempt by the company owners to make their operations more economical. Both the Oro Grande and Gold Pan operations were identically equipped,[30] the only difference being a greater lift required of the elevators at the Oro Grande plant. Under the oversight of Evans, the Oro Grande Placer Mining Company may have begun mining at a location about a mile upstream of their initial operation in the NE¼ of Section 13, Township 5 South, Range 78 West on the Arctic Placer. The Snake River Ditch was shortened to 7.3 miles and run into a new 52-inch pipeline that ran 1.5 miles to the mining plant. Drought conditions during the summer of 1902 resulted in insufficient water from the Snake River Ditch alone to run the mining plant, apparently causing it to cease operating for a time.[31] In July 1902, the company began building a new 1.5-mile-long ditch from Straight Creek to the existing pressure box at the end of the Snake River Ditch to provide additional water.[32] It was expected that the water from Straight Creek would provide enough water for the plant to resume operations.[33]

On July 24, 1902, it was reported that the mining pit of the Oro Grande Placer Mining Company was 60 feet deep.[34] By May 25, 1903, a third elevator had been installed for removal of seepage water from the mining pit. The other two elevators were reportedly hoisting gravel to the elevated flumes around the clock. The pit was reportedly within 6 feet of bedrock with one elevator lifting rock 92 feet and the other lifting rock 93

---

[28]Lakes, p. 243.

[29]Anonymous, "An Advance in Gravel Mining." *Mining and Scientific Press and Pacificf Electrical Review* 73(13), September 26, 1896, p. 253.

[30]*Mining Reporter* 46(1), July 3, 1902, p. 16.

[31]*Denver Times* September 12, 1902, p. 11, c. 5; *Summit County Journal* 23(5), August 23, 1902, p. 1.

[32]*Summit County Journal* 22(51), July 12, 1902, p. 1.

[33]*Denver Times* September 12, 1902, p. 11, c. 5; *Summit County Journal* 23(5), August 23, 1902, p. 1.

[34]*Mining Reporter* 46(4), July 24, 1902, p. 76.

feet.[35] A description of the operation in 1903 indicates that Evans hydraulic elevators were lifting sand, gravel, and boulders not over 8 inches in diameter 100 feet from the mining pit to sluice boxes above the pit, using 175 pounds of pressure per square inch at the elevator nozzles. The average depth of the gravel to bedrock was 75 to 80 feet. Boulders too large to be sucked upward by the elevator were removed from the pit by a stone boat operated on a suspended cable over the pit. The sluice boxes were equipped with Evans patent riffles, beneath which were placed Cocoa matting and canvas sheeting to save the finest gold. Tailings were washed into the river below the operation. Under the top of the sluice boxes above the upraised elevator pipe was a thick plate of the hardest manganese steel for the water, sand, and boulders to strike against. On average, 30¢ of gold per cubic yard of material washed was recovered.[36]

On July 2, 1903, one of the Oro Grande Placer Mining Company's hydraulic elevators caved in, killing workman Cyrus Ruth and injuring another workman. The bank under the No. 3 elevator flume platform gave way and fell into the mining pit, causing the flume and pipe conducting water to the elevator to break. The pit filledwith water, covering the men, who could not get out. Both of the other mining elevators were inoperable as a result of the accident.[37] By July 18, the No. 1 elevator had been dug out from the recent cave-in, and sufficient water was then available to run the three elevators and giant.[38]

By the end of the 1903 mining season, the management of the Oro Grande Placer Mining Company seem to have realized that the placer operations were not sufficiently profitable to continue mining. In order to transfer assets to the Gold Pan Engineering and Mine Supply Company, owned by the same individuals, an Attachment Suit was filed against the Oro Grande Placer Mining Company by the Gold Pan Engineering and Mine Supply Company for $7,431 to cover materials, supplies and labor.[39]

---

[35]*Ibid.*, 47(26), May 25, 1902, p. 593; *Summit County Journal* 23(46), June 27, 1903, p. 1.

[36]Lakes, pp. 242-243.

[37]*Mining Reporter* 48(1), July 9, 1903, p. 39; *Summit County Journal* 23(50), July 4, 1903, p. 1.

[38]*Summit County Journal* 23(52), July 18, 1903, p. 1; Mining Reporter 48(5), July 30, 1903, p. 104.

[39]*Summit County Journal* 24(17), November 14, 1903, p. 5.

W. H. Foster and a group of 25 men worked in the spring of 1904 to get the placer plant ready for the mining season. This work mostly seems to have been clearing the Snake River and Straight Creek ditches of ice. A new general manager by the name of Griffin was also expected to take over operation of the placer plant.[40] Griffin apparently did not work out, and it was reported that a series of unfortunate events had made operation of the placer plant difficult. As a result, George H. Evans, manager of the Gold Pan operation at Breckenridge, was in temporary charge until W. E. Thorne arrived in mid-June.[41] In the meantime, some of the assets of the company continued to be liquidated.[42]

The 1904 mining season was the last one that the Oro Grande Placer Mining Company was in operation. It was reported that the company had spent $300,000 in equipment and improvements, but had not made money as expected. The company west bankrupt before it shut down and its creditors went to court to try to recoup their losses. Several Certificates of Sale were offered by the Sheriff of Summit County. All were purchased by W. H. Foster, who was then issued Sheriff's Deeds. As a result, Foster became the sole owner of the entire holdings of the former Oro Grande Placer Mining Company. Foster intended to utilize the water system for the generation of hydroelectricity. He estimated the water system could generate 10,000 horsepower.[43] The Dillon town council granted a franchise to Foster to erect power poles through the town in March 1905, but he does not seem to have ever produced any electricity.[44] In June 1907, Foster sold the ditch, pipeline, and power generating equipment formerly owned by the Oro Grande Placer Mining Company to W. B. LeWald, acting on behalf of the newly formed Summit County Power Company. The company planned to use water from the Snake River Ditch and pipeline to generate electricity at a new power plant.[45]

---

[40]*Ibid.*, 24(40), April 23, 1904, p. 1.

[41]*Ibid.*, 24(47), June 11, 1904, p. 1 and 24(48), June 18, 1904, p. 1.

[42]*Ibid.*, 24(47), June 11, 1904, p. 5.

[43]*Ibid.*, 25(31), February 18, 1905, p. 1.

[44]*Ibid.*, 25(35), March 25, 1905, p. 1.

[45]*Ibid.*, 27(49), June 22, 1907, p. 1.

D. HYDRAULIC ELEVATOR TECHNOLOGY

The principal behind hydraulic elevators is that of a siphon or suction using water under pressure. Water is delivered under considerable pressure to a restricted nozzle by placing water in a pipe with several hundred feet of drop with the nozzle at the bottom. The nozzle sprays water upward into an upraised pipe, partly enclosed at the base, with a restricted throat just above the nozzle that acts as a venturi, creating suction. The suction draws water and gravel upward into the upraised pipe through the intake opening near the base of the pipe and propels it upward with the stream of water from the nozzle. Hydraulic elevator technology is considered to be obsolete for modern mining applications.

In conjunction with hydraulic elevators used for mining, hydraulic giants were used to wash gravel to the base of the elevator. Hydraulic giants were simply large nozzles used to direct water in a concentrated stream. Hillsides and banks containing gold-bearing gravels were washed downslope with giants into sluice boxes or sumps where the gravels were picked up by hydraulic elevators. A grizzly (i.e. an iron grate), with openings 1-inch-diameter smaller than the throat of the upraised elevator pipe, kept rock large enough to clog the elevator out of the elevator intake. This was usually placed on the ground sluice leading to the elevator intake.[46]

Hydraulic elevators were used in situations where gravels and bedrock were below the level of drainage. For placer mining, this meant that areas that previously could not be worked easily because the placer deposits were below the level where sluice boxes could be located could be worked by raising the gravels from a pit and transporting them to sluice boxes on higher ground. All that was required was a sufficient quantity of water at an elevation sufficiently above the area to be mined to create the necessary pressure at a nozzle to lift gravel entirely out of the mining pit. The method was considered to be "inefficient and wasteful, but useful where the necessary water is available."[47]

Mining of placer deposits using hydraulic elevators began in California in 1880. The first hydraulic elevator system was installed by the Yreka Creek Gold Mining Company on Yreka Creek in Siskiyou County, California. This was a Cranston patent elevator and elevated gravel 40 feet

---

[46]Robert Peele, editor, *Mining Engineers' Handbook* (New York: John Wiley & Sons, Inc., 1918), p. 790.

[47]. *Ibid.*

with 226 inches of pressure at the nozzle. An elevator was used at McGilvery's on the Trinity River in 1881, and at Oro Fino in Siskiyou County by the Eastlick Brothers. J. H. Martin, a miner from Oroville, California, then obtained a patent on an elevator similar to the Cranston type. The Joshua Hendy Machine Works of San Francisco was the owner of the Cranston patent and obtained the Martin patent. They then improved on both and developed the Hendy hydraulic elevator which was the standard for many years.[48] The first hydraulic elevator in Colorado may have been installed in 1885 near Golden on Clear Creek by J. B. Chaffee and George W. Cummings. This was a 16-inch Hendy hydraulic elevator with 190 feet of head that raised gravel 25 feet.[49]

The Ludlum elevator used first by the Oro Grande Placer Mining Company seems to have had an intake suction hole comprised of the partly open end of the upraised pipe. This relatively unrestricted opening appears to have been fed from above and may have been somewhat irregular in shape.

The Evans hydraulic elevator, used later by the Oro Grande Placer Mining Company, had a main hydraulic suction and two smaller auxiliary suctions on a more enclosed pipe. The two auxiliary suctions were to either side of the main suction and allowed air into the elevator if the main intake became plugged.[50] The elevator could continue to operate with the two auxiliary suctions even with the main suction clogged. The auxiliary suctions could be extended with any size pipe for any distance beyond the elevator to drain low-lying areas. As a result, it was frequently unnecessary to install a separate water elevator to remove excess water from mining pits, as the auxiliary suctions could be used in that capacity. Use of the auxiliary suctions did not interfere with use of the main suction. In addition, water coming in from the two side suctions enabled materials to be drawn more evenly through the main suction. The Evans hydraulic elevator was designed to handle stones up to 18 inches in diameter and had the ability to lift material 15 feet for every 100 feet of head of water. It was also reported that the Evans elevator was 20 to 30 percent more efficient than its predecessors. Another advantage of the Evans elevator was that it was not necessary to sink a shaft to bedrock to place the elevator in position to

---

[48]Anonymous, "The Hydraulic Gravel Elevator." *Mining and Scientific Press and Pacific Electrical Review* 72(14), April 4, 1896, p. 261.

[49]Anonymous, "Working Low Beds of Gravel." *Mining and Scientific Press and pacific Electrical Review* 51(22), November 28, 1885.

[50]Peele, p. 790.

work. The elevator could be used to sink its own pit. It was also relatively lightweight and easily assembled and moved.[51]

In 1904, it was reported that several hydraulic elevator plants had been installed with lifts of 90 to 96 feet, but 50 to 60 feet was considered to be the limit for profitable use of hydraulic elevators. Lifts of 25 to 40 feet were considered the best for a profitable operation. The reason was that the high pressure associated with lifting to great heights resulted in rapid wear of the elevator equipment and necessitated the use of expensive manganese steel.[52] It is likely that many factors were at play in the failure of the Oro Grande Placer Mining Company's operation. The low value of the placer deposits were probably the greatest problem, but the high lift of nearly 100 feet and the cost of equipment were probably factors as well.

E. BRIEF HISTORY OF GOLD MINING TECHNOLOGY IN COLORADO

Although gold may have been detected by earlier travelers to Colorado, it was the discovery of gold by the William Green Russell party in 1858 that stimulated the Colorado Gold Rush of 1859. Beginning in the foothills of the Rocky Mountains west of Denver, prospectors quickly penetrated deeper into the mountains in their search for mineral wealth. Principal areas of early placer mining were on Clear Creek drainage in present Clear Creek and Jefferson Counties; on the upper Arkansas River in present Lake County; along the upper reaches of the South Platte River in present Park County; along the Blue River and its tributaries in present Summit County; and near Hahns Peak in present Routt County. The highly mobile miners moved quickly from one reported discovery to the next in hopes of making a rich strike. By the later 1860s, most of the easily mined placer deposits in the region had been exhausted, and most mining efforts became focused on extracting gold and silver from primary geological formations. This "hard rock" mining required large capitalization to be successful, changing the face of Colorado from one comprised of individual entrepreneurs to a large investment industry. The only new placer deposits of any size discovered after the 1860s were along the San Miguel River in San Miguel County in the 1870s.[53]

---

[51]Anonymous, "Gravel Mining," p. 253.

[52]R. H. Campbell, "Working Low-Lying Gravel Deposits by the Hydraulic Elevator System." *Mining and Scientific Press* 2273-88(7), February 13, 1904, p. 114.

[53]Henderson, pp. 1-8, 31-38, 52-54, 129-130, and 216-245.

Placer mining continued in the state, though it was not a major contributor to the total precious metal output, and a similar change in the scale of mining and the need for capital took place with mining of placer deposits as it had for "hard rock" mining. With the most easily worked and richest placer deposits gone, mining companies were formed and placer claims consolidated. In order to work the placer deposits profitably, new technologies and techniques were used that allowed large quantities of lower grade or more difficult to reach gravel deposits to be processed in the most economical fashion. Placer mining requires large quantities of water for washing ore-bearing soil and gravel in sluice boxes and an economical way to deliver the soil and gravel to the sluice boxes. To satisfy both needs, large hydraulic systems were developed beginning in the middle 1860s to deliver water by ditch, flume, or penstock to mining locations. The most common method used for large-scale placer mining into the 1890s was hydraulic mining. For hydraulic mining, water was delivered by pipe to a mining locale under pressure where it was directed through a nozzle onto hillsides or banks that were washed downslope to sluice boxes that separated and saved the gold. Another method used, particularly in Summit County in the 1870s, was booming. Booming was done by damming a stream and letting the water loose in a torrent intended to flush streambank deposits into sluice boxes below. Hydraulic mining and booming were carried out in situations where gravity could be used to help move soil and gravel with a flow of water. Booming was a short-lived technique of the 1870s, but hydraulic mining continued to be viable in most placer mining locations into the early 1900s. Because of economic conditions, hydraulic mining virtually ceased by the late 1910s.[54]

Enormous pockets of gravels in valley bottoms remained virtually untouched by Colorado miners well into the 1890s because they could not be moved by gravity and required a great deal of effort to dig or lift to a location where the gravels could be washed. Borrowing technology from California, miners in Colorado began experimenting with mining low-lying gravels. One of the most promising methods was lifting gravels to sluice boxes located above the placer deposits using hydraulic elevators. The first hydraulic elevator installed in Colorado was in 1885 on Clear Creek near Golden by J. B. Chaffee and George W. Cummings.[55] As the elevators became more efficient, larger-scale endeavors using hydraulic elevators were undertaken, culminating in the Oro Grande Placer Mining Company's operation near Dillon and the Gold Pan Mining Company's operation near Breckenridge, both in Summit County, beginning in the late 1890s. Both of these large hydraulic elevator plants required extensive and expensive

---

[54]*Ibid.*, pp. 186-196 and 227-245

[55]Anonymous, "Low Beds of Gravel."

water supply systems. Neither recouped the high costs of construction, equipment, and operation because of the relatively low values of the placer deposits worked.

A more profitable method of working low-lying gravels – dredging – was first attempted in Colorado in Summit County in 1898. Again, this technology was borrowed from California. It is likely that dredges completely put an end to experimenting with hydraulic elevators. It was not until 1907, however, that boat dredges were introduced, making the process even more economical. Extensive dredging took place on the Blue River and Tenmile Creek in Summit County through the 1920s. Between 1915 and 1920, dredging took place in Lake County on the upper Arkansas River below Leadville. Dredging began on the upper reaches of the South Platte River in Park County near Alma and Fairplay in 1919 and continued to be very profitable through the 1920s.[56]

F. SUMMIT COUNTY POWER COMPANY

The Summit County Power Company was formed by several prominent officials of the Denver Gas and Electric Company. It was an independent company set up to fulfill the needs of Summit County and the surrounding mining country that had been overlooked by the large power companies of the state. The founders were Henry L. Doherty, Chairman of the Board (President of the Denver Gas and Electric Co.); William J. Barker, President (President of Northern Colorado Gas Co. and Vice-President, General Manager, and General Superintendent of the Denver Gas & Electric Co.); W. C. Sterne, Vice-President and General Manager (General Manager of the Arapahoe Light & Power Co.); Frank W. Freuauff, Treasurer (Vice-President of the Denver Gas & Electric Co.); John T. Brady, Assistant Treasurer (Treasurer of the Denver Gas & Electric Co.); C. N. Stannard, Secretary (Secretary of the Denver Gas & Electric Co.); George S. Pearson, Assistant Secretary; Norman G. Kenana, Director (President of Union Gas & Electric Co.); Emile Maertens, Director (President of the Connecticut Power Co.); and Senator R. J. Bardwell, Director. The company was incorporated for $500,000 on July 31, 1907.[57]

In early August 1908, the company reported that they would be ready to supply power to the Breckenridge area by September 1, 1908. A

---

[56]Henderson, pp. 34, 36-37, 43, 176, 196, and 245.

[57]*Summit County Journal* 28(9), September 14, 1907, p. 1 and 29(2), August 1, 1908:1; Colorado State Archives, Summit County Power Company, Articles of Incorporation Book 128, Page 48.

concrete powerhouse with a concrete roof was being built by the Carstarphen Construction Company. The existing pipeline with a 500-foot drop was connected to the powerhouse by 24-inch-diameter steel pipelines where water wheels were under construction. Work on the ditches, flumes, headgates, dams, and sand boxes had all been completed. Transmission lines from Dillon to the Argentine and Montezuma Mining Districts were underway, and preparations were being made to construct a line to Breckenridge.[58] The power plant was located at the terminus of the pipeline on the grounds of the old Oro Grande Placer Mining Company plant. This was on 7½ acres of land on the Blue River, 1 mile from the town of Dillon in the NE¼ of the NE¼ of Section 13, T5S, R78W on the Arctic Placer. The 1909 Annual Report for the company reported that the power plant had a 1,000 kW capacity and included generators, water wheels, transformers, and switchboards. Electricity was being provided to the mining camps of Argentine, Montezuma, Breckenridge, Dillon, and up French Gulch near Breckenridge. In addition to the generating equipment there were two dwelling houses, a store, and a storehouse at the power plant.[59]

In 1918, the Summit County Power Company had a total electrical development of 1,600 Horsepower.[60] Public Service Company of Colorado, who had a substation at Dillon, purchased about 1,000 kw of hydroelectricity from the Summit County Power Company in 1926;[61] this was likely the plant's entire output. Public Service Company seems to have first arrived in Dillon in 1925 or 1926. The Summit County Power Company continued to appear in the Colorado State Business Directories through 1928. Annual reports for the company were filed through 1928. The 1928 annual report indicates that the corporation ceased to exist on July 31, 1927.[62] The power plant was never purchased by the Public Service Company of

---

[58]*Summit County Journal* 29(2), August 1, 1908:1.

[59]Colorado State Archives, Corporate Annual Reports, Summit County Power Co., Annual Report No. 16419.

[60]Wilbur Fisk Stone, editor, *History of Colorado* (Chicago: The S. J. Clarke Publishing Co., 1918), p. 324.

[61]Public Service Company of Colorado, *Report on the Public Service Company of Colorado in Connection with the Proposed Franchise for the Supplying of Electricity and Gas to the City and County of Denver* (Denver: Public Service Company of Colorado, 1926), p. 14.

[62]Colorado State Archives, Corporate Annual Reports, Summit County Power Co., Annual Reports No. 134836 and 142753.

Colorado, so was probably abandoned in 1927. After 20 years of service, it is likely that the power plant was outdated and probably in need of repair or upgrading making it uneconomical to continue its operation.

III. ARCHITECTURAL INFORMATION

A. PHYSICAL DESCRIPTION

The Snake River Ditch originally measured 10.7 miles from its headgate on the Snake River near Keystone, Colorado, to the point where it was put into a pipe for use by the Oro Grande Placer Mining Company at their mining plant on the Dillon (Anna) Placer on the Blue River, about 2 miles north of the town of Dillon. The ditch was planned to be 10 feet wide and 5 feet deep with a capacity of 4,000 to 5,000 miner's inches of water.[63] In 1902, the ditch was shortened to 7.3 miles, terminating at a pressure box at the head of a new pipeline leading to the new location of mining operations on the Arctic Placer 1 mile west of Dillon. The pressure box was located at the present Dillon Water Treatment Plant. When the Snake River Ditch was replatted as the Oro Grande Canal No. 1, in 1907, it was 11 feet wide at the top, 5 feet wide at the bottom and had a depth of 3 feet. It had a grade of 10.56 feet per mile and a carrying capacity of 100 cubic feet of water per second.[64]

The headgate for the Snake River Ditch is on the north bank of the Snake River. The Snake River runs northeast to southwest past the headgate, and the north bank is reinforced by a levee constructed of logs and boards for 50 feet upstream of the headgate. The reinforcement of the bank appears to have extended another 100 feet upstream, but has washed out to a great extent; only occasional remnants are present. The bank reinforcement was a log framework 4 feet wide that was filled with earth and stone. Vertical boards were nailed to the outside facing the stream; only two remain in place. The bank reinforcement was originally about 4 feet tall, but is presently only 2½ feet tall.

A wooden diversion dam stretches across the river. The diversion dam is about 50 feet long, 2 to 2½ feet tall, and 5 feet wide at the crest. It is constructed of wooden boards nailed to a log framework. The sides of the dam angle inward from a wide base to the crest of the dam, which is flat. Most of the boards on the downstream side of the dam are now

---

[63]Summit County Courthouse, County Clerk's Office, Deed Book 79, Pages 149-167; Pre Emption Book 14, Page 48.

[64]Summit County Power Company, *Map*.

missing. Poles nailed on log stringers extend downstream from the dam to prevent undercutting of the dam from water cascading over the front. A 6-foot-wide spillway opening is present on the north end of the dam, about 7 feet from the headgate. The sides and bottom of the spillway are of boards, and the opening apparently held flashboards or a gate to regulate the water level behind the dam.

The headgate is a 5½-foot-square, 40-foot-long, three-sided wooden flume with wooden supports across the top. It is built of horizontal 2x10-inch planks covered with 1x4-inch boards nailed and bolted to upright 4x6-inch treated posts. The gate was a vertical lift type operated by a hand, side crank windlass with a cable. The gate is no longer present, but the windlass is still in place. The windlass is an iron pipe with a welded iron pipe cross handle on the west side. An 8-foot-long wing wall was built on the north end of the dam from the downstream (west) side of the headgate. The wing wall angles into the river and evidently helped direct water into the ditch through the headgate.

From the headgate, the route of the canal can be partly discerned for about 400 feet through a series of beaver ponds on the southeast side of the road into the Keystone Ski Area. The canal has then been obliterated for about 1,900 feet northwest to the north side of Highway 6. For 2,100 feet, the canal is present, but in poor condition immediately adjacent to the north side of Highway 6 heading in a west-southwesterly direction, gradually turning west-northwest. After bending away from the highway, the canal has been obliterated by relatively recent construction for about 2,700 feet. The canal then reappears heading in a west-southwesterly direction and is in good condition just north of a condominium development. After crossing into the development, the canal is no longer evident for about 4,200 feet. The canal then heads in a west-southwesterly direction and is in good condition. Much of the canal in this area is on a rather steep south slope. To prevent the canal from breaching the earthen bank, a wooden wall was built on the downhill side of the canal for much of its length. The wall was made of 2x8-inch horizontal planks, 12 feet long, nailed to 5- to 8-foot-tall log posts set 6 feet apart within the canal. The walls were braced by poles that extended from the top of the walls to the hillside to the north. Most of the board walls are in poor condition, and it is likely that the planks were removed for reuse elsewhere after the canal ceased carrying water. In one place, near the west end of the segment, the canal appears to have broken through the downhill bank. The breach was repaired with log cribbing filled with earth and rock. The canal then merges with the road leading into the Summit County Landfill and is obliterated for 2,600 feet.

After departing the road, the canal heads westward, then northwestward for 1,900 feet. This segment of the canal is in good condition. At the northern end of the segment, the canal heads into a small, steep drainage which seems to have created some engineering problems. Before heading into the drainage, the canal was placed in a square flume to help negotiate the curve leading into the drainage. Because the crossing of the drainage by the canal has been obliterated by fill from the Summit County Landfill, it is not known if the canal crossed the drainage in a flume, but it is likely that it did. This crossing of the drainage must not have been entirely satisfactory, however, because there is evidence that another route across the drainage was built. This was in a square flume that crossed the gulch caused by the drainage on a trestle. A Y in the flume box routes is evident on the east side of the gulch, and trestle remnants are present crossing the gulch in a northwesterly direction. The trestle remnants are large logs with twisted bridge spikes. Only the bottom portion of the flume is present in the canal on the east side of the gulch. This is constructed of 1x8-inch boards nailed crosswise on parallel stringers set on log footers. Also present at this location are two sets of concrete abutments where gates may have been placed across the canal. The name "A. P. Cribari" and date "9/20/39" inscribed in the northern abutment suggest modification of the canal after it ceased to be used for the operation of the Summit County Power Company's power plant in 1927. The canal may have been tapped to irrigate nearby pastureland, probably at a reduced flow or using water from the surrounding slopes, and the gates may have prevented water from spilling out of the canal at the old trestle crossing.

Before crossing the drainage north of the trestle location, the canal is covered by fill from the Summit County Landfill. It emerges again after about 400 feet, heading in a westerly direction for about 400 feet before it is again covered by the landfill. After about 1,000 feet, the canal reemerges heading northwest. About 900 feet of the canal is present in good condition heading around a prominent rocky point. The canal in this section was dug into Mancos shale bedrock. Before the canal rounds the prominent point, there is a breach in the outer canal bank that resulted in a deep gully being washed out of the steep southeast-facing slope. Two sets of concrete abutments are present on either side of the washed out area. These are very similar to the abutments at the trestle location described above and may have also been installed by the same individual at the same time to prevent water from exiting through the break in the canal bank.

After passing around the prominent point, the canal heads east. Remnants of a square flume are present in this section. After about 400 feet, the canal is again covered by landfill debris for about 500 feet. At the eastern end of this segment, below the canal, are the remains of a small sawmill. The superstructure of the sawmill is no longer present, but the

foundation is evident as a 10 by 32 foot rectangular arrangement of logs oriented north to south. Numerous twisted bridge spikes and large wire nails are present in the logs. The southern portion of the structure location is in a 20 by 30 foot (east-west axis) deep accumulation of sawdust. It is likely that the sawmill was used to cut lumber for use in building flumes and bank reinforcement walls for the canal.

The canal reemerges from the landfill debris a short distance beyond the sawmill location. It heads in a generally northwesterly direction, winding along the contours of hillsides and drainages. A large amount of wood debris in the canal suggests the presence of a square flume for a considerable distance. The canal is in generally good condition except where it is crossed twice by dirt roads in the vicinity of the Dillon Cemetery. Beginning just north of the Dillon Cemetery, the canal is followed by a dirt road on its uphill side for about 1.7 miles. After about 1.3 miles, there is a 150-foot-long section of canal dug into the hillside, adjacent to which are the remains of an earlier section of the canal that was in a flume on a trestle. The flume and trestle have been largely obliterated by having been pushed into an adjacent ravine and covered with earth from later construction of the canal into the hillslope. There are virtually no intact elements of the flume remaining, but some posts and beams can be seen, and some stone footings are evident. About 800 feet farther northwest, the canal swings southwestward around a prominent ridge. This is the route shown on the 1907 plat of the Oro Grande Canal No. 1, but does not appear to have been the original route of the Snake River Ditch. The original route seems to have been a 500-foot-long tunnel through the narrow ridge.

The entrance portal to the tunnel is presently evident as a slumped area on the slope just northwest of the present canal. The old canal route is partly visible as a flume box made of treated 4x6-inch upright posts with 2x12-inch plank sides over which are nailed 1x4-inch boards leading to the slumped tunnel entrance. The exit portal of the tunnel is mostly covered with earth, but has a small opening at the top. The route of the canal around the ridge appears to have been modified to flow in the opposite direction of its original course. The modified section is from a point about 300 feet northwest of the tunnel exit around the ridge and back to the point where the canal diverges from the original ditch route toward the tunnel. At the junction of the canal and ditch route are sets of cement abutments for gates to divert water, possibly into a flume box, to irrigate the hillslope below. The main canal has also been blocked at this point to divert water onto the slope. The initials "C.A.P." and date "7.8.53" on one of the abutments suggest that the modifications of the canal took place in 1953. Water diverted from the canal from both directions was apparently

collected from the nearby hillsides and indicates that the canal was minimally functioning at that time.

About 2,000 feet from the tunnel exit, the canal turns abruptly north from its westward course on the edge of a rather steep hillslope. In order to prevent the canal from washing out at this point, uncoursed, angular quartzite blocks were laid on the canal side of the outside canal bank. The rockwork is 200 feet long and 4 feet high. Remnants of sawn lumber suggest that a plank wall may have covered the wall as well.

After the rockwork, the canal continues northward for another 1,200 feet into the grounds of the Dillon Water Treatment Plant. Construction of the Dillon Water Treatment Plant obliterated the location of the junction of the canal with the Oro Grande Canal No. 2 and the pressure box for the pipeline. The Route of the Oro Grande Canal No. 2 is still visible for much of its length below the road that leads northeastward from the Water Treatment Plant to a diversion structure on Straight Creek. The route of the original Snake River Ditch beyond the Water Treatment Plant is shown almost in its entirety on the Dillon, Colorado (1970; revised 1987) 7.5 minute U.S.G.S. quadrangle, but its location and condition was not verified as part of this documentation.

IV. REFERENCES CITED

A. PRIMARY AND UNPUBLISHED SOURCES

Denver Times, 19 October 1899; 1 April 1901; 12 September 1902.

Mining Reporter, 5 January, 2 February, 14 December 1899; 25 January, 1900; 7 November 1901; 25 May, 3, 24 July 1902; 9, 30 July 1903.

Public Service Company of Colorado. "Report on the Public Service Company of Colorado in Connection with the Proposed Franchise for the Supplying of Electricity and Gas to the City and County of Denver." Denver: Public Service Company of Colorado, 1926.

Summit County Journal (Breckenridge, Colorado). 6, 27 May, 3 June, 12, 26 August, 2, 16, 23 September, 7, 21, 28 October 1899; 12 July, 23 August, 20 September, 1902; 18 April, 27 June, 4, 18 July, 14 November 1903; 23 April, 11, 18 June, 1904; 18 February, 25 March 1905; 22 June, 14 September 1907; 1 August 1908.

Summit County Power Company. "Map of the Oro Grande No. 1 Canal, Oro Grande No. 2 Canal, and Oro Grande Pipe Line, Summit County, Colorado, August 22, 1907." (Summit County Historical Society Map No. 523.) Dillon, Colorado: Summit County Power Company, 1907.

_____. Articles of Incorporation, July 31, 1907. Articles of Incorporation Book 128, Page 48. Colorado State Archives, Denver.

_____. Annual Report, March 23, 1908, Annual Report No. 14144. Colorado State Archives, Denver.

_____. Annual Report, March 4, 1909, Annual Report No. 16419. Colorado State Archives, Denver.

_____. Annual Report, February 19, 1927, Annual Report No. 134836. Colorado State Archives, Denver.

_____. Annual Report, February 24, 1928, Annual Report No. 142753. Colorado State Archives, Denver.

B. SECONDARY SOURCES

Anonymous. "Working Low Beds of Gravel." *Mining and Scientific Press and Pacific Electrical Review* 51(22). 28 November 1885.

_____. "The Hydraulic Gravel Elevator." *Mining and Scientific Press and Pacific Electrical Review* 72(14):261 and 265. 4 April 1896.

_____. "An Advance in Gravel Mining." *Mining and Scientific Press and Pacific Electrical Review* 73(13):253 and 256. 26 September 1896. On file at the Colorado School of Mines, Golden.

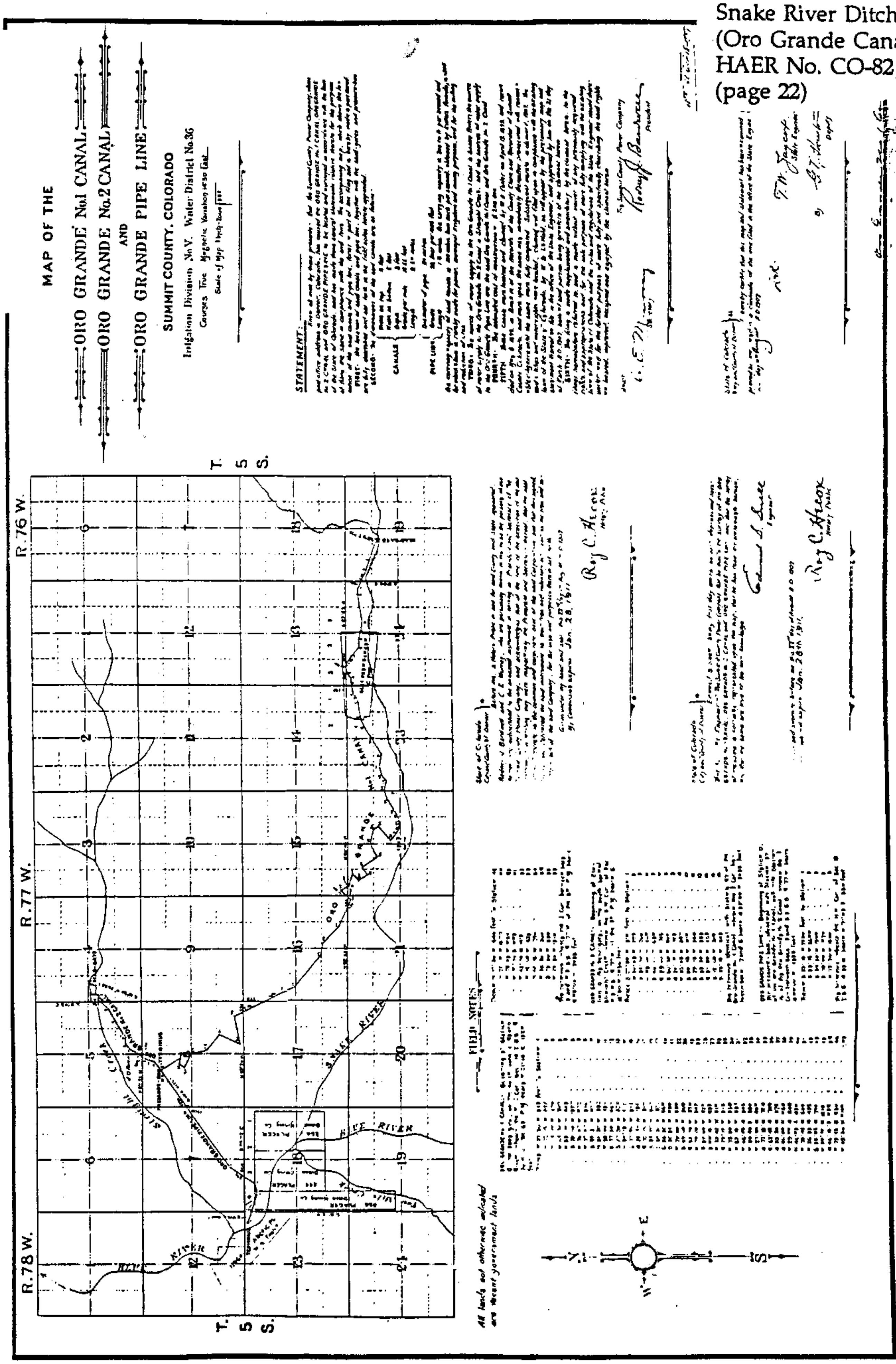
Campbell, R. H. "Working Low-Lying Gravel Deposits by the Hydraulic Elevator System." *Mining and Scientific Press* 2273-88(7):114. 13 February 1904.

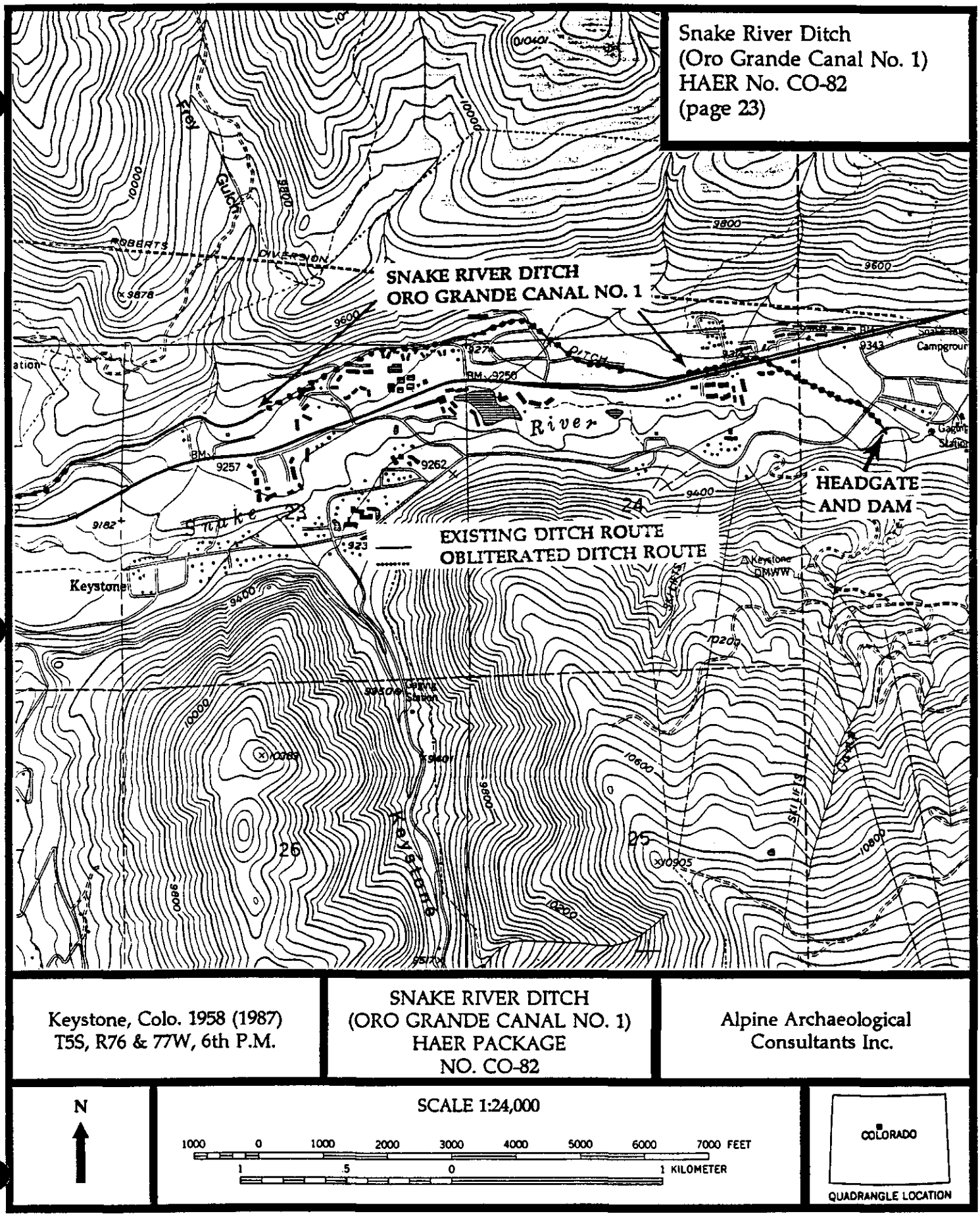
Henderson, Charles W. *Mining in Colorado: A History of Discovery, Development and Production.* U.S. Geological Survey, Professional Paper 138. Washington: Government Printing Office, 1926.

Lakes, Arthur. "Summit County Placers." *Mines and Minerals: A Mining and Metallurgical Journal* 23(6):241-244. January 1903.

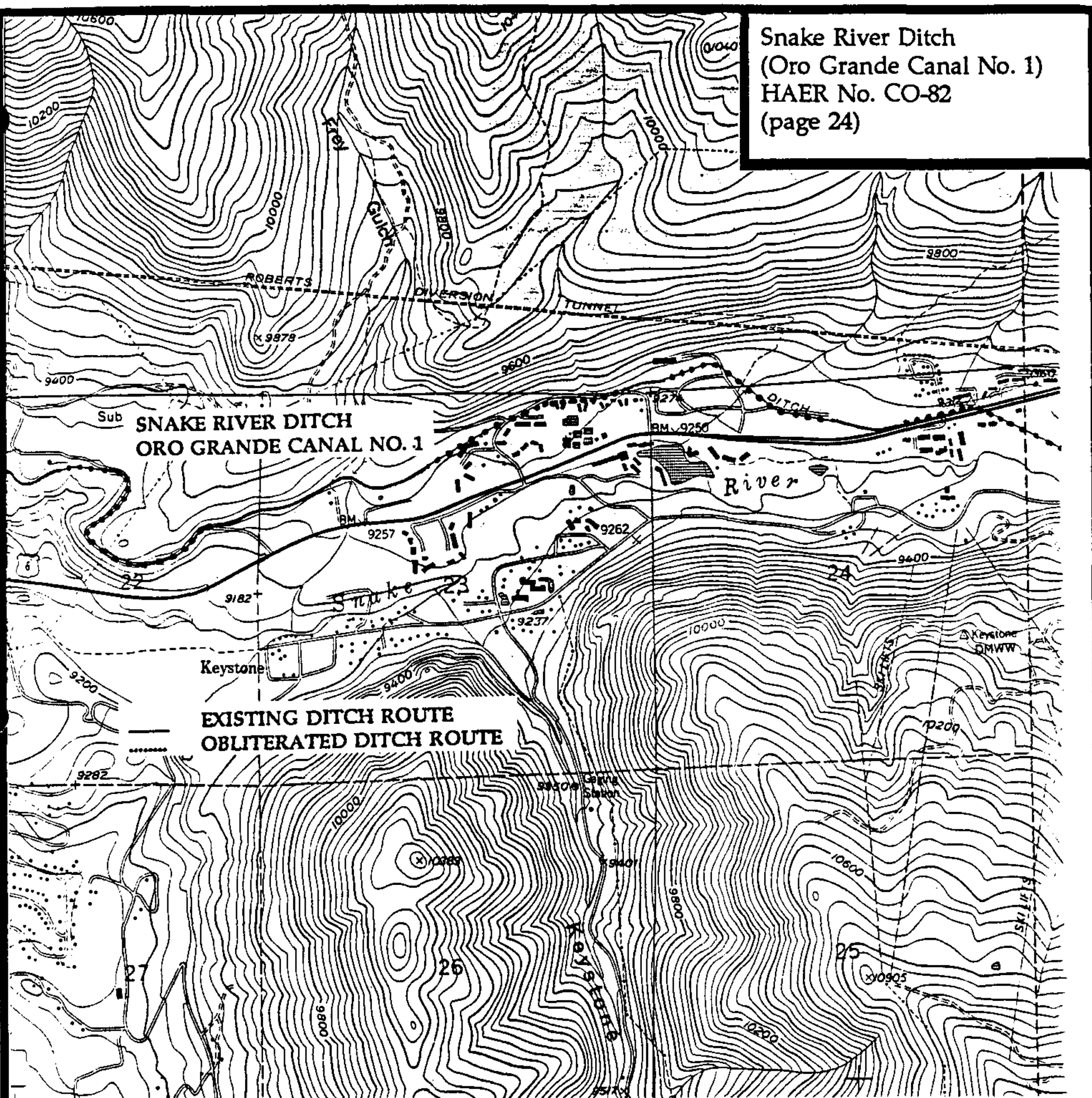
Peele, Robert, editor. *Mining Engineers' Handbook.* New York: John Wiley & Sons, Inc., 1918

Stone, Wilbur Fisk, editor. *History of Colorado.* Chicago: The S. J. Clarke Publishing Co., 1918


MAP OF THE
ORO GRANDE No.1 CANAL
ORO GRANDE No.2 CANAL
AND
ORO GRANDE PIPE LINE
SUMMIT COUNTY, COLORADO
Irrigation Division No.V. Water District No.36
STATEMENT
FIELD NOTES
R.76 W.
R.77 W.
R.78 W.
T. 5 S.
BLUE RIVER
SNAKE RIVER
All lands not otherwise indicated are vacant government lands



Route of the Snake River Ditch (Oro Grande Canal No. 1).



Keystone, Colo. 1958 (1987) T5S, R77W, 6th P.M.	SNAKE RIVER DITCH (ORO GRANDE CANAL NO. 1) HAER PACKAGE NO. CO-82	Alpine Archaeological Consultants Inc.

N

SCALE 1:24,000

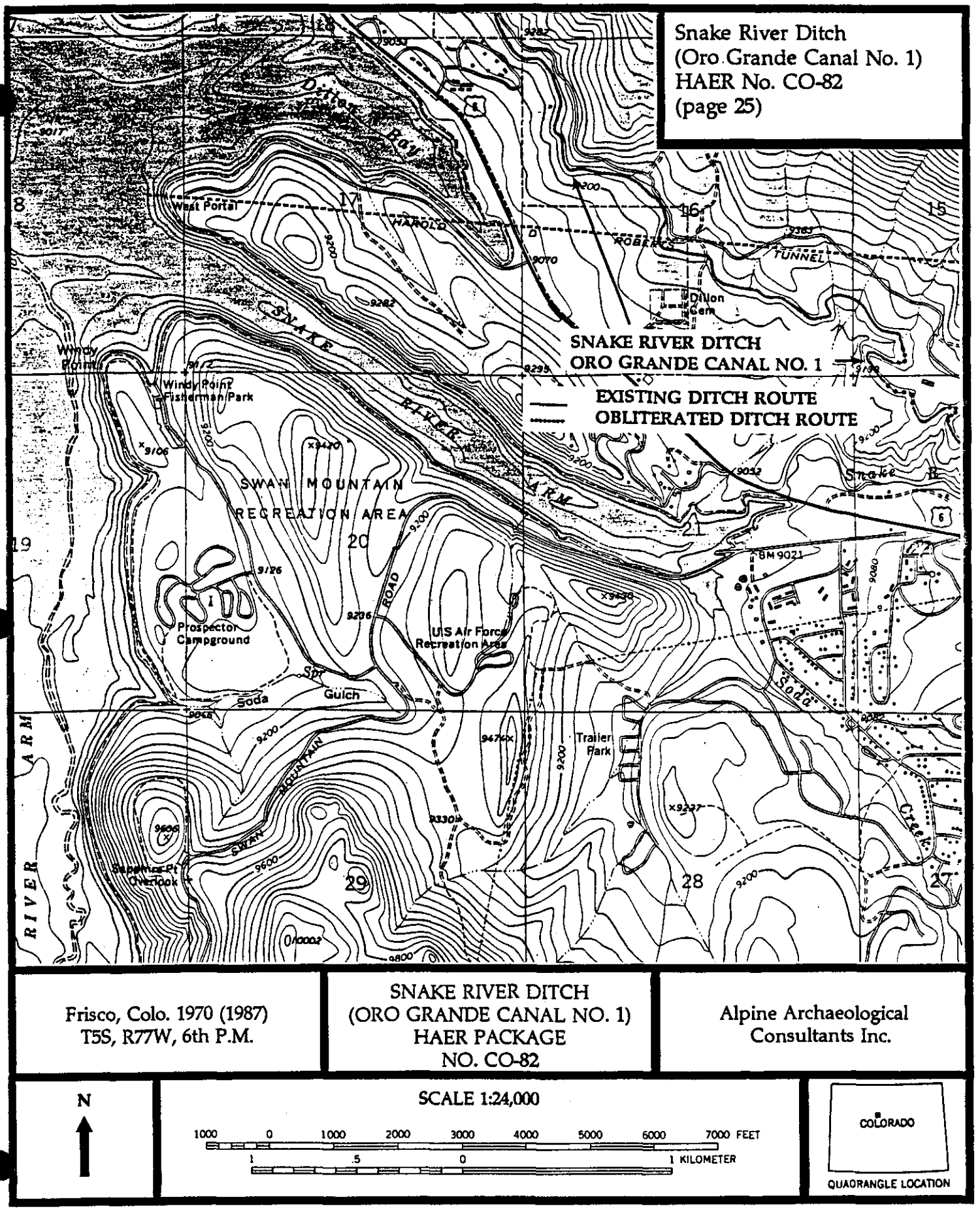
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

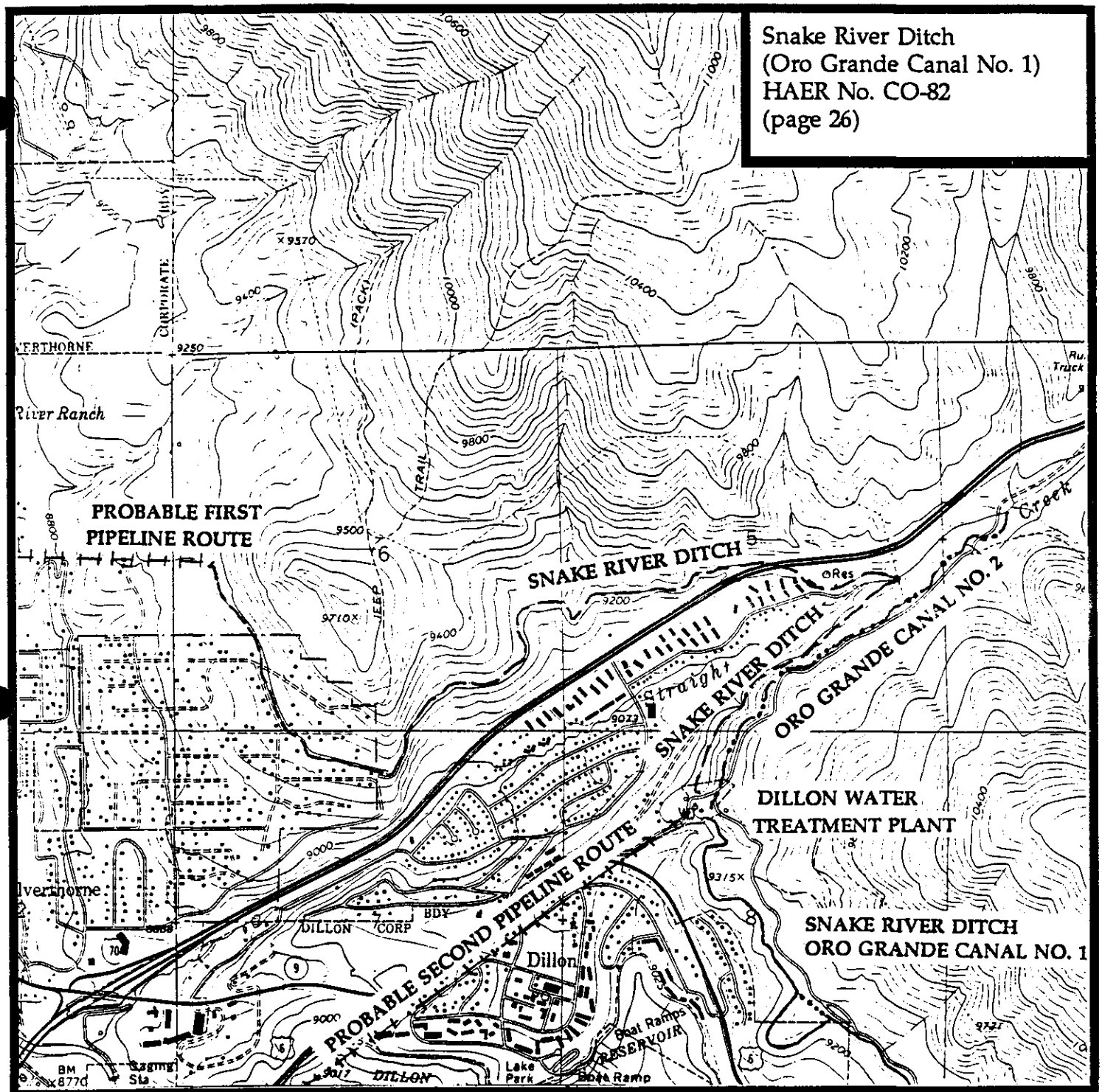
COLORADO

QUADRANGLE LOCATION

Route of the Snake River Ditch (Oro Grande Canal No. 1).



Route of the Snake River Ditch (Oro Grande Canal No. 1).

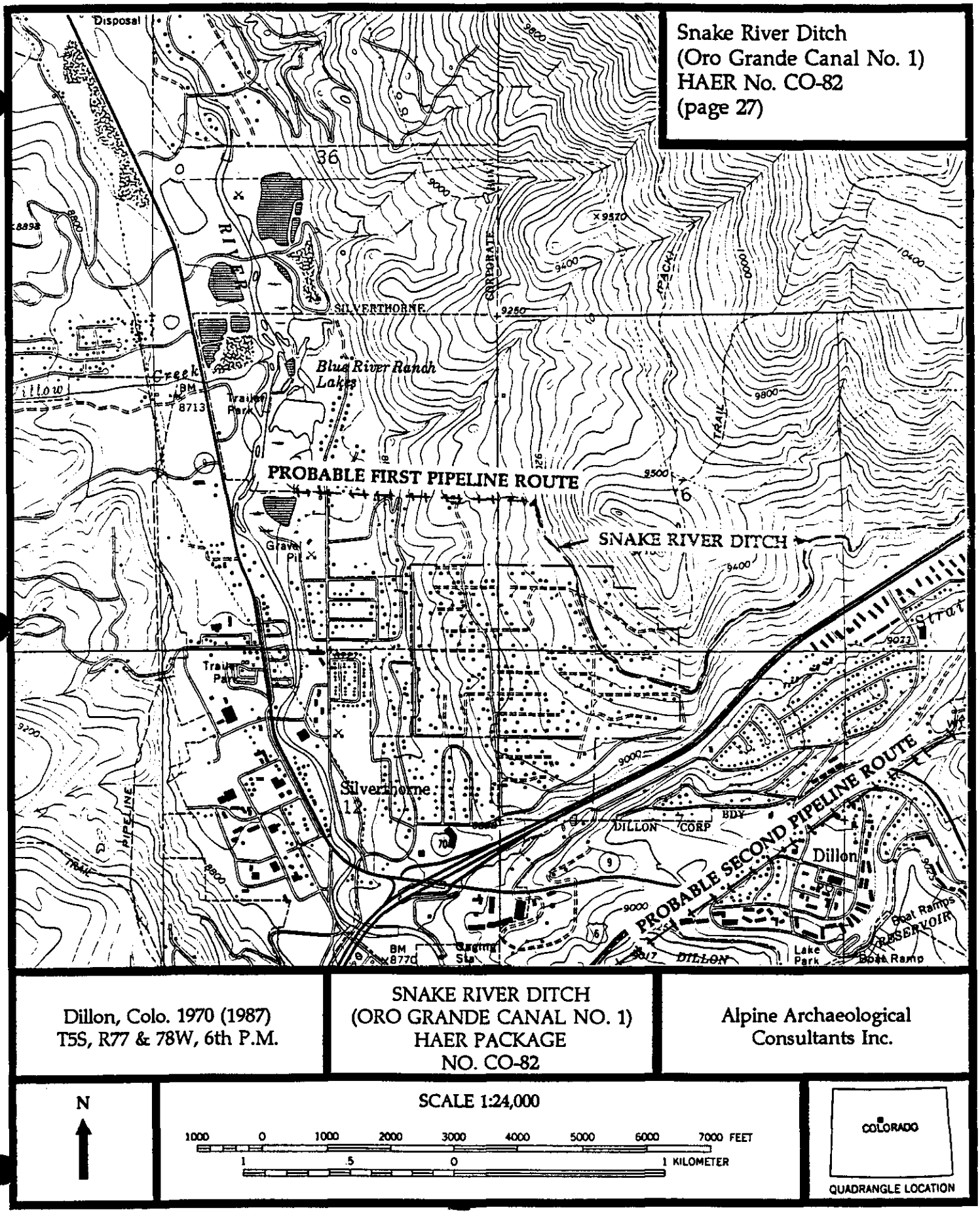


Dillon, Colo. 1970 (1987)
T5S, R77W, 6th P.M.

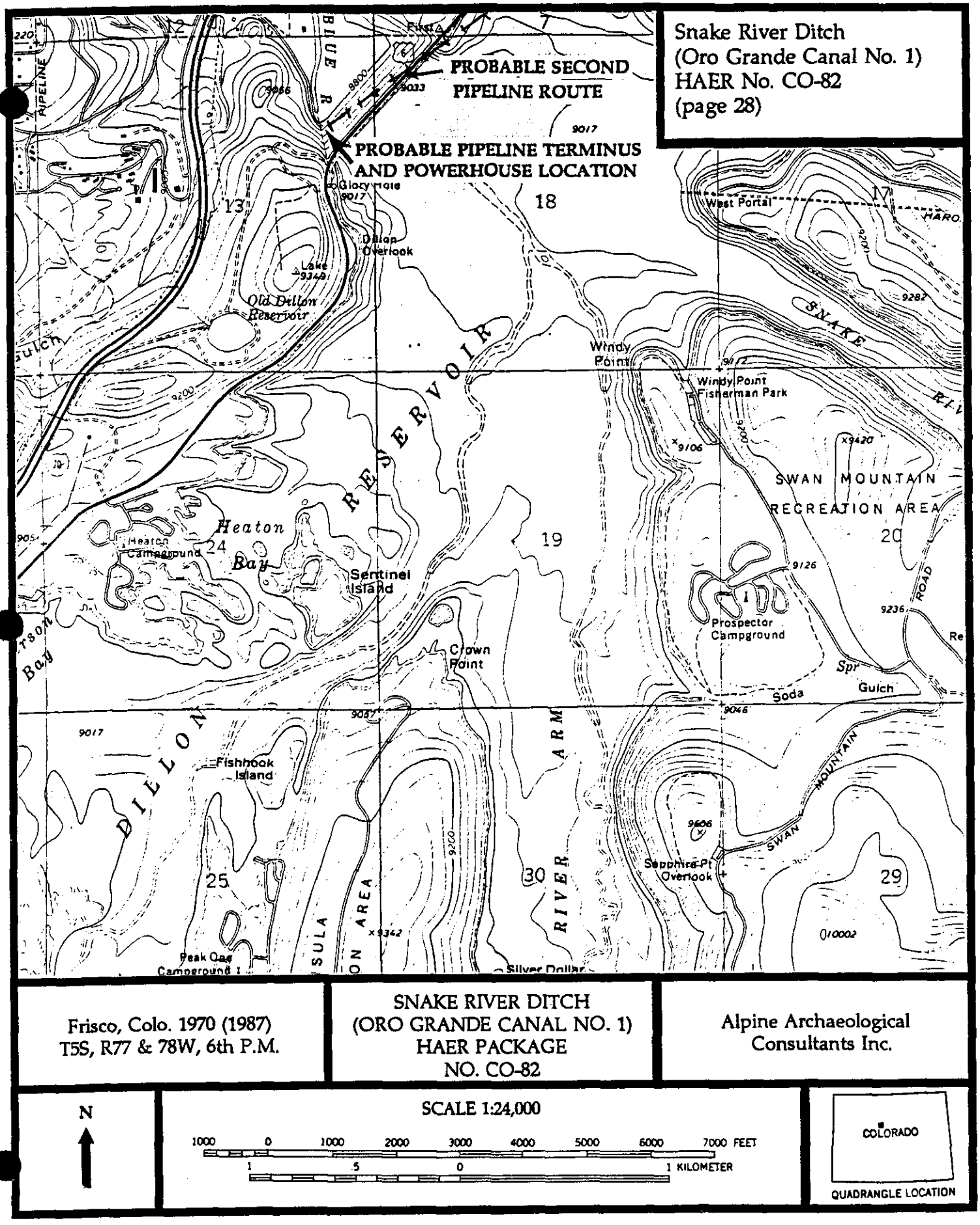
SNAKE RIVER DITCH
(ORO GRANDE CANAL NO. 1)
HAER PACKAGE
NO. CO-82

Alpine Archaeological
Consultants Inc.

Route of the Snake River Ditch (Oro Grande Canal No. 1).



Route of the Snake River Ditch (Oro Grande Canal No. 1).



Route of pipeline from the Snake River Ditch (Oro Grande Canal No. 1) and possible terminus location.