XIII

THE HISTORY OF

# THE HOLDEN-MAROLT SITE

IN ASPEN, COLORADO:

THE HOLDEN LIXIVIATION WORKS,

FARMING AND RANCHING,

AND THE MAROLT RANCH

1879 - 1986

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For the Aspen Historical Society

Under the auspices of the Roaring Fork Research Scholarship
Sponsored by Ruth Whyte

October 1990

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## INTRODUCTION

There was widespread excitement in Aspen, Colorado in the fall of 1890. "The sweet day dreams of those who have longed to see Aspen a great city are about to be realized," the *Aspen Times* declared. Edward Royal Holden had announced that his company would build a reduction works and a manufacturing plant on the edge of town. The company also planned to build a town nearby, and an electric street railway, to provide rapid transit between the suburb and the city. The financiers had already signed papers to purchase over 400 acres, and would invest hundreds of thousands of dollars in the projects. The reduction works would use the new Russell process of lixiviation [licks-i-vee-A-shun], to treat low grade silver ores,[1] which would "revolutionize old methods and create a new era in the mining industry." The *Times* reported that the mill would profitably treat ore as low as 11 ounces of silver to the ton. The newspaper estimated that 35,000 tons of low grade ore would be mined weekly in the district if it could be treated profitably. In addition, there were many mine dumps containing thousands of tons of ore which contained at least 11 ounces of silver per ton. The Holden company said that the mill would start with 40 stamps, with a capacity of 100 tons per day.[2] However, they planned to install several hundred stamps eventually, and projected they would employ 3,000 men. The newspaper also pointed out that more men would be employed mining low grade ores. It was predicted that Aspen would boom and more than double its population in only a few years. The newspaper crowed that the city would take on "a new era of prosperity."[3]

Over the next few years, some of these dreams came true, and some went unfulfilled, disappearing without a trace. The manufacturing plant and the new town never appeared. However, the mill opened in November 1891; it was one of the largest and

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[1] Lixiviation was a method of extracting silver by dissolving it in chemical solutions. Ore was the natural aggregate of rock which contained valuable metal. Usually a large portion of the ore consisted of valueless material (gangue). Low grade ores contained a relatively small amount of silver. This will discussed more completely later in the report.

[2] A stamp was a machine used to crush ore.

[3] "Auspicious Aspen," *Aspen Daily Times*, 17 September 1890, 4; "Lixiviation Works," *Aspen Daily Times*, 19 September 1890, 2; "The Lixiviation Works," *Aspen Daily Times*, 11 November 1891, 3. *Aspen Daily Times* hereafter referred to as *ADT*.

most complete Russell lixiviation plant constructed in the U. S.[4] The five story building covered over 27,200 square feet. It processed low grade ores, and the financiers invested over $300,000 for the land and construction of the mill. However, the plant never expanded its capacity beyond 125 tons per day, and it never employed more than 150 men.[5] Less than two years after it opened, the dreams were dashed when the mill closed during the "silver panic" of 1893.[6] Today, the sampling house, the office/assay building, and the salt warehouse are still standing. Remnants of the mill can be seen on the archeological site. The site became part of the Marolt Ranch in later years.

This story raises some interesting questions concerning the people, technology, business and politics of the mineral production industry in the West. Part one of this paper will address these questions in the following categories.

1. Why Edward Holden? Was he qualified to operate a reduction works?

2. Why Aspen? What was mined there? Were there competing reduction works?[7] Was the particular location of the land appropriate?

3. Why lixiviation? How did it compare with other types of ore treatment? Did it really treat low grade ores profitably? What was the track record for the Russell process? Was the process successful at the Holden Works?

4. What happened in the sampling building?

5. What was the layout and procedure in the rest of the mill?

6. Why was the silver panic important? How did it affect the mining industry and Colorado?

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[4] The Lexington mill at Butte was larger and more complete, and the Bi-Metallic mill at Phillipsburg, Montana was also more complete. Bob Spude, National Park Service, Denver.

[5] "Holden Smelting and Milling Company," *Engineering and Mining Journal*, 51, no. 11 (14 March 1891): 11.

*Engineering and Mining Journal* hereafter referred to as *EMJ*.

The company employed 150 to construct the plant, 100 men at its opening, and 50 men several months later. "The Lixiviation Plant," Aspen *Daily Chronicle*, 17 August 1891, 3; and Western Historical Studies, "Amendment to the Aspen, Colorado Multiple Property Nomination to the National Register of Historic Places," 27 January 1990, Colorado Office of Archaeology and Historic Preservation, Colorado Historical Society, section E, 7-8.

[6] "Holden Smelting and Milling Company," *EMJ* 51, no. 11 (14 March 1891): 332; "General Mining News," *ADT*, 06 Nov 1891, 4; *ADT*, 17 Sep 1890, 4.

[7] Reduction was the chemical (metallurgical) process, and concentration (ore dressing) was the mechanical operation in which the silver and other valuable metals were separated from the gangue. Lixiviation and smelting were chemical processes.

7. Was Holden's company successful, and merely a victim of the panic of '93? Or was it a failing business whose demise coincided with the crash? How did the price of silver and treatment costs relate to profits? Did the company compete successfully in the low grade ore market? Did the lixiviation process cause financial problems? Did Holden's plant managers view the plant as successful? Did the company act like it was successful before the panic?

8. What happened to Edward Holden and to the mill after the Holden company closed?

Mining and milling were only one source of excitement in the Roaring Fork valley. Early in the spring of 1882, the mining camp of Aspen was crowded with strangers coming to claim ranches in the valley. New men came through the camp almost daily, bringing seed and farm implements with them for their new enterprises. The land rush had been sparked by the removal of the Indians from the Ute Reservation the previous autumn. Now people saw a good opportunity to acquire cheap land, in a valley that had been promoted as an agricultural paradise. They had heard that the land was rich, arable and easily tilled, and that there was plenty of water. Boosters assured them that crops could be raised "of quality and abundance as will convince the doubting and astonish the sanguine."

Over time, the valley did fulfill many expectations, although always at the price of hard work. Agriculture became an important industry which continued long after silver had collapsed.

Examining the history of farming and ranching in the valley provides a context for studying the Marolt Ranch (which is on the site of the Holden Works). Armed with this agricultural background information, we can determine if the Marolt operation was representative of ranches in the area. Conversely, by studying one place in detail, we can learn more about ranches in general.

Part two of this report studies farming and ranching in the Roaring Fork Valley, in the following categories.

1. The settlement period, during the 1880's - How did the new farmers and ranchers acquire their land? How did they learn which products and techniques were

effective? What were their main products? Where was their market? What techniques and implements did they use?

2. The period of commercialization, organization and confrontation, during the three decades after 1890 - How did changing markets impact crops and stock production? What associations did the farmers and ranchers organize? What do they tell us about the interests and values of the members? How did the ranchers react to federal control of grazing?

3. The Marolt Ranch, early 1880's to 1986 - Who had owned the land, and how was it used? How did the Marolts come to own the ranch? What structures survived from the Holden Works, and how were they used? What ranching activities were carried out on the ranch? Were these activities expected, in light of earlier ranching history? How did the ranch change?

The Holden-Marolt site is unique in Pitkin County. The two primary historical industries of Pitkin County, mining and agriculture, were both actively pursued on the location. It is fortunate that there is an opportunity to preserve the site. The Aspen Historical Society is to be commended for their efforts to inform, educate and entertain people concerning the fascinating history of the valley.

# PART ONE: MILLING AND THE HOLDEN LIXIVIATION WORKS

## WHY HOLDEN?

Edward R. Holden was no stranger to the mineral reduction business. In fact, by the time he made his announcement in Aspen, Holden was one of the most well known names in the industry.

Holden was born in New York City on September 27, 1855 or 1856. He studied metallurgy there, then moved to Leadville in 1880.[8] He began as a miner in the Little Pittsburgh mine,[9] but within a few years he was a partner in Chanute & Holden, assayers and chemists. In a few more years he became proprietor of Holden's Public Sampling Works, one of the largest in the silver mining center.[10]

During this time, Ed Holden was earning a reputation as being knowledgeable, quite outspoken, a promoter and a speculator. He was appointed receiver of the celebrated Emma mine in Aspen, because the judge regarded him as competent in every respect, "who was not only able to tell what a piece of ore was but to present intelligently its constituent parts."[11] A newspaper later noted that one could depend on Holden's observations: he "takes in everything going on about him. His opinion is worth something." Another paper observed "He is a fighter from away back and will make a hard battle for his opinions."[12]

Holden first worked for a smelter in 1882, when he was metallurgist for the North Texas Smelter Company. The organization built a plant in Aspen, on the banks of Castle Creek, although that company never opened the facility. Holden visited the town for the

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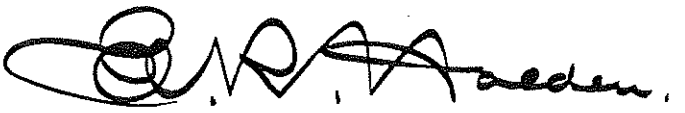
[8] Henry Dudley Teetor, "Smelting and Refining in Colorado: Edward Royal Holden," *Magazine of Western History* 10 (1889): 65, 66; and Robert L. Harper, comp., *Colorado Mines* (Denver: Carson, Hurst and Harper, [November 1891]), 29.

[9] This was the mine that made Horace Tabor rich in 1878.

[10] *Leadville City Directory* (Leadville: Corbett & Ballenger, 1883-1887).
A sampling works bought ore from a number of mines and shipped larger lots to smelters at a better rate. The price paid for the ore was based on a "sample" of the whole ore shipment. The sample was assayed to determine its value.

[11] *Aspen Weekly Times*, 7 March 1885, 1; and Teetor, 66.
*Aspen Weekly Times* hereafter referred to as *AWT*.

[12] *Aspen Weekly Times*, 22 April 1893, 4; and "Mr. Holden Removed," *ADT*, 10 November 1891, 3.
*Aspen Weekly Times* hereafter referred to as *AWT*.



EDWARD R. HOLDEN

Henry Dudley Teetor, "Smelting and Refining in Colorado: Edward Royal Holden," Magazine of Western History 10 (1889): 65.

first time that year. Eight years later Holden built his own lixiviation plant across the creek, and shared a property line with the smelter.[13]

That experience apparently influenced him, because Holden became convinced that smelter owners made the profits in the mining industry. A mine operator took a lot of risks, he reasoned, and might not ever strike a good vein. If the miner did strike one, it might play out. If he had ore, he had to pay transportation and smelting costs, and rely on the smelter to be honest about the assay value. The smelter owner, on the other hand, drew his business from a variety of mines and so reduced his risks. The miners came to him, and he was in control of the ore. So Holden decided to go into the smelting business.[14]

Over a period of seven years Holden was president of five ore reduction facilities. In 1886 he and Chanute built the Holden Smelter in the Denver area. Holden was president and general manager. During this time Aspen's *Rocky Mountain Sun* referred to Holden, "of Denver smelting fame," as "one of the best smelting men in the state."[15] However, the Holden Smelter had borrowed heavily from the Colorado National Bank, and in the winter of 1886-87 was on the verge of bankruptcy.[16] Holden resigned as president; the bank took over the company and reorganized it as the well known Globe Smelter and Refining Company.

Meanwhile, Holden had convinced his Leadville friend Meyer Guggenheim that owning a smelter was the way to make money, and they decided to start a smelter together. Holden and Guggenheim organized the Philadelphia Smelting & Refining Co., and built the large smelter in Pueblo in 1888. Holden was president and general manager. Holden and the Guggenheim family had disagreements, and after a year, he sold the Guggenheims his 49% interest in the Philadelphia smelter.[17] The smelter man next formed

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[13] "Analysis: E. R. Holden, the Metallurgist, of the N. T. Smelter," *Aspen Times*, 9 December 1882.
The North Texas smelter was sold to J. B. Wheeler in June 1883; he named it the Aspen Smelter. "Cash Sale," *Aspen Times*, June 1883, 1; and "The Smelter," *Aspen Times*, 7 July 1883, 1.
*Aspen Times* hereafter referred to as *AT*.

[14] Edwin P. Hoyt, Jr., *The Guggenheims and the American Dream* (n.p.: Funk & Wagnalls, 1967), 60.

[15] "The Roaring Fork Valley as a Smelting Centre," *Rocky Mountain Sun*, 28 January 1888, 2.

[16] Dennis Sheedy, *The Autobiography of Dennis Sheedy*, (Denver: n. p., 1922).

[17] Hoyt, 72.
For more information on Holden's activities at the smelters in Denver and Pueblo see Hoyt, 54-73 passim; Gatenby Williams [William Guggenheim], *William Guggenheim* (New York: Lone Voice Publishing

the Holden Smelting and Milling Co. in the fall of 1890, and then built the Holden Works at Aspen.[18] While the Aspen plant was in operation, Holden became involved with two other reduction facilities. He built a smelter, in Leadville in 1892, as president of yet another company, the Holden Smelting and Refining Company.[19] In the spring of 1893, he announced that he would build a mill in Cripple Creek to treat low grade gold ore.[20] During these years Holden was known as "one of the most successful financiers" in Colorado and was a key player in the mineral industry in the West.[21]

Besides smelting and milling interests, Holden also had a large amount of money invested in Colorado mines. The Silent Friend in Chaffee County and the Justice group near Aspen are examples.

Edward Holden was well known in the mining industry when he built the Holden Works in Aspen. He was an opinionated speculator and promoter, and had been involved in large mining, assaying, sampling and smelting companies in Leadville, Denver and Pueblo. As a result, he was familiar with the technical, financial and administrative aspects of the mineral industry.

## WHY ASPEN?

After Holden sold his Philadelphia Smelter stock to Guggenheim in 1889, he had the idea of establishing a reduction works somewhere in the West. Why would he have thought of Aspen?

Around 1890 Aspen was one of the most important silver mining districts of the state. About half a million dollars in silver was mined per month in Pitkin County; the county produced 1/6 of all the silver in the United States. In the year the Holden Works

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Co., 1934), 34-35, 51-55 passim; and James Fell, *Ores to Metals* (Lincoln: University of Nebraska, 1979).

[18] Holden had moved to Denver in 1886 and continued to live there until 1897. He lived in Aspen only for a brief time while he recovered from a stage coach accident when he was receiver of the Emma mine. *Denver City Directory*; and *AT* Supplement, 2 May 1885, 1.

[19] Incorporation Records, Holden Smelting and Refining Company, Colorado State Archives, Denver; *Denver City Directory* (Denver: Corbett & Ballenger, 1887 - 88; Ballenger & Corbett, 1889 - 97); and *Leadville City Directory* (Leadville: Ballenger & Richards, 1892).

[20] "Another Enterprise," *ADT*, 28 April 1893, 2; and Marshall Sprague, *Money Mountain: The Story of Cripple Creek Gold* (Lincoln: University of Nebraska Press, 1953), 175-76.

[21] Harper, 29.

opened, Aspen's silver production was the highest in the state, surpassing even its rival, Leadville, by over 2,000,000 ounces.[22]

Based on its mining activity, Aspen became a thriving town. With an estimated population of 12,000 in 1892, Aspen was the third largest city in Colorado, after Denver and Leadville. Both the Colorado Midland and the Denver and Rio Grande Railroads served the city, with ten daily passenger trains. The city had an electric light plant, a municipal water system, 10 churches, over 1000 children in three schools, three banks, a hospital, an opera house, both horse and electric street cars, and three daily and three weekly newspapers.[23]

However, with all its silver and prosperity, Aspen had surprisingly few ore treatment plants. While Leadville had at least 15 smelters at one point, Aspen had two smelters (the Aspen and the Hardinge), a concentrator (Schueler & Stockder), and two sampling works (the Rust and the Taylor & Brunton).[24] The smelters operated on an irregular basis, partly because it was more economical to have high grade ores treated at larger smelters in Leadville, Pueblo or Denver.

Holden theorized that no competition would exist between the Holden Works and the smelters and concentrator because they treated different types of ore. Smelters handled high grade ore with relatively high lead content, while lixiviation works handled low grade "dry" ore (with less than 5% lead). Aspen ores were essentially silver ores, and contained remarkably small amounts of other metals; lead did appear in many, though not all, Aspen ores. There was an abundance of low grade ore in the district; the newspaper later observed there was enough to supply four plants like Holden's.[25] These low grade, dry refractory ores of Aspen had long been a "bugbear" to the smelter men of the state.[26]

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[22] U.S., Department of the Interior, Geological Survey, *Mining in Colorado: A History of Discovery, Development and Production*, by Charles W. Henderson, Professional Paper no. 138 (Washington, D. C.: G.P.O., 1926), 201; [John G. Canfield], *Mines and Mining Men of Colorado* (Denver: John G. Canfield, 1893), 33; and Malcolm J. Rohrbough, *Aspen: The History of a Silver-Mining Town, 1879-1893* (New York: Oxford University Press, 1986), 215.

[23] Rohrbough, 173; and [Canfield], 31.

[24] Edward Blair, *Leadville: Colorado's Magic City* (Boulder: Pruett Publishing Co.), 99; *Aspen City Directory* (Aspen: D. J. Sayer, 1892).

[25] "General Mining News," *EMJ* 50, no. 19 (8 November 1890): 553; "Lixiviation Works," *ADT*, 19 September 1890, 2; Willard S. Morse, "The Holden Lixiviation Works, Aspen, Colorado," *EMJ* 52, no. 21 (21 November 1891): 593; and "The Lixiviation Works," *ADT*, 11 November 1891, 3.

[26] Refractory ores were complex and, thus, were more costly to reduce with the smelting process.

For the year and a half after Holden left the Philadelphia Smelter, he reportedly spent over $120,000 on large scale experiments with the Russell and Von Patera lixiviation processes. (These processes will be discussed more fully below.) He leased the works of the Colorado Gold and Silver Extraction Co. for tests, and also sent 50 tons of Aspen ore to be treated at the Ontario mill in Park City, Utah. He and his assistants found that Aspen ores could be treated successfully; Holden was confident he could reduce ore which contained at least 10 ounces of silver at a good profit. He contracted with the Russell Process Co. for exclusive rights to use their patented process at Aspen.[27]

This was not the first time Aspenites had heard of the Russell process. A representative from the Russell Manufacturing Company of Denver visited Aspen in June 1883 trying to promote the process, but no one accepted his offer.[28]

Holden also had a vested interest in building a plant in Aspen that would reduce low grade ores. Holden was one of the principal owners of the Justice group of mines in Tourtelotte Park, at the end of the Aspen Public Tramway. Other owners included Benjamin and Meyer Guggenheim. The property had large bodies of low grade ore, which had been impossible to mine profitably. Once the Holden Works opened, the Justice mines could operate at a profit.[29]

Once Holden selected Aspen as the district for his mill, he had to select the specific location. Originally, Holden planned to buy only a small site to build a mill. He found a 20 acre site just west of the town, owned by the Colorado Midland Railroad, that satisfied the requirements. The site was close to the mines; Castle Creek supplied water for power and the lixiviation process; the Midland ran through the property, which provided a delivery system for both ore and supplies; coal mines were only ten miles down the railroad; and there was room for both disposal of tailings and for future additions. However, the Midland officers refused to break up their 400 acre property, called Stitzer's Ranch, which was the location of the proposed mill.

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[27] "Lixiviation Works," *ADT*, 8 February 1890, 4; *ADT*, 18 September 1890, 4; L. D. Godshall, "The Lixiviation of Silver Ores," *EMJ* 51, no. 18 (2 May 1891): 515; "Lixiviation Works," *ADT*, 19 September 1890, 2; "General Mining News," *EMJ* 50, no. 13 (27 September 1890): 369-70.

[28] "Reduction Works," *AT*, 23 June 1883, 1.

[29] Harper, 50.

Holden wanted the mill site so he decided to buy the entire 400 acres, and build a town on the remainder.[30] On August 1, 1890 the Colorado Midland Railroad granted M. L. Chapman (a Holden investor) an option to buy the Stitzer Ranch for $60,000. Chapman put down $1,000 and was to pay $29,000 more within 60 days, or else the contract would be forfeited. Apparently the milling company failed to meet the requirements of the contract, because the Midland retained title to the property. Some agreement must have been reached, however, because the Holden Works was constructed in 1890-91 on a 20 acre parcel within the 400 acre parcel. The Midland deeded this 20 acre parcel in the south west quarter of section 12 to Holden's representative, J. B. Wilbur, in December 1891. That same month Wilbur transferred the title of the 20 acres to the Holden Smelting and Milling Company; this land became known as the Holden Tract. It was located just west of Aspen on the west bank of Castle Creek.[31]

Another contributing factor to choosing Aspen as a location was the town's eagerness for a reduction facility; the construction of the Castle Creek bridge exemplifies this. Since the town had so few treatment plants, residents were anxious to please Holden. When the company announced it would build a new town and plant on the west side of Castle Creek, the corporate officers acknowledged that they would need a bridge. City and county officials were enthusiastic about satisfying this need. County commissioners decided they would build the bridge as a general highway crossing, and that the Holden company could use the bridge at no charge for a street car line (to connect to the proposed town). Holden and his vice president Richard Cline submitted a $25,000 bond to assure the commissioners of their intentions to build an industrial plant west of the creek. The commissioners awarded the bridge contract to the King Iron Bridge and Manufacturing Co., but seven weeks later the commissioners annulled the contract. They had learned that the county had severe financial problems because of certain bonds for the county courthouse.

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[30] Although the name of the town was never officially announced, the newspaper referred to it as the "Wilbur townsite," in honor of James B. Wilbur, Holden's active representative in the early planning. "The Castle Creek Bridge," *ADT*, 19 November 1890, 4.

[31] "Option," book 80, p. 315, Pitkin County Clerk; "Deed," book 92, p. 445, Pitkin County Clerk; "Quit Claim Deed," book 92, p. 443, Pitkin County Clerk.

There was an additional 40 acre parcel that was to be included in the grand plan. Harry D. House sold the property in the south east quarter of section two to Charles H. Graham (a major Holden investor) in August 1890. Even though the 400 acre Midland option failed, Graham kept this 40 acre parcel until 1908. "Warranty Deed," book 63, p. 290, Pitkin County Clerk; and "Warranty Deed," book 148, p. 331, Pitkin County Clerk.

In addition, there was a legal technicality concerning the need for a public highway at the point designated for the bridge.[32] The cancellation came as a surprise to the Holden company, and to the King Iron Bridge Company; the latter had already started casting the bridge and preparing the site.[33] Aspenites were in a quandary until Representative Coombs sponsored a bill which led to the state partially funding the construction. The bridge was built at the end of Hallam Street, and was completed in December 1891; the county paid $6,400 of the $17,280 costs. The bridge was about 75 feet high, and the length of the entire structure was 510 feet. The bridge was used until 1961, when it was replaced.[34]

Holden had been correct in perceiving there was a market for his plant. The Aspen district contained a large amount of dry, low grade, silver ores, which could not be economically treated at smelters. In the first two months of operation nearly 17,000 tons of ore were shipped to the Works. They treated about 72 to 125 tons of low grade ore per day for the next 18 months.[35] In addition, his investment in the Justice mine group benefitted. He located an ideal site which was available for purchase, and the town was anxious to accommodate his business.

## WHY LIXIVIATION?

During the 1880's and 90's the Russell lixiviation process enjoyed a great popularity in the mineral production industry. The process was explained in detail in journal articles, texts and handbooks, with statements of excellent results. As a result, about 18 major plants installed the process, which involved large investments of capital. By examining Holden's plant in Aspen, we can gain insight into this process and better understand the significance of lixiviation. To do so, we must first place the process in the larger context

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[32] Pitkin County Commissioners, "Minute Book," vol. 1, minutes of September 11, 1890, 231; October 29, 1890, 241; 20 November 1890, 249; 10 January 1891, 263.

[33] "The Bonds Cancelled," *ADT*, 11 January 1891, 6.

[34] "Let's Have a Bridge," *ADT*, 6 February 1891, 2; Pitkin County Commissioners, meeting of 11 December 1891, 363; Colorado, State Engineer, *Biennial Report for the Years 1891 and 1892* (Denver: Smith-Brooks Printing Co., state printers, 1892), 363-364; and *Denver Post*, 7 February 1961.

[35] F. A. Shepard, "Pitkin County Statistics," *AWT*, 19 December 1891, 1; Willard S. Morse, "The Lixiviation of Silver-Ores by the Russell Process at Aspen, Colorado," American Institute of Mining Engineers *Transactions* 25 (March 1895): 139; "The Lixiviation Works," *ADT*, 12 Feb 1892, 4; and "General Mining News," *EMJ* 53, no. 21 (21 May 1892): 552.

American Institute of Mining Engineers *Transactions* referred to hereafter as AIME *Transactions*.

of the silver extraction industry. A reasonable place to begin is with definitions and explanations of terms and processes.[1]

There were two main ways to extract silver from ore in the nineteenth century: pyrometallurgy (smelting), and hydrometallurgy (milling: amalgamation or leaching).

I.Pyrometallurgy (fire)

A. Smelting - ores heated until they were molten and then components separated by their melting points

II.Hydrometallurgy (liquid)

A. Amalgamation mills - mercury brought in contact with silver to form an alloy (amalgam)

1. Pan processes - ore, mercury, copper sulphate and water mixed in large pan and heated
2. Other processes - patio, plate, and barrel

B. Lixiviation or leaching mills - silver dissolved in solution

1. Von Patera process - silver chloride dissolved in a solution of sodium hyposulfite
2. Russell process, a modification of the Patera process - used an extra solution of sodium-copper thiosulfate
3. Cyanide process - silver dissolved in a cyanide solution (not used successfully until early 1900's.

Smelting had a high extraction rate of silver; but in earlier years smelting costs, and transportation charges, had been high so this process was restricted to high grade ores. However, over time improvements led to price reductions. But smelting costs varied with ore types. High lead ores were less expensive to work than refractory ores. As a result, refractory, low grade ore were usually left in the ground because of the additional cost.

In amalgamation, liquid mercury attracted silver particles and formed an alloy called an amalgam. The silver in the amalgam could then be easily separated from the mercury. Amalgamation was effective on simple ores, but was ineffective with refractory ores. Amalgamation was often less expensive than smelting, but the percent yield was lower. It

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[1] For a good overview of milling and smelting technology see Don L. Hardesty, *The Archaeology of Mining and Miners: A View from the Silver State*, Special Publication Series, no. 6 (Ann Arbor, Michigan: The Society for Historical Archaeology, 1988), 38 - 66; and Otis Young, *Western Mining*, (Norman: University of Oklahoma, 1970).

was often practiced when there was no nearby smelter. Usually the introduction of railroads into an area made smelting of high grade ores more profitable than amalgamation.

The third basic way to retrieve silver was lixiviation, which obtained silver through chemical leaching. First, the ore was crushed to expose the minerals to treatment. Then silver was converted into a soluble form; the most common method was the chloridizing roast, in which ore and salt were roasted to produce silver chloride. (Chloridizing was often used in amalgamation also.) Next, the silver was dissolved in a chemical solution, and then recovered by precipitation.

Lixiviation could be more appropriate than smelting in certain situations. Lixiviation required less fuel. The operation could be carried on near the mine, thereby saving transportation costs. Lixiviation was especially used on dry, low grade ores, which would not be profitable to smelt. Silver ores with a large percentage of lead or copper were reduced better through smelting.

The Austrian mining engineer Von Patera and his countryman Guido Kustel introduced lixiviation in the United States in 1874. Kustel's nephew Ottokar Hofmann designed and operated the first successful lixiviation plant at Silver King, Arizona in 1880. The Von Patera process roasted the ore with salt, then soaked it in a solution of sodium hyposulfite (thiosulfate), $Na_2S_2O_3$, in water. The silver chloride dissolved in the solution, and was drained off in the liquid (this is used today to develop black and white film). The resulting silver sulfide was precipitated from this solution by adding sodium or calcium sulfide.[2] The earlier methods of lixiviation were inapplicable to some ores because the solutions did not dissolve certain forms of silver. In addition, lead and copper were precipitated together with the silver, which was not desirable.

For years metallurgists had tried to develop processes that treated low grade ores more effectively at less cost. In 1884 Edward H. Russell (assayer at the Ontario mill in Park City, Utah) patented an improvement of the Von Patera process that promised to be the answer.[3] He first treated the crushed, roasted ore with an "ordinary" solution of sodium hyposulfite, as in the Von Patera process. Then Russell leached the ore with an "extra" solution. He made the "extra" solution by adding copper sulfate, $CuSO_4$, to the

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[2] International Correspondence Schools, *A Textbook on Metallurgy of Gold, Silver, Copper, Lead and Zinc*, vol. 4, *Hyposulfite Lixiviation...* (Scranton, PA.: International Textbook Co., 1902), sec. 33, 28.

[3] U. S., Department of the Interior, Patent Office, *Official Gazette of the U. S. Patent Office*, vol 26, no. 13 (25 March 1884): 1187, 1204; vol. 27, no. 2 (8 April 1884): 204.

sodium hyposulfite solution. This formed the double salt $Na_2S_2O_3 \cdot Cu_2O_3$, or $4Na_2S_2O_3$, $3Cu_2S_2O_3 + H_2O$, known as sodium-copper thiosulfate or cuprous hyposulfite. It extracted silver which would not have been extracted by earlier methods, thus producing a higher percentage of silver; this was the remarkable difference in the Russell process. As a result, low grade ores could be treated. When used on the right ores and in the right conditions the Russell process could extract 90 to 95% of the silver. To solve the problem of lead and copper precipitating together with the silver, Russell used sodium carbonate to first precipitate lead. Copper and silver were then easily precipitated.[4]

This is merely a simplified explanation of the Russell process; it was a complex, delicate operation which required constant testing and adjustments by metallurgists. We are lucky that professional publications contain detailed accounts of technical activities at the Holden Works. Carl A. Stetefeldt, Russell's partner, commended Morse for recording the numerous experiments conducted at the Holden Works. He noted that "Such thorough and extensive work has not been done before or since in any metallurgical establishment in this country."[5]

Two of the steps, roasting and leaching, were the subjects of much debate and controversy, and were critical factors in determining the success of the Russell process at the Holden Works. Roasting was one of the most complicated and most important steps in the lixiviation process. One issue was the amount of chloridation that took place during roasting. In the early years of the Russell process, its promoters had a rather cavalier attitude about roasting. They claimed that the extra solution would extract silver even from ores not completely chloridized during roasting. Over time, however, metallurgists realized that the success of the leaching depended on the quality of the roasting. Holden's managers learned that extracting silver from poorly roasted ores consumed excessive chemicals and time. It was more cost effective to start with a good roasting.[6] Thus, it

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[4] International Correspondence Schools, vol. 4, sec. 33, pp. 19, 28; and Leonard S. Austin, *The Metallurgy of the Common Metals*, 6th ed. (San Francisco: Mining and Scientific Press, 1926), 250.

For a thorough explanation of the chemistry of the Russell process see Carl Schnabel, *Handbook of Metallurgy*, trans. Henry Louis, vol. I, *Copper, Lead, Silver, Gold* (London: Macmillan and Co., 1898), 733 - 739.

[5] Carl A. Stetefeldt, *The Lixiviation of Silver-Ores, with Hyposulphite Solutions with Special Reference to the Russell Process*, 2nd ed., (New Haven, Connecticut: By the author, 1895), v.

[6] L. D. Godshall, "A Review of the Russell Process," 1 May 1893, *Proceedings of the Colorado Scientific Society* 4 (1891-93): 321.

was important for the plant to carefully monitor roasting to achieve the most complete chloridation it could.

Another issue was the amount of silver that volatilized (vaporized) during the roasting. The goal was to keep the temperature just high enough to induce chloridation, but not high enough to vaporize the silver. It was difficult to predict the amount of volatilization, because two ores of the same chemical composition roasted under identical conditions would seldom show the same results.

The ore at the Holden mill lost 9.2% of the silver during roasting. Willard Morse, general manager of the mill, estimated that less than 1% was due to dust loss, with the remainder due to volatilization. The mill extracted 94.21% of the silver in the roasted ore, thus the yield on the raw ore, as ordinarily assayed, was 85.58%.[7]

Both the amount of chloridation and the amount of volatilization were dependent on the type of furnace that was used. The best type to use was dependent on the character of the ore. The Stetefeldt furnace was common and was the type at the Holden Works.[8] Other mills used a reverberatory furnace, or one of several other types.

L. D. Godshall, superintendent of the Holden Works for a year, found through experiments that the Aspen ores roasted better in reverberatory furnaces than in their Stetefeldt furnace.[9] Godshall and Morse both blamed the Stetefeldt furnace for the high volatilization rate. Stetefeldt disputed their claims and insisted that the silver was lost in dust; Godshall and Morse thought the Works' extensive dust collector system was sufficient. To counteract volatilization the Works installed a smoke condenser. (Stetefeldt sarcastically wrote, "Recently Mr. Morse has put up a plant for collecting this dust, or the 'volatilized silver' as he calls it.")[10] Smoke was conducted in pipes through vats of cold water; the silver would have been retrieved from the condensation. If this had worked,

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[7] Morse, "The Lixiviation of Silver-Ores," 140, 146.

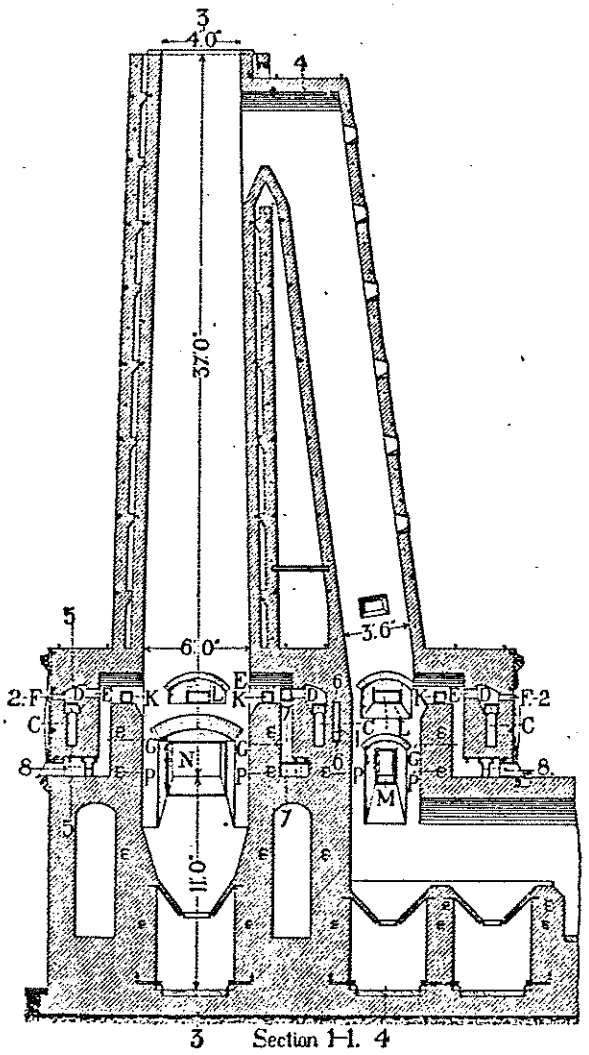
Willard Morse later was on the executive board of Guggenheim's American Smelting & Refining Company, and worked for the company in Mexico. He was also manager of the Tabor Opera House, and the Windsor hotel in Denver. He was a friend of H.A.W. Tabor and Eugene Field, and compiled *Clippings from Denver Tribune, Written by Eugene Field, 1881-1883*, New York, 1909. "Pioneer Denver Hotel Man Dies on West Coast: Willard S. Morse Also Known as Authority on Mining," *Denver Post*, 16 October 1935, 3.

[8] Carl A. Stetefeldt designed the Holden Works, and was an enthusiastic promoter of the Russell process.

[9] Godshall, "A Review of the Russell Process," 312-16.

[10] C. A. Stetefeldt, "The Stetefeldt Furnace," AIME *Transactions* 24 (February 1894): 20.

PLATE I.




Sections of the Stetefeldt Furnace.

"The latest design of the Stetefeldt furnace, as built at the Holden mill, Aspen, Colorado."

Stetefeldt, C. A. "The Stetefeldt Furnace," AIME Transactions 24 (February 1894): 5.

they would have saved about $5,000 of silver per month. Unfortunately, the equipment started operating only a few weeks before the Works closed, so the results are not known.[11]

Leaching was the second step that was a concern. After roasting, the ore was charged (loaded) into large wooden tanks. One at a time, three types of liquids were released into the vats from the top, then drained from the bottom. The first liquid was water, which removed soluble salts. This washing, however, resulted in a decrease in chloridation, so the silver converted to an insoluble form. Morse noted that this had been a serious obstacle to the success of several leaching works, and Godshall observed that this trouble existed "to an alarming extent" with the Aspen ores, until adjustments were made. Godshall and Morse had differing opinions about the cause, but both centered on problems with roasting in the Stetefeldt furnace.[12] The Holden Mill leached the ore seven times, first with water, then ordinary solution, extra solution, ordinary solution, extra solution, ordinary solution, and finally water.[13]

Despite its higher recovery rates, the Russell process did have disadvantages when compared to the Patera process. The Russell process required a more complicated plant, and greater skill was needed to operate it successfully. In addition, the extra solution did not perform better than the ordinary solution on some types of ore. The greatest objection to the Russell process was the cost of treating ore, which by 1893 was $10 per ton for a mill with a 100 ton per day capacity, and $12 per ton for a mill of 50 tons daily capacity.[14] Given these drawbacks, it is reasonable to explore if other Russell plants were successful.

The Russell process was used in several locations, with mixed results. In February 1886, the Sierra Grande Co. at Lake Valley, New Mexico opened a large Russell plant,

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[11] Godshall, "A Review of the Russell Process," 306; Morse, "The Lixiviation of Silver-Ores," 137; "Mr. Holden's Views," *AWT*, 27 May 1893, 1; and "Mining Notes," *AWT*, 1 July 1893, 2.

A photograph of Aspen shows the smoke from the Holden Works hanging over the entire town. The condenser eliminated the smoke, which pleased the residents. The newspaper noted that "One noticeable feature is that the huge volume of smoke that formerly rolled from the tall chimney is absent." "The Holden Works Starts Up," *ADT*, 25 June 1893, 5.

[12] Godshall, "A Review of the Russell Process," 310-12; and Willard S. Morse, "The Effect of Washing with Water upon the Silver Chloride in Roasted Ore," AIME *Transactions* 25 (October 1895): 587.

[13] Morse, "The Lixiviation of Silver-Ores," 142.

[14] Godshall, "A Review of the Russell Process," 321-22.

calculated to work 80 tons of ore per day. Stetefeldt claimed the Russell process was proven to be successful, but that the plant had many mechanical problems and could not make a profit while funding expensive repairs. Stetefeldt also said the process was used successfully in Cusihuiriachic, in the state of Chihuahua, Mexico from 1886 - 1888, until a new manager changed processes. However, Hofmann used the same plant as an example of the failure of the Russell process.[15] He said that the Cusi Co. had operated the plant using the Patera process successfully for years, on a scale of 50 to 60 tons per day. The company then adopted the Russell process, but after 1 1/2 years of heavy financial losses, the process was discarded and the Patera process was resumed. The Russell process was very successful in the Yedras Mill, Sinaloa, Mexico according to Stetefeldt. However, Hofmann stated that the process was a failure at the Sombrerete Mill in Zacatecas, Mexico. A Stetefeldt furnace was used in the new mill, which Hofmann claimed was not the appropriate furnace for the type of ore, resulting in an imperfect roasting. The extra solution didn't react, and after eleven months of unsuccessful trials the company failed. The Marsac Mining Company in Utah replaced a pan amalgamation mill with a Russell mill. According to Phillips, the extraction of silver was 2% better and of gold 30% better than the earlier plant, while the chemicals used cost 1/150 of the value of the mercury in amalgamation, and it used much less power. However, a high extraction rate did not necessarily make the process a commercial success, as demonstrated by its rejection at the Blue Bird Mining Co. near Butte, Montana. In May 1893, Godshall said there were three large Russell mills were operating successfully, one of which was the Holden Works. By 1907 Hofmann declared that the Russell process had been a failure. He stated that the claims for the success of the process had been based on small scale experiments, under conditions that were not practicable to create and maintain on a large scale. With such conflicting reports from such opinionated observers, it is difficult to discern the truth of the situation. Further examination of the plants would be enlightening, but is not in order in this paper. It seems significant, however, that nine years after the introduction of the Russell process, only three plants, of perhaps 18, were still operating.[16]

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[15] Ottokar Hofmann had proposed the "Hofmann process" about 1880, which used sodium hyposulfite with calcium polysulfide; it never became popular. He was a strong critic of the Russell process.

[16] Carl A. Stetefeldt, *The Lixiviation of Silver-Ores with Hyposulfite Solutions, with Special Reference to the Russell Process* (New York: By the author, 1888), 5-7; Ottokar Hofmann, *Hydrometallurgy of Silver: With Special Reference to Chloridizing Roasting of Silver Ores and the Extraction of Silver by Hyposulfite and Cyanide Solutions* (New York: Hill Publishing Co., 1907), 251-52, 254; J. Arthur Phillips, *Elements of Metallurgy* (London: Charles Griffin and Co., 1891), 797; and Godshall, "A Review of the Russell Process,"

What ultimately put an end to the Russell and Patera methods was the extremely low price of silver. The low silver prices couldn't counteract the higher treatment charges, so low grade ores couldn't be treated at a profit. Those processes were replaced by the cyanide process, which could treat low grade ores on a large scale at low cost.

The cyanide process is a type of leaching which replaced Russell lixiviation in the late 19th century. The process was perfected for silver ores in Mexico at the turn of the century. Cyanide of sodium or potassium dissolved the silver, which was then precipitated from the solution. The cyanide process has widespread use in the precious metals industry today.

Although not the miracle process it was originally touted to be, the Russell process of lixiviation was useful in its niche. The process extracted more silver from complex ores than amalgamation did. It was effective on low grade ores, especially ones with a low lead content, which resisted smelting.

However, the Holden Works did have some problems with the process. Water affected the chloridation, but adjustments in roasting corrected that. Roasting turned out to be more important than originally perceived. A perfect chloridation was needed to have a cost effective leaching. Almost 10% of the silver was lost at the Holden Works in dust and volatilization, which resulted in lower silver production. Godshall believed that the Stetefeldt furnace was the wrong type for Aspen ores. A smoke condenser was installed to save the vaporized silver.[17] The plant operators continuously tested and adjusted the process to improve their yield. By 1893, the Holden Works was the epitome of lixiviation plant design.

## WHAT HAPPENED IN THE SAMPLING BUILDING?

> "A description of this sampling business will be more interesting than would a visit to the sampler, for there is nothing picturesque, romantic nor inviting in witnessing piles of earth ground fine, and reduced in bulk from tons to one pound in weight."[18]

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321.

[17] For more information on silver reduction, including details on the Holden Works, see Henry F. Collins, *The Metallurgy of Lead and Silver*, part II, *Silver* (London: Charles Griffin and Co., 1900).

[18] "The Hewitt Sampling Works Company," *Rocky Mountain Sun*, 21 January 1888, 2.

Although that Aspen reporter found nothing inviting about watching the sampling process, it is safe to say that those of us who are interested in the historic Holden sampling building would jump at the chance to watch it in operation in the 1890's. However, since that option is not open to us, we have to depend solely on written descriptions and extrapolation.

An assayer used a sample of only a few ounces of ore to determine the type and quantity of valuable minerals in a load of ore that weighed hundreds of tons. Those few ounces had to accurately represent all the minerals in the exact proportions as the original ore. The process of selecting a representative specimen of ore was called sampling. It was an important step in Holden's milling process since he paid the mine owner for the amount of silver in the ore, based on the assay of the sample.

The sampling building (known today as the Marolt granary or barn) was the beginning point in processing ore at the Holden Works. The Colorado Midland Railroad delivered ore to the loading dock on the west side of the sampling works. The ore was probably loose, although high grade ores were often sacked. Railroad scales weighed the cars and ore. Then the ore was either shoveled or discharged into a bin. It is likely that at the Holden Works the "first sample" was taken during this unloading process. This was usually done by taking a certain unit of ore to the sampling pile; for example, every third shovel full, or every fifth ore car or tenth wheelbarrow load. The technique was called fractional selection. The amount of ore taken in the first sample was dependent on the type of ore. First samples of less than 80 tons often represented about 240 tons of uniform low grade ore.[19]

Sampling works used either hand or machine methods, or a combination. There were four ways to do it by hand: by quartering, by fractional selection, with the split shovel and by channelling. The general manager of the Holden Works reported that the plant used quartering, also known as the Cornish hand quartering system.[20] There are two possible ways the plant could have used hand quartering. It may have used quartering exclusively throughout the sampling process, or it may have used machine sampling for the

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[19] International Correspondence Schools, *A Textbook on Metallurgy of Gold, Silver, Copper, Lead, and Zinc*, vol. 3, *Surface Arrangements at Reduction Works, Ore Dressing and Milling, Sampling Ores*, section 29, (Scranton, Pennsylvania: International Textbook Company, 1902), 2, 4; and H. O. Hofman, *The Metallurgy of Lead and the Desilverization of Base Bullion*, 3rd ed., (New York: The Scientific Publishing Company, 1893), 48.

[20] Willard S. Morse, "The Lixiviation of Silver-Ores by the Russell Process at Aspen, Colorado," AIME *Transactions* 25 (March 1895): 138.

first part of the sampling and quartering for the "finishing" sample. It is more likely that they used the latter combination method.[21]

I will first describe the Cornish hand quartering method, as it would have been done if it were used for the entire sampling process. I will then describe the more likely scenario of a combination of machine and hand methods; the quartering method would have been just the same, except on a smaller scale. The goal of both methods was to continuously reduce the quantity of ore while keeping the proportions of components the same.

In hand quartering, the ore was first thoroughly mixed, then divided into four parts, two of which were eliminated and two were used as a sample. "Coning" was the process used to mix the ore, to obtain a uniform character. The "first sample" was taken from the crusher and was dumped on the floor in a circle large enough for two men to walk inside. The floor on which the quartering was done had to be clean, smooth and free from cracks, and was often covered with a sheet of iron. If this was not available, a piece of canvas could be used. The two samplers walked around the inside of the circle, at least twice, always opposite each other. As they walked, they took a shovel of ore from the circle, and carefully piled it in the center, so a cone formed. The workmen dropped each shovelful exactly on the apex of the cone; this was done by holding the shovelful above the apex then suddenly pulling the shovel away from the ore, so the ore dropped straight down. This method distributed the ore evenly on all sides of the cone. After the outside circle was completely transferred to the center cone the floor was swept carefully and the sweepings were also placed on the center of the cone. A 50 ton cone was about 10 to 12 feet high. (Later, when the sample was reduced to about 2 tons, the cone was about 3 1/2' high and 8' or more in diameter.[22] The shovels were long-handled and round-pointed. Coning could be repeated to further mix the ore. The samplers then changed to short-handled, square-pointed shovels, and "pulled down" the cone, again working opposite each other. They walked around the cone in one direction and used their shovels to draw down the ore from the center to the periphery until it gradually became a wide, flat topped pile, about 6 to 18 feet in diameter and 6 to 12 inches high. The purpose of the activities up to this point was to mix the ore thoroughly.

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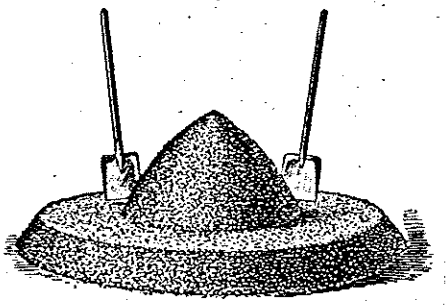
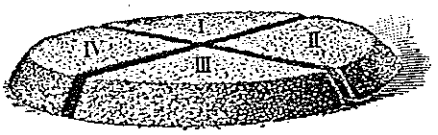
[21] Bob Spude, National Park Service, interview by author, Breckenridge, Colorado, 14 September 1990.

[22] Richard W. Lodge, *Notes on Assaying* (New York: John Wiley & Sons, 1915), 28.

Coning



Pulling down




Quartering

International Correspondence Schools, A Textbook of Metallurgy, vol. 3, Surface Arrangements, section 29, 6-7.

PHOTO BY RINEHART

EDWARD R. HOLDEN

PRESIDENT HOLDEN SMELTER, ASPEN

Robert L. Harper, Colorado Mines (Denver: Carson, Hurst and Harper, (1891)), 41.

Next, the sample was reduced in quantity. Two straight lines were drawn across the flattened pile at right angles to each other, dividing the ore into four parts (hence the name quartering). Half of the sample was removed by taking away two diagonally opposite quarters (it was put it in bins with the rest of the original load of ore). The remaining two sections went through the coning and quartering process again. When the quantity of ore was small enough that it required a more uniform size, it was crushed by crushers or rolls. The whole crushing and quartering process was repeated until the sample was between a few and 100 pounds, which was the "finishing sample."[23] It was treated further by the head sampler in the finishing, or sampling, room. Two men could quarter a one ton sample down to a few pounds (about 10 quarterings) in about two hours.[24]

It is more likely that the Holden Sampling works used machines for the bulk of the sampling process. The following is a conjectural reconstruction of the process. The ore came in the door farthest to the north on the west side of the building. (This was the "first sample," which was obtained through fractional selection.) The ore was discharged into a chute which went under the floor to the boot of the north elevator. It lifted the ore to the ceiling, and dropped it onto a "grizzly" (an iron grate). Smaller pieces fell into a bin, and larger pieces were put through the Blake crushers, one at a time. The ore then went to the rolls for further crushing. It was again sized (using trommels) and larger pieces returned to the rolls. The ore, which looked like sand at that point, went down another chute which went to the boot of the southern elevator. The ore was raised into a cupola which extended the height of the roof. As the ore dropped from the top, the stream of ore went through a series of simple mechanical separators which divided the flow, and resulted in a sample of the ore. At the bottom, the bulk of the ore would have gone to the bins with the original ore, and the small sample would have gone to the finishing (or sampling room) to be treated with hand quartering.[25]

Compared to machine sampling, hand sampling was slower, more expensive, required a larger work space, and could be inaccurate if not done properly. The main source of inaccuracy in quartering was when the cone was pulled down, because the center of the cone could be shifted to one side or another. In addition, it was possible that a

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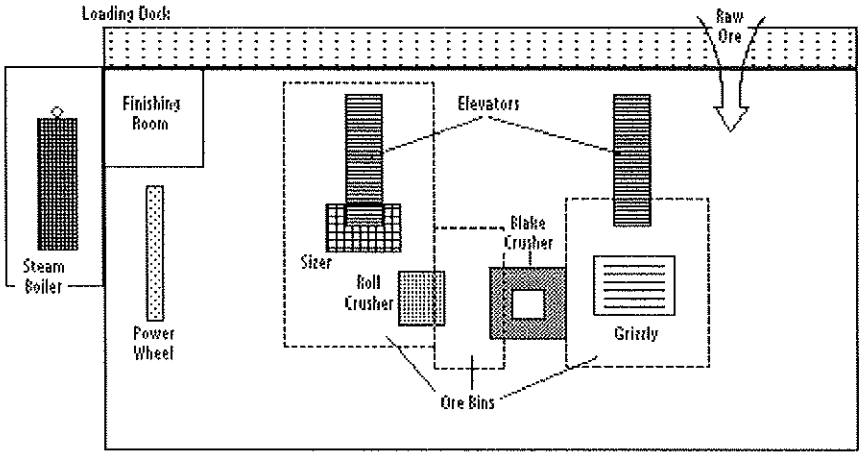
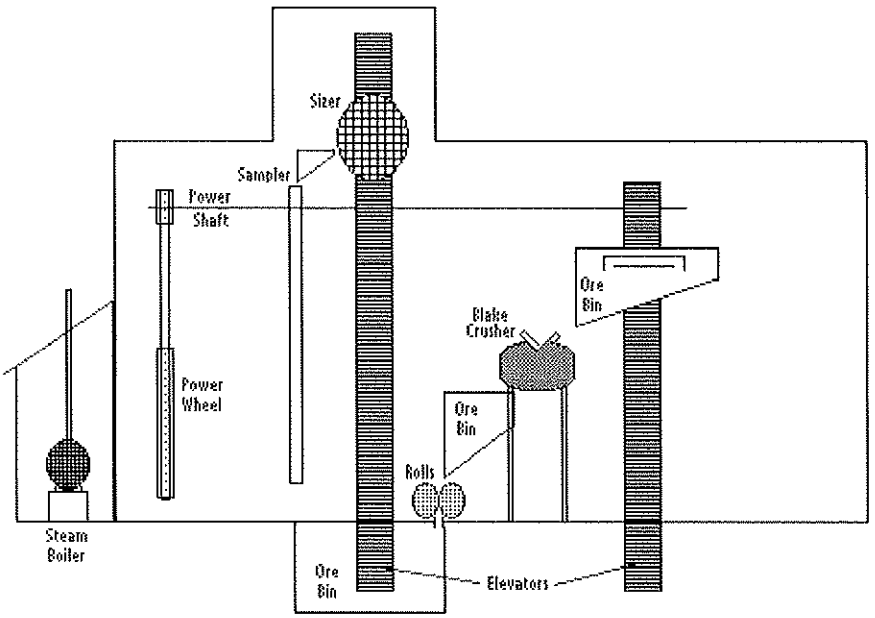
[23] Hofman, *Lead*, 50; Lodge, 29; and International, sec 29, 11.

[24] Hofman, *Lead*, 50.

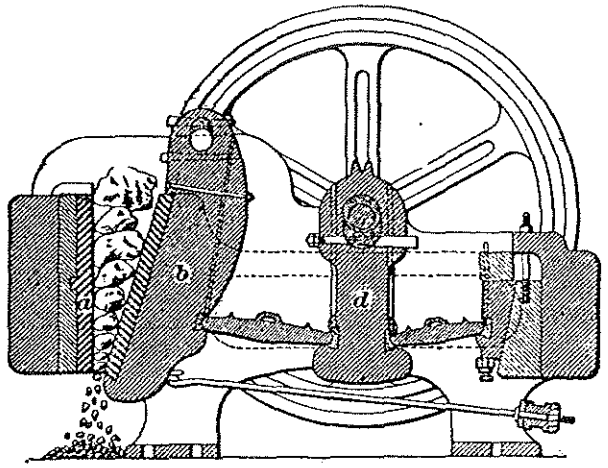
[25] Spude, 14 September 1990.

# Holden Sampling Works
# Conjectural Reconstruction



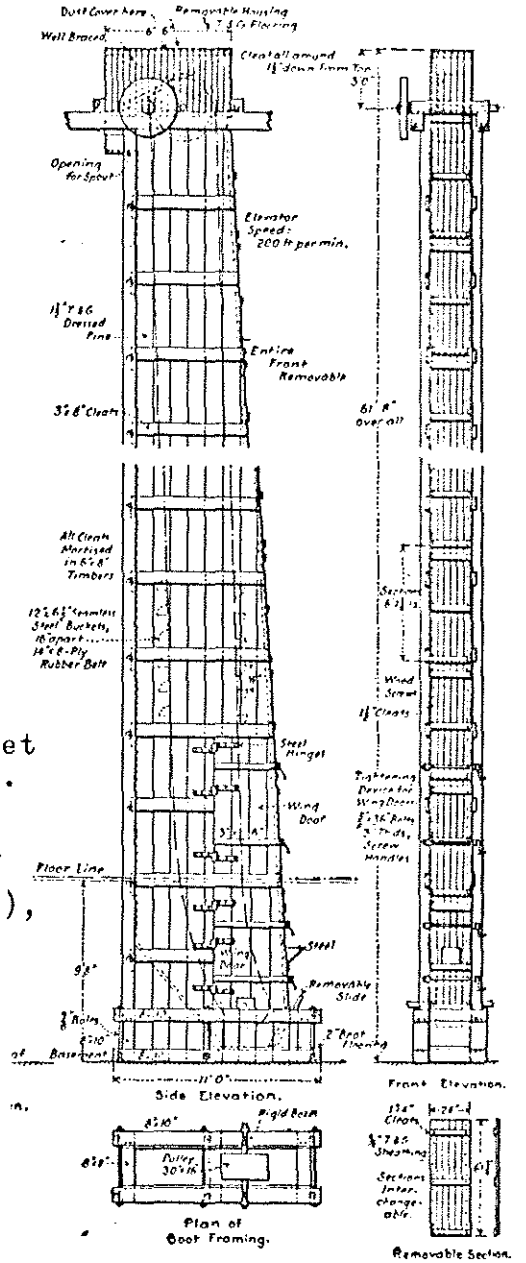




Drawn from a conjectural sketch by Bob Spude, National Park Service.




BLAKE CRUSHER

The Coal and Metal Miners' Pocetbook of Principles, Rules, Formulas and Tables (Scranton: International Textbook Co., 1905), 419.

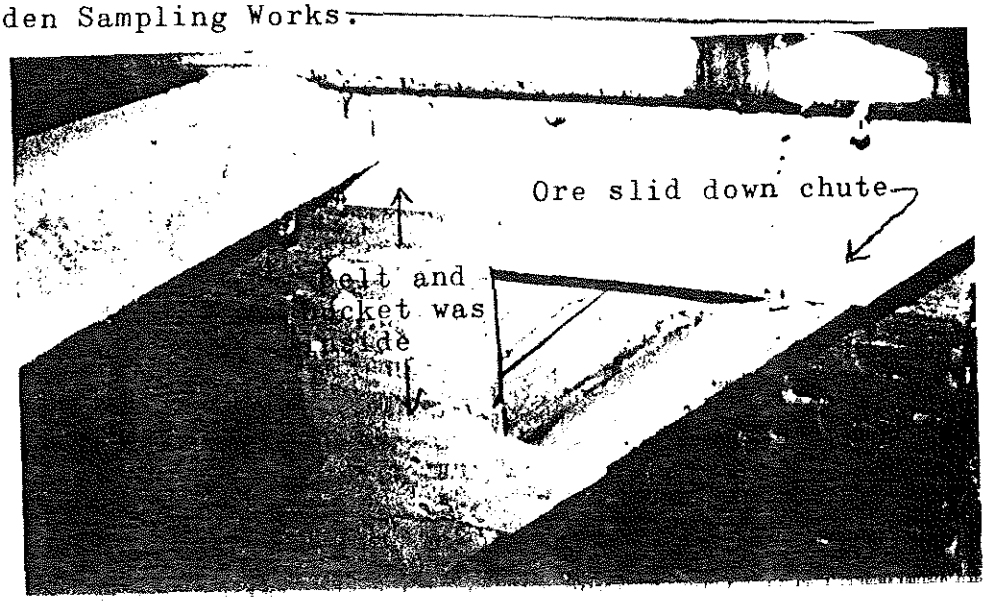



Ore elevator, with bucket and belt inside housing.

Edward S. Wiard, Theory and Practice of Ore Dressing (New York: McGraw-Hill Book Co., 1915), 239.

FIG. 130.

Bottom of elevator housing, below floor in Holden Sampling Works.



shovelful did not land exactly on the apex of the cone.[26] However, in 1893 quartering was more common than machine sampling.[27] By 1899 metallurgical works still tended to do sampling by hand, while public sampling mills often did their sampling by machine.[28] By 1909 coning and quartering had been generally discarded because of its inherent errors.[29]

The Holden Works used two Blake crushers, for initial crushing, and two sets of rolls for finer crushing.[30] Blake crushers (or breakers) were the most popular type of jaw crusher, which were used for coarse breaking. They operated on the principle of a nut cracker. The rock was dropped into the wider end, on the top, and one side of the jaws moved towards the other. The rock broke under the pressure, and fell out the smaller bottom end. Jaw crushers were useful for breaking large quantities of material, when uniform sizing was not essential. A crusher broke the ore to a size of roughly one to two inches. The machines came in a wide range of sizes; it is not known what size crushers the Holden Works used.[31]

Blake crushers caused a great deal of vibration, which could cause the framework of a building to shake. Engineers suggested setting the machines on the ground, or constructing heavy foundations to absorb the shock.[32] By examining the extensive foundation structure under the Holden sampling works it seems obvious that the company chose the latter option.

Rolls were used for finer crushing. The machine had two cylinders (or rolls), face to face, with parallel axes; the rolls revolved so the adjacent faces rolled downward. Rock was dropped between the rolls and was broken by the pinching action. The machines

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[26] H. M. Kimball and B. T. Wells, "Metallurgical Sampling," *The Bulletin of the Technical and Engineering Society of the Colorado School of Mines* 2, no. 3, (May 1904): 19.

[27] Hofman, *Lead*, 62.

[28] International, sec. 29, 2.

[29] Robert H. Richards, *Ore Dressing*, vol. 3, (New York: McGraw-Hill Book Co., 1909), 1570.

[30] Willard S. Morse, "The Holden Lixiviation Works," *EMJ*, 52, no. 21 (21 November 1891): 593.

[31] The Hewitt Sampling Works in Aspen used a 7 x 10 Blake crusher (that is, it accepted ore pieces up to 7 by 10 inches in size.) A mill in Silverton with a capacity of 125 tons per day used in their sampling department one 8 x 12 Blake crusher, which crushed to 1 1/2 inches. "The Hewitt Sampling Works Company," *Rocky Mountain Sun*, 21 January 1888, 2; and Richards, vol 2, 1051.

[32] Edward S. Wiard, *The Theory and Practice of Ore Dressing*, (New York: McGraw-Hill Book Company, 1915), 177.

usually accepted ore 1/2 to 3 inches in size, and produced a course sand.[33] Again, the size of the rolls at the Holden Works is not known.[34]

There could be two reasons why the Holden Works had two crushers and two rolls. Mills sometimes set up two parallel work flow patterns, so that two types of ore were crushed and sampled simultaneously. If a machine broke down, processing could continue, rather than come to a standstill. This was especially important in locations that were far from replacement parts. A second explanation is that crushers and rolls were sometimes operated in series, going from coarse to fine. The first Blake crusher would accept the largest pieces, and produce smaller, coarse pieces, which could then be crushed smaller in the next crusher, and so on. The Holden Works probably used the second system.

Ore was lifted vertically within the Holden sampling works using a belt and bucket style of ore elevators. The continuous belts were made of canvas and rubber, and metal buckets were attached. The belts went around a head pulley at the top, and a boot pulley at the bottom. The head pulley was supported by bridge trees. These supports are still located near the ceiling above the north elevator. The boot pulley was mounted on timbers which were part of the frame of the boot below ground level.[35] This structure, pulley, and belt and bucket are still evident below the floor of the sampling works. The ore was fed into the buckets at the bottom, carried upward through the main floor, to the ceiling, and then discharged. The elevator was enclosed in a wood housing, and there were openings for inspections and repairs. Wing doors were necessary near the boot so that the area could be shoveled out after choking.[36] These openings are still evident on the boots that remain beneath the floor of the building.[37]

The last step in sampling was conducted in the finishing room. Finishing rooms were often partitioned from the main room of sampling works, and was protected from

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[33] Donald M. Liddell, ed., *Handbook of Non-Ferrous Metallurgy*, vol. 1, (New York: McGraw-Hill Book Company, 1926), 69.

[34] The Hewitt Sampler had 27 x 14 inch Jackson rolls (that is, a diameter of each roll was 27 inches, and the face of each roll was 14 inches wide. A Silverton mill used one pair of rolls, 36 x 14 inches, set 1/2 inch apart. "The Hewitt Sampling Works Company," *Rocky Mountain Sun*, 21 January 1888, 2; and Richards, vol 2, 1051.

[35] Wiard, 235.

[36] Theodore Simons, *Ore Dressing Principles and Practices*, (New York: McGraw-Hill Book Company, 1924), 265; and Wiard, 237.

[37] For more information on elevators see Wiard 234 - 249.

wind and dust. Only the head sampler entered the locked finishing room when the final samples were prepared. There was a window which allowed the seller to observe the process.[38]

The hand quartering process was used on the finishing sample; it was the same as has been described, but on a smaller scale. First, the ore was often ground finer in a sample grinder (a small machine.) It was then repeatedly quartered until the ore fit into three four-ounce sample bottles. The seller and the mill each got a bottle, and one was kept for control; sometimes a fourth bottle was given to an umpire. Each bottle was assayed three times, so both the sample and the assay were checked.[39]

The assay office at the Holden Works was housed with the office, known today as the Opal Marolt house. It was about 150 feet west of the sampler. The assay furnace was in the southwest corner of the building. Assay offices for mills were usually in separate buildings, or were in the building with the superintendent's office; an assay office was never in the mill because the vibration was bad for the balances.[40]

The Holden sampler only sampled about one third of the ore that the company treated in its first 14 months of operation. The rest was sampled by the Taylor & Brunton Sampling Works.[41] This occurred possibly because the Holden Works purchased a large amount of ore before the plant opened, and the sampler had not been finished at the new plant.[42]

Sampling was an important step in the business of the Holden mill. The sample had to accurately reflect the composition of the original load of ore. Holden paid for the ore based on the results of the assay of the sample. Sampling was done in the building known today as the Marolt granary or barn. The Holden company used the Cornish hand quartering method of sampling. It is not clear if it used that process alone, or in combination with machine sampling. The evidence of two elevators in the site indicate

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[38] International, sec. 29, 35; and Hofman, *Lead*, 62, 67.

[39] Hofman, *Lead*, 66; and International, sec. 29, 11.

[40] Robert H. Richards, *Ore Dressing*, vol. 2, (New York: The Engineering and Mining Journal, 1903), 1088.

[41] Morse, "The Lixiviation of Silver-Ores," 140.

[42] "Mining Notes," *AWT*, 10 October 1891, 4; and "The Lixiviation Works," *ADT*, 11 November 1891, 3.

that latter situation. The plant used two Blake crushers and two sets of rolls in the sampling process. Assaying was done in the office building (the Opal Marolt house).

## THE PHYSICAL PLANT

The plans for the Holden Mill were designed by Carl A. Stetefeldt, of San Francisco, and by Salkeld & Behr. Stetefeldt was a mining engineer, one of the leading metallurgists of his generation, inventor of the Stetefeldt furnace, and promoter of the Russell lixiviation process. The plant was patterned after a mill in operation in Park City, Utah, either the Ontario or Marsac Mill.[43]

When first built, the main mill buildings covered an area of 27,200 square feet, not including the sampling house and the buildings over ore beds, nor the refinery that was added later. The main mill structure was built on a hillside, so gravity helped move the ore and solutions. Day laborers constructed the plant, beginning in early May 1891 and finishing November 1, 1891. Hunt and McDonald were the contractors for the excavation and stone work. During construction 10,000 cubic yards were excavated, 72,000 cubic feet of stone work were laid; 1,200,000 feet of lumber and 700,000 brick were used.[44]

Mills were usually constructed of wood, substantially framed, with shingled roofs. The Holden mill had those features.[45] Some mills were painted on the outside, while others were not. It can be seen from photographs that the Holden mill was painted a dark color, although it cannot be seen if the sampling building was painted. (There is no obvious visual evidence of paint on the framing of the building today, except for the white window frames.) When mills were painted, it was usually with red mineral paint.[46] Mineral paint was a term for paint which was made from natural minerals found in the earth; they were also called earth colors. The natural hydrated oxides of iron lost their yellow color at a high heat and formed red colors, which varied from a yellowish red to a

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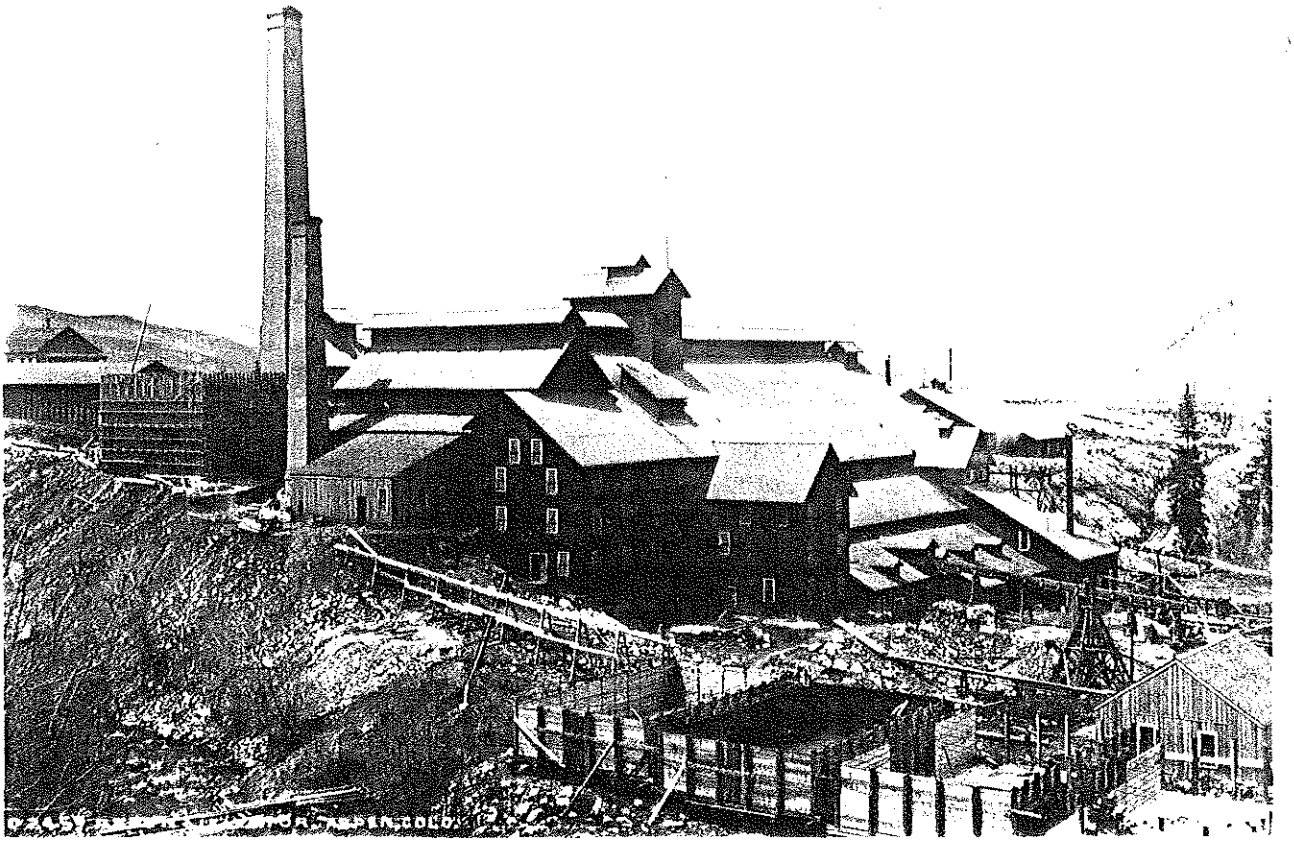
[43] "Holden Smelting and Milling Company," *EMJ*, vol. 51, (14 March 1891): 11; Morse, "The Lixiviation of Silver-Ores," 137; and "Work Starts Today," *ADT*, 20 September 1890, 3.

[44] *EMJ*, 51, no. 11 (14 March 1891): 332; "Mining Notes," Aspen *Daily Chronicle*, 28 August 1891, 3; and Morse, "The Holden Lixiviation Works," 593.

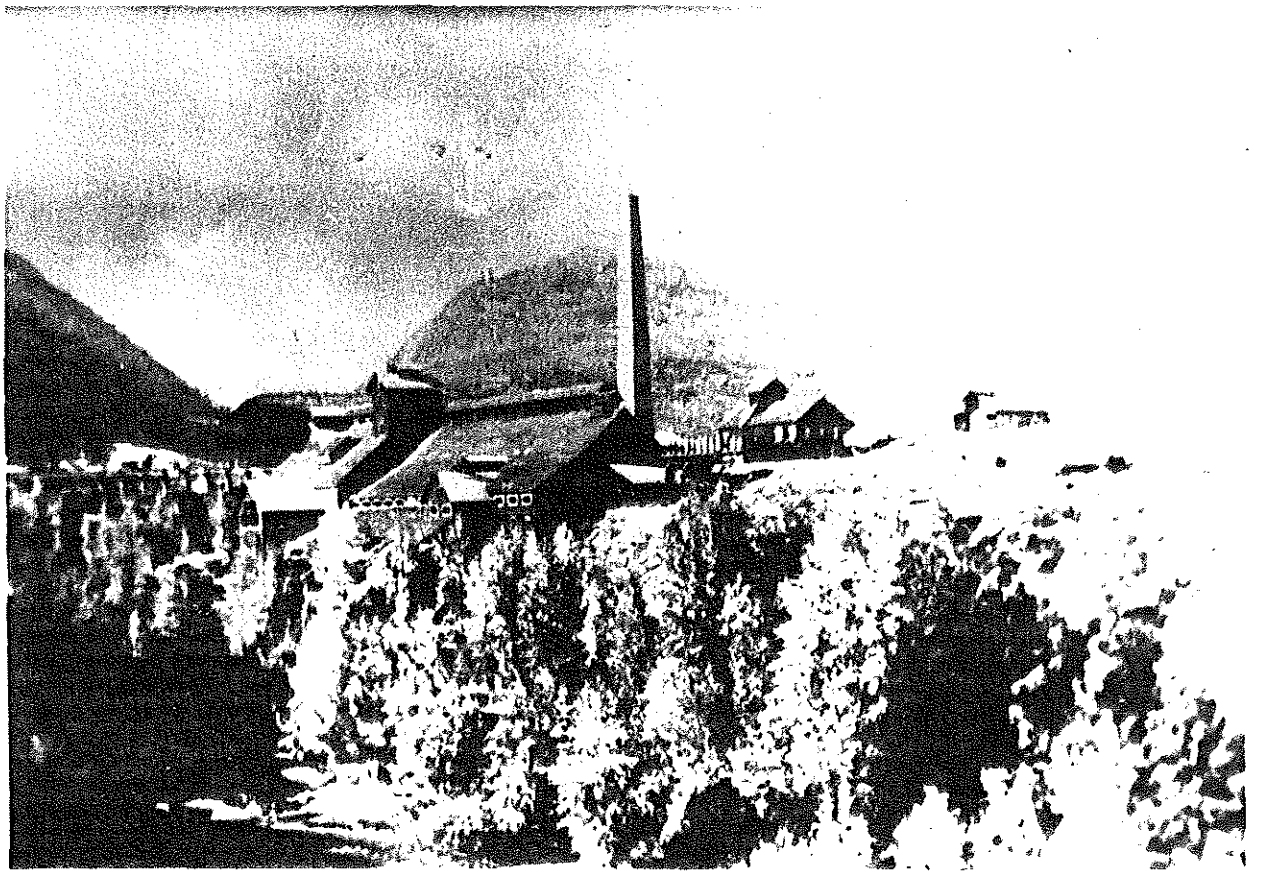
[45] Henry Louis, *The Dressing of Minerals*, (New York: Longmans, Grenn & Company, 1909), 488.

[46] Richards, vol. 2, 1089.

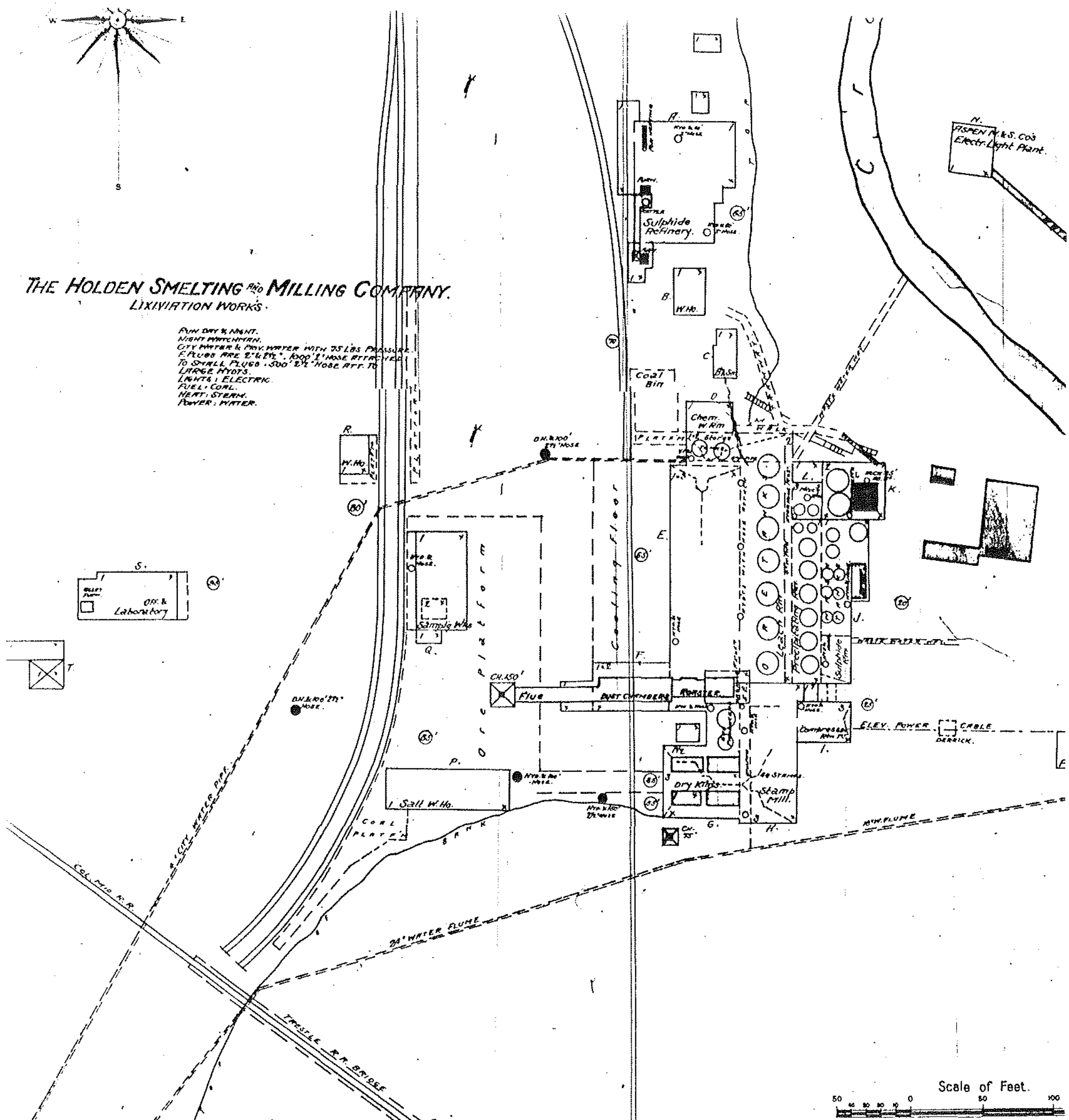
HOLDEN LIXIVIATION WORKS



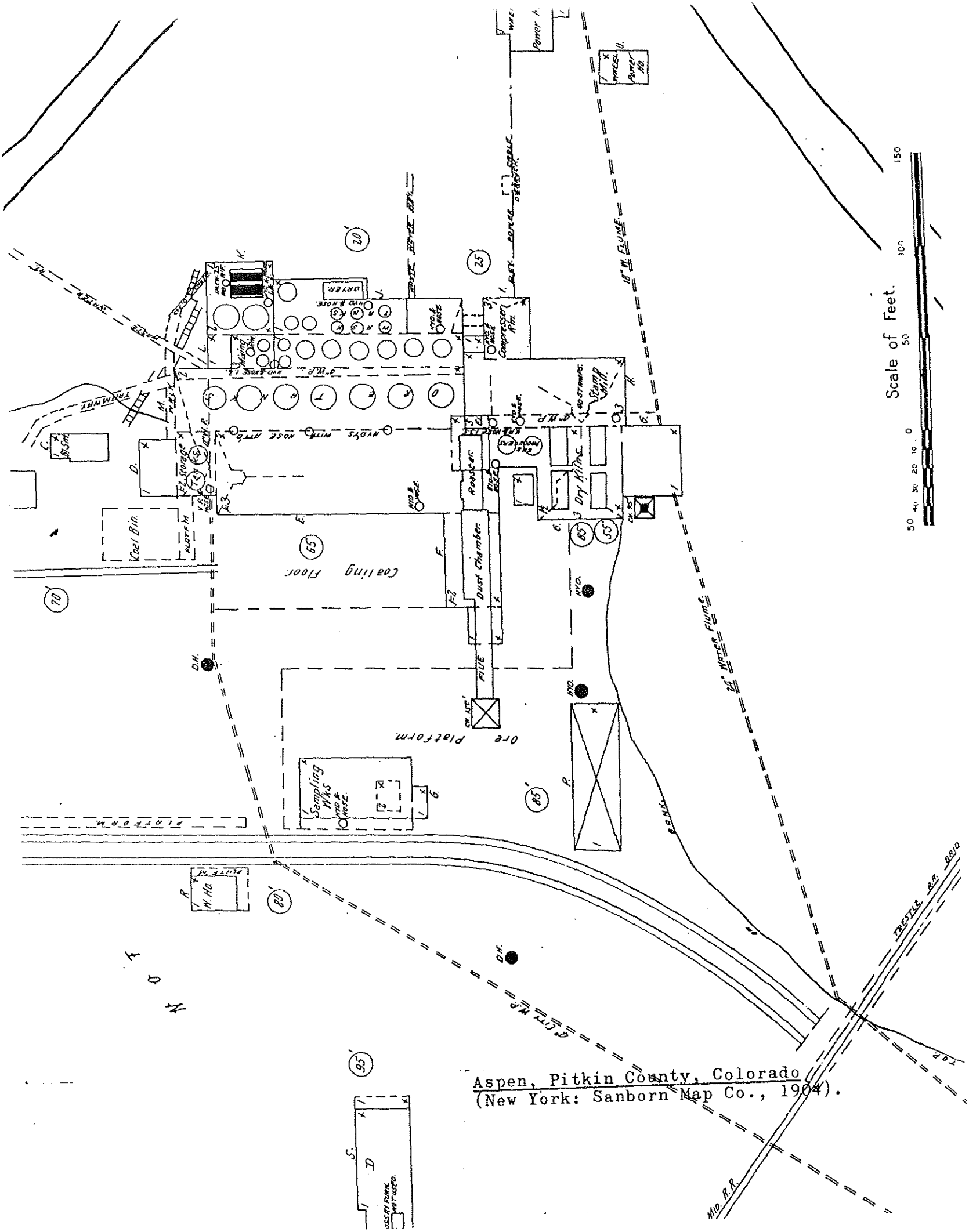
Courtesy of Colorado Historical Society. William H. Jackson, photog.
Taken from south east.



Courtesy Aspen Historical Society. Taken from north east.

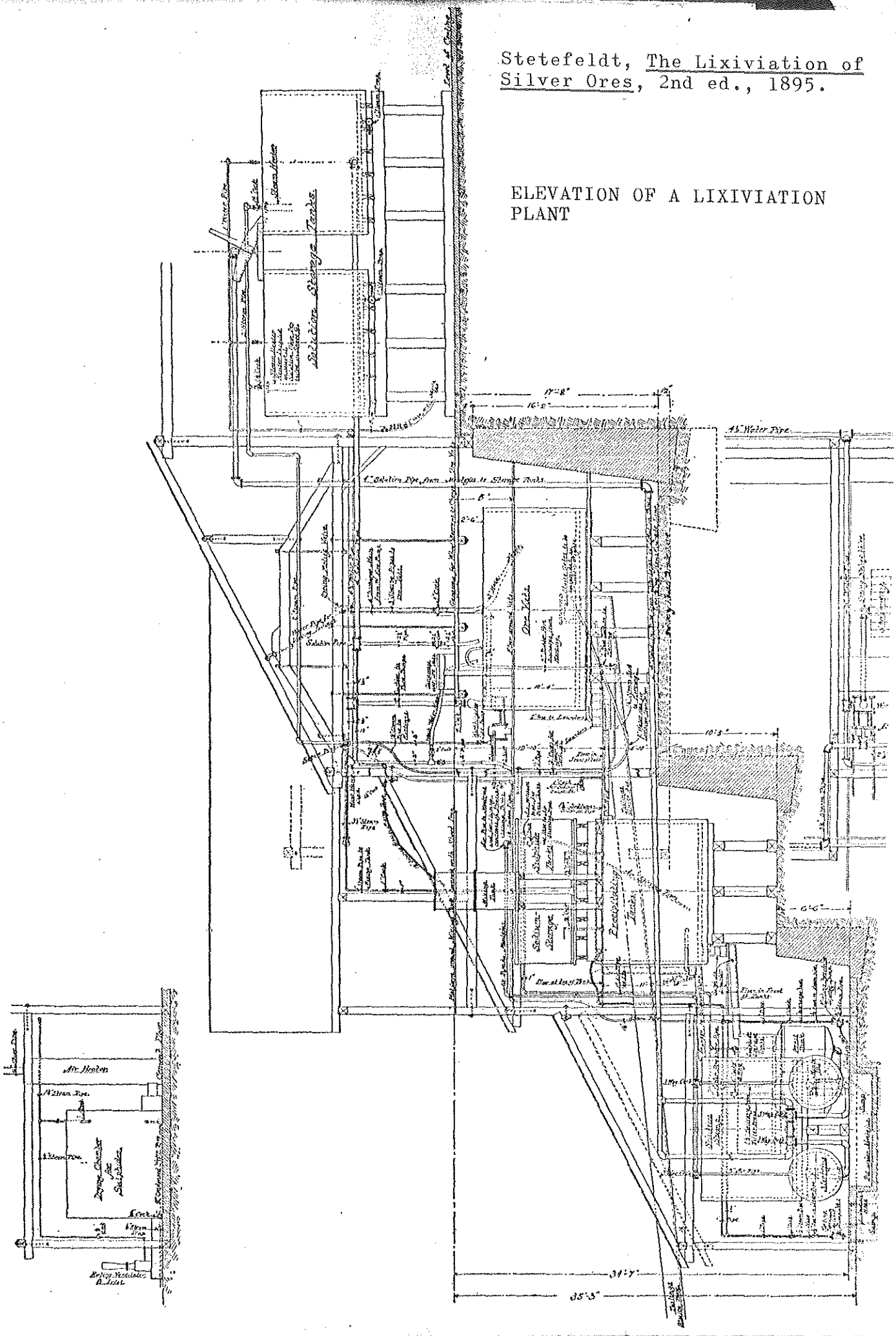



Aspen, Colorado, Pitkin County
(New York: Sanborn-Perris Map Co., 1893).


Scale of Feet.
150
100
50
0
50 40 30 20 10 0
Coal Bin
Coaling Floor
Dust Chamber
Ore Platform
Sampling Wks
Dry Kilns
Boarding
Scrap Mill
Compressor Plt.
Dryer
Engine
Boiler
Pump
Wheel
Tramway
Trestle
Platform
W. Ho
D.H.
Hyd.
Pipe
Flume
Aspen, Pitkin County, Colorado
(New York: Sanborn Map Co., 1904).

Stetefeldt, The Lixiviation of Silver Ores, 2nd ed., 1895.

ELEVATION OF A LIXIVIATION PLANT

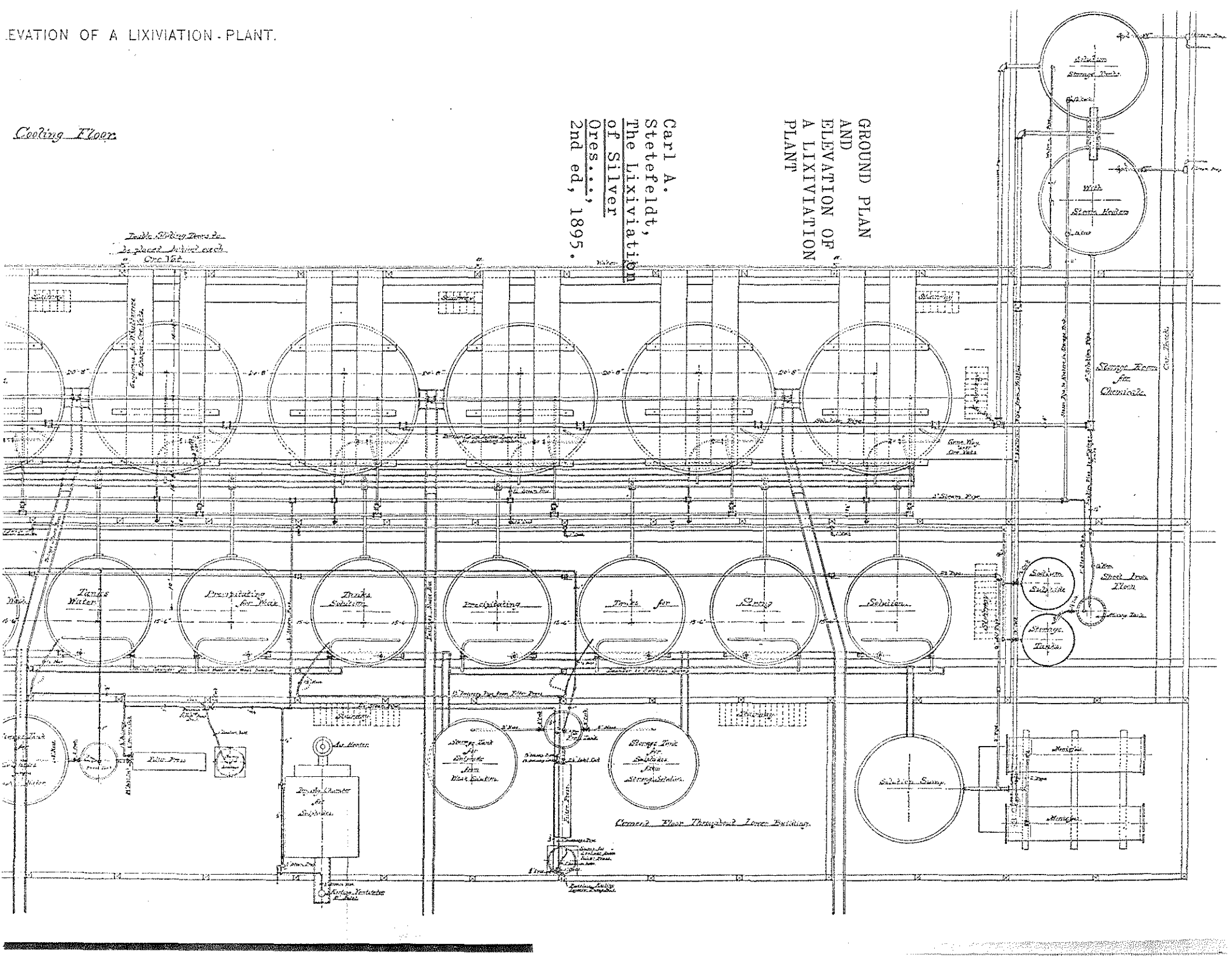


EVATION OF A LIXIVIATION - PLANT.

Cooling Floor.

GROUND PLAN AND ELEVATION OF A LIXIVIATION PLANT

Carl A. Stetefeldt, The Lixiviation of Silver Ores..., 2nd ed, 1895.



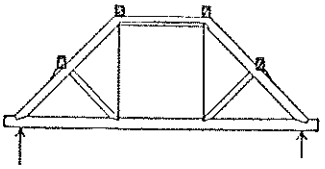
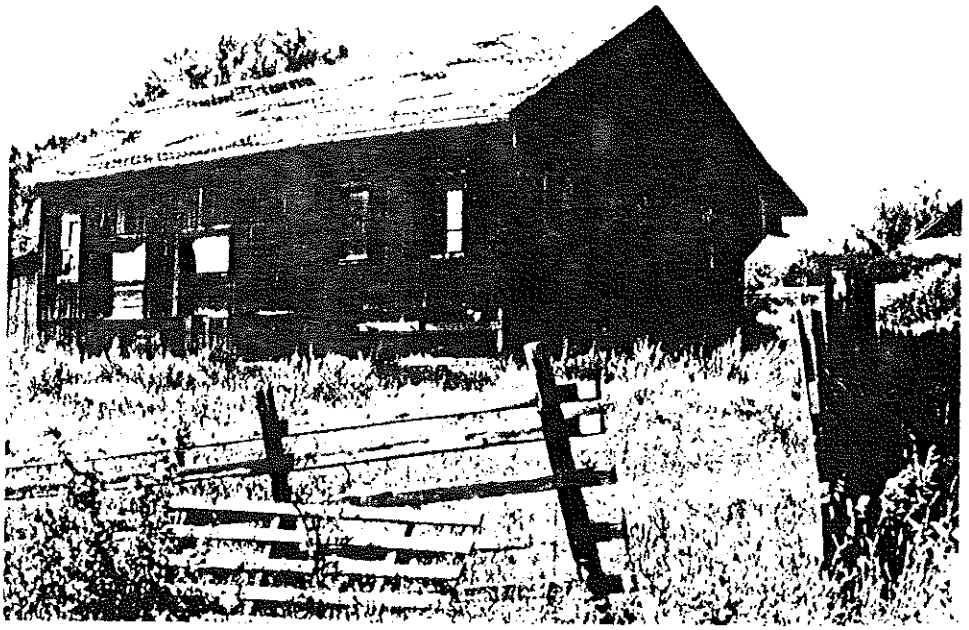
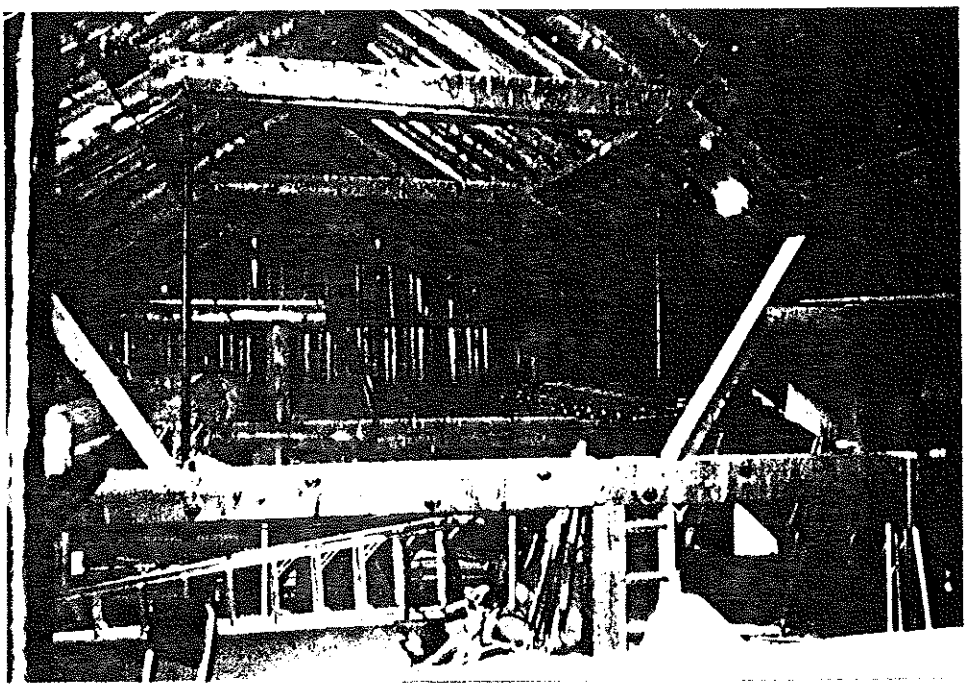


Fig. 17. Queen Rod Trusses. Fig. 18.

F. E. Kidder, Building Construction and Superintendence, part 3, Trussed Roofs and Roof Trusses (New York: William T. Comstock, 1906), 22.



Exterior of sampling building from north east, 1990



Queen rod trusses under roof of sampling building Elevator support is to left rear.

brownish red.[47] Large buildings such as mills and barns were painted with red mineral paint because it was inexpensive.[48] The trim may have been painted with a cheap white lead paint.

The Holden site was served by two spurs of the Colorado Midland Railroad. One went along the west side of the sampling works, to deliver ore. The other came from the north and stopped about 120 feet north east of the sampling works. It delivered coal to the coal bin, and later picked up the refined silver from the sulphide refinery.[49]

The sampling works was on the level ground at the top of the hill, in a separate frame building with a shingle roof, about 150 feet west of the main mill building. (Sampling works were usually not directly connected to the mill or smelter.)[50] The roof of the sampling works is supported by Queen-rod trusses. This type of truss uses a pair of vertical metal rods to support vertical stress. Since the length of rafter was over 12 feet, two additional braces were added to prevent distortion under uneven loads, although in severe cases they would not be sufficient. Trusses of this type were updated versions of Queen-post trusses in which all members were of wood.[51] The machinery in the sampling house used water power, and electricity lit the building.[52]

Surrounding the sampler on the east and south was a platform containing ore storage bins which held several thousand tons of ore. After the ore was sampled, it was mixed on the bedding floor. The lixiviation process required a variety of ores which were mixed to produce ores of appropriate composition for the treatment.[53]

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[47] I. G. Gentele, "Mineral Colors," trans. Percy Neymann, *The Painter*, (1885): 101.

[48] Patricia S. Eldredge, Sherwin-Williams paint historian, telephone interview by author, Cleveland, 5 September 1990.

[49] *Aspen, Colorado, Pitkin County* (New York: Sanborn-Perris Map Co. Ltd., February 1893).

[50] *Aspen, Colorado, Pitkin County*, 1893; and Hofman, *Lead*, 68.

[51] F. E. Kidder, *Building Construction and Superintendence*, part 3, *Trussed Roofs and Roof Trusses*, (New York: William T. Comstock, 1906), 20-23.

[52] Morse, "The Holden Lixiviation Works," 593.

[53] Morse, "The Lixiviation of Silver-Ores," 137; and *ADT*, 20 September 1890, 3.

After mixing, the ore was put in tram cars on rails and run to the southern end of the mill. The ore was dumped into the top of the shelf dryers, which was on the same level as the sampler.[54]

Salt was also taken into the shelf dryers. About 300 to 500 barrels of salt were used monthly; it was purchased in Salt Lake City and stored in the salt warehouse. (That building was later used on the Marolt Ranch as the "old barn," the horse barn, and the milking shed.) It is about 100 feet south of the sampler (granary), and it was about 100 feet west of the shelf dryers. The warehouse was over 80 feet long, much longer than it is today.[55]

The drying plant consisted of four 30-foot high Stetefeldt double shelf dryers, six shelves high. Ore was dried in 3 1/2 of these shelf dryers, and 1/2 was used for salt. The shelf dryers had dust chambers and a chimney 65 feet high; this was the smaller stack visible on the south side of the mill.[56]

After drying, the ore and salt were moved in separate tram cars on rails which were at the bottom of the shelf dryers. The tram tracks went on top of the self feeders of the stamp battery, where the ore and salt were dumped into the hoppers of the feeders. Thirty 850-pound stamps dropped 92 times per minute to crush the ore small enough to pass through a 30-mesh screen. Ten stamps, of 650 pounds each, crushed the salt to 24-mesh. When the Holden plant opened, the company projected that it would eventually have several hundred stamps; these plans were never realized.[57]

After the ore and salt were crushed they were elevated to the top of the 50-foot high Stetefeldt furnace. The salt and ore were dropped into one hopper, so they mixed. As they dropped through the furnace, the salt and ore got red hot and went through a chemical change.[58]

The furnace and dryers were heated with coal gas obtained from two Taylor revolving bottom gas producers. The machines manufactured 1,500,000 cubic feet of gas

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[54] Morse, "The Holden Lixiviation Works," 593.

[55] Transportation costs for salt had prevented similar works from being established in Aspen. *ADT*, 20 September 1890, 3.

[56] Morse, "The Holden Lixiviation Works," 593; Morse, "The Lixiviation of Silver-Ores," 137.

[57] Morse, "The Lixiviation of Silver-Ores," 138; Morse, "The Holden Lixiviation Works," 593; and *ADT*, 20 September 1890, 3.

[58] Morse, "The Holden Lixiviation Works," 593.

per day, from coal mined at Sunshine and New Castle. The coal was delivered by railroad to the bin on the north end of the mill building.[59]

The fumes from the Stetefeldt furnace went into a large dust chamber 20 feet high, 12 feet wide and 50 feet long; from there it went into an inclined flue, then to the base of the main stack, which was 165 feet high, and six feet square inside. About 200,000 brick were used in the construction of the furnace and dust chamber, and 225,000 for the main stack. It was reputed to be the highest stack in the state. This chimney was a landmark in Aspen until the 1950's, when it was dismantled. At the top of the stack, on the east side, was the date 1891 under a crescent with the letter H straddling the right side. Holden used this same symbol to brand his 5,000 cattle on his 18,000 acre ranch near Wichita Falls, Texas.[60]

The hot ore mixture was next spread out on the concrete cooling floor, which was 8,000 square feet, part of which was in the open air. It was left there for about four days.[61]

The ore then went into the leaching, or ore, tanks, which were on the level below the cooling floor, to the east. The seven vats each held about 100 tons of ore, and were 17 feet in diameter and 9 feet high. The vats of ore were alternately filled and drained with the ordinary and extra solutions, and with wash water. The solutions were then pumped into six precipitating tanks which were east and below the level of the leaching vats. These tanks were each 12 feet in diameter and eight or nine feet high. The wash water was pumped into six 8 x 10' vats east of the precipitating tanks. The ore tailings were sluiced out of the vats into the creek below the mill.[62]

After a chemical reaction, silver sulphide was drawn off the tank, and taken to the sulphide room on the next level where it was filtered with a Johnson filter press operated

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[59] Arkell, Macmillan & Stewart, *Aspen: Her Mines and Mineral Resources* (Aspen: Arkell, Macmillan & Stewart, 1892), 7; and C. A. Stetefeldt, "Consumption of Fuel in the Taylor Gas-Producer Plants at the Aspen and Marsac Mills Compared," AIME *Transactions*, 23 (1893): 135.

[60] Morse, "The Holden Lixiviation Works," 593; Morse, "The Lixiviation of Silver-Ores," 138; Aspen *Daily Chronicle*, 2 November 1891, 3; and Teetor, 68, 69.

Holden was active in stockmen's associations, and his office contained an extensive collection of books about stock raising. Frank Hall, *History of the State of Colorado*, vol. 4 (Blakely Printing Co., 1895), 468.

[61] Morse, "The Holden Lixiviation Works," 593; and Morse, "The Lixiviation of Silver-Ores," 142.

[62] Morse, "The Holden Lixiviation Works," 593; and Morse, "The Lixiviation of Silver-Ores," 138.

by compressed air. Next, a steam dryer was used for drying the sulphides. Silver sulphide, a soft black material, contained over 3,000 ounces of silver per ton. When the plant first opened, the silver sulphide was shipped to refineries in the East; later the plant built its own refinery north of the main mill building and used a process developed by Godshall.[63]

After the silver was removed from the solutions they were reused. Two Montejus tanks, utilizing compressed air, elevated the solutions to the storage tanks located north of the cooling floor. There were four storage vats for solutions, 12 feet in diameter and 8 feet deep. There were also two storage vats for sulphides which were 10 feet in diameter and 4 feet deep. Below the sulphide room were two boilers, each 54 x 14. These boilers generated steam to heat the building and solutions, and for drying the sulphides.[64]

The entire plant was run with water power which turned wheels and belts. Water was also used to generate electricity for lighting. The water was taken from Castle Creek, about a mile above the works, and was conveyed first in a covered wooden flume, and then in a steel pipe to the wheel house, located near the creek by the mill. At the receiver of the water-wheels, the water had a head of 170 feet.[65] Power and electricity were produced by two Pelton wheels. An eight-foot diameter Pelton wheel supplied power for the mill machinery. The power was transmitted from the large wheel to the main countershaft in the mill by steel rope that moved over sheaves 12 feet in diameter. A three-foot diameter wheel ran an Edison 250-light dynamo, which furnished light for the entire plant.[66]

## THE SILVER ECONOMY

The price of silver was of critical importance to the mineral production industry, so it is important to be familiar with the context of the silver economy in order to better understand the Holden company. The United States had used a bimetallic standard since

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[63] Morse, "The Holden Lixiviation Works," 593; Morse, "Lixiviation of Silver-Ores," 138, 145; *ADT*, 20 September 1890, 3; and Godshall, "A Review of the Russell Process," 319.

[64] *EMJ*, vol. 51, 332; Morse, "The Holden Lixiviation Works," 593; and Stetefeldt, *Lixiviation*, 2nd ed, 111.

[65] Morse, "The Holden Lixiviation Works," 593.

[66] Morse, "The Holden Lixiviation Works," 593; and Harper, 54.

its early history, that is, both silver and gold were freely received by the mint and were equally available as legal tender. However, the U. S. had changed to a de facto gold standard when the Coinage Act of 1873 put an end to the use of the silver dollar as a monetary standard. At that time the market value of silver was about $1.30. Very soon after that the large silver strikes in the West flooded the market with the white metal, which caused its value to drop. Mine owners and miners demanded a return to bimetallism, which would insure a market for their product. Congress passed the compromise Bland-Allison Act in 1878, which did not restore bimetallism, but did guarantee that the Treasury would buy and coin a certain amount of silver each month. For the next six years the situation seemed stable, and the price of silver reached a high of $1.21. However, the market again became glutted with silver, and the price began dropping. The issue became heated again, and deeply affected national politics. "Silverites," including most Aspenites, advocated the free and unlimited coinage of all silver. Congress responded with another compromise act, the Sherman Silver Purchase Act of 1890. It guaranteed that the Treasury would purchase 4,500,000 ounces of silver per month, about the amount of national production. The price of silver rose briefly, then began another steady decline. The government had to pay gold, which remained stable in price, for the large amount of silver being mined, which was increasingly less valuable. The average price of silver in 1890 was $1.05, in 1891 it was 98 cents, and in 1892 it was 87 cents. That was a crucial price range; if the price went below 80 cents most mines would have to close for lack of profits. Despite legislation to subsidize silver, increasing production deflated efforts to support its price.[67]

In 1893 the country became paralyzed by a financial panic that started in the East in February and moved westward. In the first four months of the year 28 eastern banks failed; by the middle of the year 32 steel companies had failed, and the price of silver continued to drop. Holden was optimistic that easterners would realize that silver was not connected to the panic, and that it was necessary to put more money in circulation, which could be accomplished through remonetization of silver.[68]

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[67] Phyllis Flanders Dorset, *The New Eldorado* (New York: Macmillan Co., 1970), 336-38; Max Silverman, "A Political and Intellectual History of the Silver Movement in the United States, 1888 - 1896" (Ph.D. diss., New York University, 1986); and James Edward Wright, *The Politics of Populism: Dissent in Colorado* (New Haven: Yale University Press, 1974), 134.

[68] Mary Beth Norton and others, *A People and a Nation: A History of the United States*, 2nd ed., vol. 2, (Boston: Houghton Mifflin Co., 1986), 575-76; and *AWT*, 27 May 1893, 1.

Colorado was not to be spared, however; the panic hit the state in late June. That same week, on June 26, India announced the closing of its mints to silver coinage; they had been a large purchaser of American silver. Within four days the price of silver plunged from 80 cents to 62 cents per ounce.[69] Leading Colorado mine and smelter owners held a portentous meeting in Denver on June 29 to discuss the crisis. They resolved that all silver mines and smelters should immediately close until the silver industry could become profitable; this move had a tremendous impact throughout the state.[70] The next day, June 30, President Grover Cleveland issued a call for Congress to convene in a special session on August 7 to repeal the Sherman Act. He was convinced that the silver subsidy was a cause of America's economic crisis. In the last week of June Colorado faced panic and depression, the closing of the India mints, the closing of Colorado silver mines and smelters, and a call for repeal by the president.

The economy of Colorado was devastated because of its dependence on silver. In July 45,000 Coloradans were thrown into unemployment, as 435 mines and 377 businesses closed. In Aspen 2,000 of the 2,200 adult male residents lost their jobs within a week. The Holden Works laid off most of their large force of men on July 25. Twelve Denver banks closed their doors in a three day period in July. By the end of the year, over 400 businesses were bankrupt and most Colorado railroads were in receivership.[71]

In August of 1893 Congress convened in a special session to consider repealing the Sherman Silver Purchase Act. The "silver senators" tried to block the repeal, but after a record breaking 80 day filibuster Congress voted on October 30 to repeal the law, ending the subsidization of the silver market. Within minutes the price of silver plummeted to 50 cents an ounce.[72] (The repeal of the Sherman Silver Purchase Act did not demonetize

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[69] Wright, 166-67.

[70] "In Darkness," *Rocky Mountain News*, 30 June 1893, 1.
Attendants from Aspen included D. R. C. Brown, D. M. Hyman, and B. Clark Wheeler. The meeting condemned Holden for sending a telegram to the east which said, "We will repudiate all our bonds and obligations due in the East, as we have no money to even pay the interest. It will bring about a new Declaration of Independence and the establishment of a Western empire." "Ed Holden's Opinion," *Rocky Mountain News*, 29 June 1893, 1. The newspaper supported Holden's actions, and explained that if Holden's plants Leadville and Aspen plants were destroyed "he will likely be a pauper." "Mr. Holden's Sin," *Rocky Mountain News*, 1 July 1893, 4.

[71] Wright, 167; and "Lixiviation Works Attached," *AWT*, 9 September 1893.

[72] Dorset, 344.
The annual average price of silver didn't reach $.80 again for 25 years, in 1917. Department of Interior, 201.

silver, as is popularly believed. The policy of the U. S. was to "continue the use of both gold and silver as standard money, and to coin both gold and silver into money..." Congress simply stopped the requirement that the government buy 4,500,000 ounces of silver per month.)[73] The repeal was almost an anticlimax in Colorado. It was the last nail in the coffin, and insured that the depression, which was already devastating the state, would continue for some time. Colorado's silver mining industry never recovered.[74]

## WAS THE HOLDEN COMPANY SUCCESSFUL?

By the 1890's the era of the independent miner working alone on a claim was past. The depletion of surface minerals led to "hard rock" mining; it was necessary to mine tons of ore to obtain ounces of valuable metals. This required large investments of capital; the miner became an employee of a corporation. The mine owner had to pay for mining costs, then pay to ship the ore to a company which would process it. The smelter, mill or sampling works bought the ore, paying for the valuable metals. But the mine owner had to pay the company a "working charge" for treating the ore, usually a cost per ton of ore. The mine owner wanted to get the best price for his ore, and pay the smallest transportation and working charges to maximize his profits. Thus, the reduction or concentration company that could extract the highest percentage of valuable minerals, and keep the working charges lowest had the best chance of acquiring the ore. As the price of silver decreased, the money to pay for mining, shipping and processing decreased. A miner may have been able to pay $12 for processing if he received $20 for the silver, but it would not be practical to pay $12 if he received only $15. Since the price of silver had been declining for some time, some mining companies had stopped developing low grade ore. Metallurgists continually tried to devise more effective and economic ways to reduce low grade ores.

Godshall, who had been supervisor at the Holden Works, was convinced that the Russell process was a good way to compete in the market for low grade ore. As late as May 1893, he tried to convince people to build lixiviation mills. He acknowledged that the smelters had been reducing their treatment charges to surprisingly low levels, and that

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[73] *Repeal of the Sherman Silver Purchase Act, Statutes at Large*, 28, (1893): 4.

[74] For a good overview of the silver question see Dorset, 336-45 and Rohrbough, 211-21.

freight charges had also dropped slightly. And yet, he pointed out, there were large quantities of low grade ores that were not processed. He recommended a Russell mill as a profitable investment, based on a cost of $10 per ton for a 100 ton per day capacity mill, and a minimum extraction rate of 90%. As evidence, he cited three large Russell mills which were operating successfully; one of these was the Holden Works.[75]

Willard Morse reported that the total cost of treating ore at the Holden Mill was $8.54.[76] The discrepancy between Morse and Godshall can be resolved by examining Morse's figures (Godshall did not include how he arrived at his cost figure). It appears that Morse did not include interest costs on loans. Holden had at least $443,000 in loans (this will be discussed in more detail below).[77] Assuming 6% interest on 14 month loans results in $31,010 in interest, or about $1.00 per ton. By adding this to Morse's cost we obtain $9.54, a figure very close to Godshall's round number of $10.

During the fourteen month period between November 1891 and December 1892, the Works treated 30,856.9 tons of ore. Since they charged $12 per ton, this resulted in an income of $370,283. Assuming a cost of $9.54 per ton, the company had about a $75,908 profit margin on treatment.[78]

When the Holden Works bought ore it paid 95% of the price of silver on the New York exchange that day. The ore that the Works treated during that period was assayed at an average of 27.9188 ounces of silver per ton, and so contained 861,488 ounces of silver. The average value of silver in 1892 was 87 cents, so the company would have paid an average of 82.65 cents per ounce, for a total of $712,020.[79]

Holden needed to extract 95% of the silver, or he would have paid for more silver than he produced to resell. However, the extraction rate on the raw ore was only 85.58%.[80] The value of the extracted silver was $641,454. Thus the company lost about

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[75] Godshall, "A Review of the Russell Process," 306, 321-22.

[76] Stetefeldt, *The Lixiviation of Silver Ores*, 2nd ed., 200.

[77] J. B. Wheeler Banking Co. of Aspen v. Holden et al, 52 Pacific Reporter 1033 (Court of Appeals of Colorado 1898).

[78] Morse, "The Lixiviation of Silver-Ores," 139; Willard S. Morse to Frank Bulkley, 9 October 1891, D. R. C. Brown Papers, Box 12, Western Historical Collections, University of Colorado Library, Boulder; and "The Holden Works," *AWT*, 7 November 1891, 2.

[79] Morse to Bulkley; Morse, "The Lixiviation of Silver-Ores," 139; Department of the Interior, 201.

[80] Morse, "The Lixiviation of Silver-Ores," 146.

$70,565 because it didn't recover all the silver it paid for. Although the profit on the working charge helped reduce the losses on silver extraction, it appears that the Holden Works had a profit of only $5,343 in 14 months.

There were two basic ways the company could have remedied the low profit: either cut costs or raise income. Cutting costs meant reducing the cost of treatment (labor, chemicals, etc.). Raising income could be accomplished either by increasing working charges, improving the extraction rate, or reducing the loss through roasting.

In February 1893 the mill cut costs by laying off six men. This was accomplished by extending the work shifts so there were two shifts with longer hours instead of three shifts.[81]

Increasing working charges would have been difficult because the smelters and railroads had been decreasing their costs. Critics in Aspen complained that Holden's price was no better than the $5 to $6 smelting charges in Pueblo or Denver plus the $6 railroad freight.[82] Thus, by increasing his charges, Holden would have priced himself out of competition.

The fact that the extraction rate on raw ore was so low (85.58%) was actually due to the loss of silver during roasting. The Holden Works extracted 94.21% of the silver in the ore that was roasted.[83] This was a good rate for the Russell process and would have been difficult to improve.

During the 14 month period, 78,901.96 ounces of silver, worth about $68,644, was lost during roasting through volatilization and dust. If the company eliminated that loss, it would have operated at a profit of about $73,987 in 14 months. As we have seen, the Holden Works elected to try just that, by installing the smoke condenser. This improvement cost $25,000, but they expected to save $5,000 per month on the lost silver. The works were closed for nearly two months to install the equipment, and reopened June 23, 1893. If they had recovered their losses in roasting, it would have made the difference between a failing and profitable company. But the company never got the chance, because of the depression and the plunge in silver prices.[84]

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[81] "Reducing Expenses," *AWT*, 3 February 1893, 2.

[82] "The Lixiviation Works," *ADT*, 12 Feb 1892, 4.

[83] Morse, "The Lixiviation of Silver Ores," 146.

[84] Morse, "The Lixiviation of Silver-Ores," 140; and "Mining Notes," *AWT*, 1 July 1893, 2.

By the time the Holden Works closed, it had accrued a significant amount of debt. However, it is not necessarily a sign of weakness when a company borrows money. Loans are frequently used to build an expensive plant, like the Holden Works, or to smooth cash flow when receivables are slow in being paid. However, when the company cannot repay the debt it usually is because of poor operating results. This was the situation with the Holden Works even before the depression struck Colorado.

The Works used several sources for its loans. Holden personally advanced the company about $200,000 and then borrowed $100,000 from Charles H. Graham.[85] Holden held all but a few of the shares of the company, and he pledged these to secure the loan from Graham. In addition, Holden borrowed a total of $143,000 from two other individuals and three banks. When Graham pressed him for payment, Holden transferred the promissory notes of the company (for Holden's advancements) for additional security on the loan.[86] Holden's creditors were getting nervous even before late June of 1893.

When the panic hit the state, the smelter and mine owners resolved, on June 29, that the silver industry should close in Colorado. The Holden Works closed on July 25. During the crisis Holden made a statement concerning the economic situation; it was described by a newspaper as "the piercing cry of pain from a man whose fortune is locked up in silver mining and silver smelters, and who had suddenly thrust upon him the painful sight of his fortune melting into nothing."[87]

The paper probably didn't appreciate just how tied up Holden's fortune was. Creditors pushed Holden for payment on their loans, so Holden mortgaged the Aspen property to secure the loans. Graham brought suit against the company for the notes which had been transferred to him. The mortgagees then started proceedings for the foreclosure of the property. The sheriff took possession of the plant and property on

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[85] Graham had known Meyer Guggenheim in Philadelphia. Graham then moved to Leadville, and convinced Guggenheim to do the same. It is likely that Holden met Graham while he lived in that city in the early 1880's, since that is when Holden met Guggenheim. Graham was involved in the Philadelphia Smelter, and in 1893 was one of its owners. He was one of the original stockholders of the Holden Smelting and Milling Co., and was involved in acquiring the property for the Holden Works.

[86] J. B. Wheeler Banking Co. of Aspen v. Holden et al, 52 Pacific Reporter 1033 (Court of Appeals of Colorado 1898).

[87] "Mr. Holden's Sin," *Rocky Mountain News*, 1 July 1893, 4.

August 29. The legal and financial problems tied to this closing would haunt Holden for years, eventually leading to his declaring personal bankruptcy in 1900.[88]

The Holden Smelting and Milling Company in Aspen had been on the verge of being a successful company. It had borrowed a large amount of capital to build and operate the plant. It had some problems with the lixiviation process, which reduced the income. As a result, the company had probably operated with an insignificant amount of profit for the period from November 1891 to December 1892. In spite of this, the management apparently believed that the plant would be successful. In May 1893 Godshall recommended the process as a profitable one. That same month the plant invested $25,000 to install a smoke condenser; this indicates the company planned to continue operating for some time. If the condenser had succeeded in retrieving the lost silver, the company would have operated at a comfortable profit. However, the plant closed only a few weeks after the installation, due to the silver panic of 1893. Like so many other companies, the Holden Works was ruined by the collapse of the silver market.

## AFTER THE HOLDEN WORKS CLOSED: THE MAN

Edward R. Holden continued to have a checkered career. About the time the Aspen plant closed, the Holden Smelter in Leadville also closed. However, his mill in Cripple Creek was successful, due in part to the increase in gold mining after the silver panic. He was president of the Senator Gold Mining Company in 1896, based in Denver. In 1900 he was associated with a mining company in Jefferson County, Montana; during that time he declared bankruptcy due to the Aspen plant creditors. In 1903, an American company, one E. R. Holden & Co., was implicated in mining stock fraud in London. It is unclear if Edward Royal Holden was involved with this. It was reported that a few years later he was seen selling newspapers at a cigar stand in the east. He came back to Cripple Creek, then built a mill in Mohave County, Arizona in 1915. Holden received eight patents

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[88] "Lixiviation Works Attached," *AWT*, 2 September 1893; Transfer of Deed of Trust, July 6, 1893, Deed Record Book 97, Pitkin County Courthouse, Aspen, Colorado; Writ of Attachment, August 29, 1893, Writ of Attachment Book 9, Pitkin County Courthouse, Aspen, Colorado; Union National Bank of Denver v. Edward R. Holden, cases 3400, 3404 (Circuit Court 1896), National Archives, Denver; and *EMJ* 69, no. 10 (10 March 1900): 299.

concerning ore reduction from 1916 to 1920. In 1917 he was president of the Holden Mining and Milling Company of Elko County, Nevada, while he lived in Los Angeles.[89]

## AFTER THE HOLDEN WORKS CLOSED: THE PLANT

During 1893 to 1895 the Aspen Holden Works's creditors filed numerous law suits against the company and each other to try to retrieve their losses. Eventually, some of the creditors decided to join together to form a new corporation to operate the mill, and to divide the profits based on their respective claims.[1] They incorporated in April 1895 as the Aspen Union Smelting Company. The principal office was in Denver, with a branch office in Aspen.[2] A similar situation had developed with Holden's plant in Leadville. There were several common creditors between Holden's two plants, including the Union National Bank of Denver. The new company that was formed in Leadville in 1894 was called the Union Smelting Company.

The members of the board of directors of the Aspen Union Smelting Company were connected with creditors and/or were familiar with the mining industry. The Union National Bank hired attorney Lyndon S. Smith to organize both new companies, and he was president and a director of both.[3] Smith had practiced law in both Denver and Aspen. He specialized in mining and corporate law, and he was identified with many of the most important mining litigations in Colorado.[4] Roger W. Woodbury was on the board of directors for both companies. He became the president of the Union Bank of Denver in 1886, and continued as president when the bank reorganized as the Union National Bank of

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[89] *Denver City Directory* (Denver: Corbett & Ballenger, 1896); *EMJ*, 69, no. 10 (10 March 1900): 299; "London," *EMJ*, 76, no. 18 (31 October 1903): 671-72; *Denver Post*, 13 July 1930, 6; "The Mining News," *EMJ* 100, no. 12 (18 September 1915): 495; U.S., Patent Office, *Annual Report of the Commissioner of Patents* (Washington: G. P. O., 1917-1921); Walter Harvey Weed, *The Mines Handbook: An Enlargement of the Copper Handbook*, vol. 12 (New York: Stevens Copper Handbook Co., 1917), 587; and *Los Angeles City Directory*, (Los Angeles, 1917).

[1] 52 Pacific Reporter 1033.

[2] "Articles of Incorporation," Aspen Union Smelting Company, 23 April 1895, Colorado State Archives, Denver.

[3] *Denver Times*, Bench and Bar edition, February 1899, 5.

[4] *Denver Times*, Bench and Bar edition, February 1899, 5; "Certificate of Incorporation," Union Smelting Company, 9 January 1894, Colorado State Archives, Denver; and *Historical and Descriptive Review of Colorado's Enterprising Cities* (Denver: J. Lethem, [1893]), 115.

Denver in 1890. Woodbury had personally loaned Holden's Aspen company almost $47,000.[5]

Other directors of the Aspen Union Smelting Company were Charles L. Hill, John L. McNeil, and Frank Bulkley. Charles Leonard Hill was a prominent mining man in Colorado. He supervised several prominent mines, one of which was the A.Y. and Minnie mine in Leadville, owned by Charles Graham and Meyer Guggenheim. Hill may have represented Graham's interests in the new Aspen Union Smelting Company. John McNeil was a mining engineer, and was secretary and manager of the Aspen Mountain Tunnel and Drainage Company. Frank Bulkley was general manager of J. B. Wheeler's Aspen Mining and Smelting Company; the J. B. Wheeler Banking Company was a Holden creditor.[6]

The Holden Smelting and Milling Company deeded the Holden Tract to the Aspen Union Smelting Company in April 1895. The Aspen Union Smelting Company started operations in a portion of the Holden Works on May 13, 1895, less than a month after incorporating. The company operated only as a sampling business at the beginning, and planned to remodel and improve the sampling works. (It is unclear if the owners ever actually implemented this plan.) Meanwhile, they experimented with methods of treating low grade ores, to determine which one they would use in the mill.[7]

One technique they investigated was the Crooke process. John J. Crooke, a noted Colorado mining man, developed a type of lixiviation similar to the Russell process, except for the precipitation. The details were kept secret by Crooke, but he used copper plates and obtained a pure silver product, instead of the sulphide of silver obtained in the Russell process.[8] Despite the investigation of milling processes, it appears that the Aspen Union

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[5] Wilbur Fisk Stone, *History of Colorado*, vol. 1, (Chicago: S. J. Clarke Publishing Co., 1918), 399; and 52 Pacific Reporter 1033.

[6] Harper, 40; and *Historical and Descriptive...*, 109, 119.

[7] "General Mining News," *EMJ*, 59, no. 21 (25 May 1895): 492; and "A Third Sampler," *AWT*, 18 May 1895.

[8] "General Mining News", *EMJ*, 59, no. 17 (27 April 1895): 396; and Western Slope Congress of Colorado, *Western Colorado*, (Grand Junction: Grand Junction *News* Book and Job Print, 1893), 59.

There were other Crooke processes. William Crookes patented a process to extract silver and gold using sodium amalgam. There was another Crooke process which was used in smelters, and involved stirring the molten ore with lead. William Crookes, *A Practical Treatise on Metallurgy*, vol. 1 (London: Longmans, Green, and Co., 1868), 347; and Henry Collins, *The Metallurgy of Lead and Silver*, part 2, (London: Charles Griffin & Co., 1900), 317-318.

Smelting Company never opened the rest of the plant under its own administration.[9] Later it did lease part of the plant to concentrating companies.

## *THE CONCENTRATION PERIOD*

> "At no time in the history of mining has there been so much call for concentrating machinery as now, and the writer believes that we are just entering what may be termed "the concentration period."[10]

Concentrating became very important to the entire mining industry in the late 1890's for three reasons: mines produced predominantly low grade ores; a Colorado man invented the Wilfley table, a significantly better concentrating machine; and the development of a large smelting industry on the plains.

In Aspen, and across the country, silver mines had depleted their high grade ores. If Aspen's low grade ore was sent to a smelter in Denver or Pueblo, transportation and smelting charges had to be paid on the full weight, the cost of which reduced or eliminated profits. This problem could be solved by concentrating, or dressing, the ore; that is, discarding some of the worthless material (gangue).

Ore dressing was the process of mechanically (rather than chemically) separating some gangue from the valuable minerals, thereby increasing the percentage of metal in the ore. The term was also applied to separating metals which in combination were not desirable in the smelting process. Concentration was a type of ore dressing that used water. Ore dressing was not an end process. Its products (concentrates which were 1/3 to 1/12 of the weight of the original) were shipped to smelters or mills.

Concentration had been practiced for years, though not always with satisfactory results. The Wilfley table (patented in 1895) revolutionized concentration because it generated significantly better yields at a low cost (about 85 cents per ton in 1899.)[11] The table was about 18 feet long and 7 feet wide. The top was inclined, covered with linoleum, and had strips of wood, or riffles, across the surface. The crushed ore was fed at the upper corner, and water washed over it, while the table was vibrated mechanically.

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[9] "General Mining News," *EMJ*, 64, no. 25 (18 December 1897): 735.

[10] F. L. Bartlett, "Concentrating Plants for Small Mines," *EMJ*, 65, no. 19 (7 May 1898): 549.

[11] Wascott, "Mining in Aspen District, Colorado," letter, *Mining and Scientific Press*, 79, no. 18 (28 October 1899): 492.

The combination of the inclination, the riffles, water, gravity, and the motion of the table caused the heavier metals to accumulate, and the lighter material was washed away.

This new design of machinery satisfied Aspen's needs, and the town gained the distinction of having numerous concentrating mills. The plants were instrumental in keeping the Aspen mines open, by enabling them to operate at a profit.

## THE THATCHER MILL

During the concentrating period, the Holden Works would have been a sensible location for a such an operation. The buildings, crusher, stamps, water and railroad access were all available. The Argentum-Juniata and Mollie Gibson mining companies wanted to jointly install a concentrator in the old Holden plant, and negotiated for it in December 1897. Apparently, however, the negotiations were not successful because later that same month the Aspen Union Smelting Company leased part of the Holden plant to George W. Thatcher, who remodeled it as a concentrator.[12]

Captain George Thatcher was a well known, early Aspen pioneer, who was active in the community. He was instrumental in the successful drive to form Pitkin County. The captain was given credit for convincing capitalists to build the first smelter in Aspen (the North Texas Mill), and he was the marshall of the parade at the completion of the Rio Grande Railroad into Aspen. Thatcher had been manager of the Little Rule, Durant and Compromise mines, and had interests in a number of other mines.[13]

Thatcher's contract with the Aspen Union Smelting Company covered the southern part of the Holden Works. It included the sampling works, the office and assay room, the stamps, the mill power plant, the blacksmith shop, water rights, and all railroad side tracks. The owners gave him permission to change the location of a crusher and a set of rolls from the sampling works (to use them with the concentrating tables) but he had to return the machines to their original position at the end of the lease. Thatcher was also given permission to erect a building on the site, and to put a new electric dynamo in the power house where the former dynamo was set. The lessee was to take care of the leaching

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[12] "General Mining News," *EMJ*, 64, no. 25 (18 December 1897): 735; "Lease," book 139, p. 523, Pitkin County Clerk.

[13] "Aspen: The Men Who Led the Way Over the Divide," part 2, *AT*, 30 April 1881, 1; *AT*, 28 October 1882, 3; *ADT*, 1 November 1887, 4; and Harper, 42.

tanks, and was to repair the dam, flume and ditch which conveyed water from Castle Creek to the mill.[14]

When Thatcher opened the Aspen Concentrating Company, or the Thatcher mill, as it was called, the plant was comprised of a crusher, stamps, and six Wilfley tables. The pulverized ore was washed from the stamps through 40-mesh screens into the launder which conveyed it to the tables on the floor below. Five of the tables took the ore from the launder, in regular gradations of fineness, while the sixth handled slime from a five-berth settling tank.[15]

The mill ran on custom ores, that is, the company was not affiliated with one particular mine. One of the mines whose ore was treated was the Copperopolis Mine on West Aspen Mountain, of which Thatcher was a major owner.[16]

Although it seems like the Thatcher mill should have been successful, it apparently was not. The plant had a large capacity, 200 tons per day, and had trouble securing sufficient ore to keep it in operation.[17] This may have been a contributing factor to its closing before the end of its contract.

## THE STARK MILL

Although the Thatcher contract was supposed to last until January 1901, in the fall of 1899 the Stark Milling Company was installed in the old Holden Works. Edward R. Stark leased the plant and remodeled it, adding machinery for a concentrating mill.[18]

Stark had a background in both ranching and mining. He had been a butcher and Elbert County cattleman before he made his fortune investing in mines in the Cripple Creek area. He was president of the Mutual Mining and Milling Company, treasurer of the Raven Gold Mining Company, and a director of the Union Gold Mining Company. Although Stark apparently continued to live in the Colorado Springs area, he was well

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[14] "Lease", book 139, p. 523.

[15] "General Mining News," *EMJ*, 65, no. 17 (23 April 1898): 501. Slimes were very fine particles of ore.

[16] Ibid.

[17] "Pitkin County Again Experiences Prosperity," *Denver Times*, 31 December 1898, 24.

[18] "Pitkin's Output Presses $3,000,000," *Denver Times*, 31 December 1899, 21.

acquainted with stockmen and ranches across the state. He was appointed to the office of state inspector of cattle, horses and sheep, under the State Sanitary Board.[19]

The Stark mill was a custom mill, and had a capacity of 100 tons per day; it used a different process from the Thatcher mill. First the stamps pulverized the ore to a size that would pass through a 40-mesh screen. It was then sized by an upward current of water against a descending stream of pulp.[20] The heavier sizes were conveyed to Wilfley tables and the slimes to V-shaped boxes, where the settled pulp was treated on Frue vanners.[21] Stark claimed that the combination of the two systems - the Wilfley table for the coarse sand and the Frue vanner for the slimes - saved 70% of the valuable metals.[22]

By the time the Stark mill was operating, it was proudly reported that Aspen had more concentrating works than any other section in the West. The Smuggler mine had two concentrating plants, one for silver-lead ores and one for silver-zinc ores. The Mollie Gibson and Argentum-Juniata mining companies operated a large joint mill. The Famous Mining Company had a concentrating plant which treated the Little Annie group of mines.[23]

Because the Stark mill was the only custom mill in the camp, it depended on mines that didn't have their own concentrating mills. During a portion of 1900 the Stark mill was idle from a lack of ore supply. However, late that year it was used as a test mill on D. R. C. Brown's Della S. and Homestead mines ores, so the mill was running full time.[24] However, the next year Brown built his own mill to treat the ore from his numerous mines.[25] It was a critical blow to the Stark mill to lose that business, and the plant subsequently closed.

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[19] "Cases of Great Luck in Mining Strikes," *Denver Times*, 19 February 1899, 20; and Sargent & Rohrabacher, *The Fortunes of a Decade*, (Colorado Springs: The Evening Telegraph, 1900), 32.

[20] Pulp was crushed ore mixed with water.

[21] A Frue vanner was a table-mounted endless belt which was a concentrating mechanism. The pulp flowed onto the belt surface, which shook or vibrated side to side. As a result, the heavier metals sunk to the bottom and the lighter gangue stayed near the top, then was washed away. Hardesty, 43.

[22] U.S.G.S., *Mining in Colorado*, 199 citing U. S. Treasury, *Report of the Director of the Mint upon the Production of the Precious Metals in the United States During the Calendar Year 1900*, by G. E. Roberts, 1901.

[23] "Pitkin's Output Presses $3,000,000," *Denver Times*, 31 December 1899, 21.

[24] U.S.G.S, *Mining in Colorado*, 199 citing U. S. Treasury, *Report of the Director*; "Pitkin County Hopeful," *Denver Times*, 30 December 1900, sec. 3, 5.

[25] "Aspen, Celebrated for Its Mines Over the Range," *Denver Times*, 10 November 1901, 17.

*THE NEW HAMPSHIRE YEARS*

Throughout its ownership of the old Holden works, the Aspen Union Smelting Company had financial difficulties, and creditors continued to beleaguer the owners. In April 1901 the company finally gave up and transferred the title of the Holden Tract to Arthur H. Hale, of Manchester, New Hampshire. It is likely that the land transfer was related to a debt. Hale was treasurer of the Merrimack River Savings Bank (in New Hampshire) from 1899 to 1930, as well as the vice president of his local First National Bank.[26]

The New Hampshire resident owned the Holden Tract until March, 1923, when he transferred title to Marion C. Smyth, also of Hillsboro County, New Hampshire. Again, it is likely that the land transfer was related to debt or bank business. Smyth's late husband had been Frederick Smyth, who was the founder of the Merrimack River Savings Bank and had held controlling interest until his death in 1897. Mrs. Smyth continued to be involved with the bank and was a good manager of the wealth she inherited from her husband.[27] After owning the Holden Tract for four years, she transferred the Holden Tract to the Merrimack River Savings Bank in 1927. The property returned to a Pitkin County owner in January 1932, when W. C. Tagert bought the land.[28]

It is unclear what happened on the Holden Tract during the 31 years that it was owned by New Hampshire parties. It's possible that it lay dormant, or was rented to ranchers. About 1922-23 Fred Cullet's family lived in the building that had served as the office of the Holden Works. During that time Cullet rented nearby ranch land from a company based in Colorado Springs (possibly former Colorado Midland Railroad owner Albert E. Carlton.)[29] It is known that during "the New Hampshire years" the mill fell into disrepair. By 1904 the mill was closed, the building was in bad condition and going to

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[26] "Deed," book 142, p. 386, Pitkin County Clerk; and Elizabeth Lessard of Manchester Historic Association to Lysa Wegman-French, 27 June 1990, Aspen Historical Society Archives.

[27] "Quit Claim Deed," book 159, p. 201, Pitkin County Clerk; and Lessard to Wegman-French. The Merrimack River Savings Bank closed in 1930, when it was discovered that Arthur Hale had been embezzling funds. Hale was sent to prison, and Mrs. Smyth was left in much reduced circumstances.

[28] "Quit Claim Deed," book 158, p. 329, and book 55, p. 293, Pitkin County Clerk.

[29] Amelia Trentaz, interview by author, telephone, Aspen, 2 August 1990.

decay, and the machinery had "gone to ruin."[30] Area residents took advantage of the abandoned resource, and salvaged its lumber and hardware. By the time Tagert acquired the property, the mill was gone. The sampling works, the salt warehouse and the office/assay building were the only large remaining structures. Parts of the mill are probably in homes and on ranches all across the valley.

In May 1932, only a few months after Tagert acquired the 20 acre Holden Tract, he released the title to Frank Jr., Rudolph, and Stephen Marolt for one dollar. They combined it with their other recent purchase, the Midland Ranch, to form the Marolt Ranch.[31]

## CONCLUSION

Edward R. Holden was a shrewd operator who had been involved in several companies in the mineral production industry. He was not reckless, so he spent much time and money investigating the Russell process and Aspen ores before he decided to build the Holden Works in that town. He observed that the district needed a local plant to handle dry, low grade ores.

When the Holden Works opened, the Russell lixiviation process fit an industry niche. It extracted more silver than amalgamation, and was promoted as the way to process dry, low grade ores which the smelters could not treat profitably.

However, some problems in the Russell process became evident over time. The roasting was much more important than originally believed. Operators needed to achieve a perfect chloridation to efficiently retrieve silver. In addition, a significant amount of silver was lost during roasting, through volatilization and dust. There was some question if the wrong type of furnace had been purchased. During the first wash with water, silver reverted to an insoluble form. These problems combined to create a low extraction rate. Adjustments were made to improve production, but the most crucial improvement was never tested since the plant closed during the silver panic.

From a business point of view, the company was marginal. Reasons included a continual decline in the price of silver, along with problems in the lixiviation process. In addition, the company carried a significant amount of debt, which it was unable to repay. It installed a smoke condenser to improve its recovery rate. However, we will probably never know if the "improvement" was successful. If it was effective, it would have tipped

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[30] *Aspen, Pitkin County, Colorado*, (New York: Sanborn Map Co., 1904): 2.

[31] "Quit Claim Deed," book 157, p. 356, Pitkin County Clerk.

the scales to make the company profitable. Unfortunately, the panic of 1893 struck Colorado at that time, and the silver economy in Colorado, along with the Holden Smelting and Milling Company, came to an end. Several attempts were made to operate milling businesses in the Holden plant, none of which were successful. The Holden Tract was controlled by absentee owners for three decades. The site entered a new era when it was added to the Marolt Ranch in 1932.

## PART TWO: FARMING AND RANCHING

The Aspen mining camp had been, since its founding two years earlier, filled with animals. Horses, mules and jacks, sometimes wandering freely, congested the streets. The pack animals were all in demand. The mines used jacks to haul ore through the tunnels. Jack trains then carried the tons of ore over the mountains to the nearest railroad, near Leadville. Horses were used for transportation (pulling wagons and buggies, and riding). But while the town did not have a shortage of the four-legged creatures, it did have a shortage of food for them. Hay was scarce, and it sold for astronomical prices. The few ranchers that were scattered in the Roaring Fork Valley didn't produce enough hay to satisfy the demand. The animals weren't the only ones who were short of nourishment. The miners lived on a monotonous diet of bread, salted pork and canned goods. Their foodstuffs came from Leadville on jack trains, and the prices were high.

However, the autumn of 1881 brought the exciting promise of fresh vegetables, fruits and meats, and hay. The Ute Indians were removed from their reservation, which had extended over most of the valley. Settlers rushed into the valley to claim farms, and immediately began cutting grasses for hay. Settlers dreamed of making the land productive, miners dreamed of a variety of fresh food at reasonable prices, and both envisioned an agricultural industry to match the thriving mining industry.

### SETTLEMENT 1879 - 1889

The year 1879 marked the beginning of white settlement in the Roaring Fork Valley. Miners were the first residents, attracted by the silver in the Aspen area. Farmers and ranchers were slow in coming to the Roaring Fork Valley, partly because the lower valley was on the Ute Indian Reservation.

There were 30 to 40 farms in the valley between Aspen and the Grand River during the winter of 1881-82. However, they cultivated such a small total area that they were not visibly noticeable during a trip down the Roaring Fork Valley.[1] John C. Eames was the

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[1] *AT*, 18 February 1882, 2; and *AT*, 27 August 1881, 1.

first rancher in the Roaring Fork Valley, being there in 1879 with the mining pioneers.[2] Charles Jacobs and Henry Staats were the first homesteaders in the Snowmass-Capitol Creeks area, in 1880. Jacobs located on the site that was later the Fred Light Ranch, and Staats located on Lime Creek, on the present site of the St. Benedicts monastery.[3] Another one of the first ranches in the valley was that of Phil Pratt and Don Sebree, who delivered hay in Aspen in 1880. Their ranch was located on Wild Cat Creek, which emptied into the east side of Snowmass Creek (spelled Snow Mass at that time).[4]

The farming pioneers experimented with crops and techniques during the summers of 1880 and 1881. They found that the Roaring Fork Valley had difficult conditions in which to grow crops. The elevation of the valley floor went from 6,000 to 8,000 feet, and side valleys extended up towards 13,000 foot peaks. When they started they didn't know that the average growing season was only 76 days, nor that the nights got close to freezing, nor that the average annual precipitation at Aspen was 19.2 inches and the humidity was very low. However, they learned that the soil was good, made of clay loam and sandy clay loam.[5] The new farmers planted a variety of crops and were pleased with the results; they found that the Roaring Fork Valley was "prolific in agricultural resources."[6]

## THE UTE RESERVATION AND THE LAND RUSH

The Ute Indians were restricted to the western third of Colorado, starting in 1868. The eastern border of their reservation was 107 degrees west longitude, a north-south line about 1/2 mile west of the confluence of Snowmass Creek and the Roaring Fork River. Aspen was not on the reservation, though settlers attracted to the mining camp spilled over onto the reservation.

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[2] "Aspen: the Men Who Led the Way Over the Divide," *AT*, 30 April 1881, 1; and "Farming Lands," *AT*, 1 January 1884, 6.

[3] Charles D. Hart, "History of Capitol and Snowmass Creeks," typescript, n.d., Pitkin County Public Library, Aspen, Colorado. 3.

[4] "Our Ranches," *AWT*, 26 September 1885, 4.

[5] County Information Service, Department of Economics, Colorado State University, *County Data Book* (Fort Collins: Colorado State University, 1980.

[6] "Aspen: History of the Mining Discoveries of Pitkin County," *AT*, 7 January 1882, 2.

During that period, American citizens commonly believed that land should be "productive." Since the Ute Indians were not farmers, Anglos believed that the Indians were wasting the land on the reservation. The whites believed it was their divine right and responsibility to acquire the land and make it productive; the Utes were greedy to keep all that land for themselves.

Governor Pitkin discussed the Ute Reservation in his message to the state legislature in 1879. He rhapsodized that every kind of grain and fruit could be grown there without difficulty, and that it contained one-third of the arable land in Colorado. However, he stated, the land was going to waste. "It has been claimed that the entire tribe have had in cultivation about 50 acres of land ... and I believe that one able-bodied white settler would cultivate more land than the whole tribe of Utes," he proclaimed.[7]

The demands for the Ute removal peaked after the natives attacked the White River agency in 1879. The government convinced the Utes to sell most of their land to the U. S., including the lower Roaring Fork Valley. The last of the northern Utes were ushered out of Colorado into Utah in September 1881.[8]

As soon as the Utes left, settlers streamed into the region, although Congress had not yet declared that the area was public land available for settling. The peak of the land rush was in late 1881 and early 1882. By the first of April the majority of ranch land had been claimed. The agricultural section of the valley that was most in demand was between the Frying Pan River and the Crystal River (Rock Creek), where the valley was wide.[9] About 100 ranches were located and improved to some degree by July. Improvements included housing, fences, ditches, and the breaking and planting of land.[10] The summer of 1882 marked the beginning of significant production in the valley.

These early ranchers in the Roaring Fork Valley settled on their land before it had been officially surveyed, and, below Snowmass, before it was officially in the public domain. The newspaper observed "Uncle Sam has not yet surveyed these lands, nor placed

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[7] Alvin Steinel, *History of Agriculture in Colorado* (Fort Collins: State Agricultural College, 1926), 99.

[8] Wilson Rockwell, *The Utes: A Forgotten People* (Denver: Sage Books, 1956); and Harold Van Horn, "Absorption of Public Lands in Colorado: 1860 - 1890" (M.A. thesis, University of Denver, 1965), 20, 161.

[9] "Farming Lands," *AT*, 1 January 1884, 6.

[10] "The Valley," *AT*, 1 April 1882, 2; "Ranch and Garden," *AT*, 9 September 1882, 3; "Ranch and Garden," *AT*, 1 July 1882, 3; and *AT*, 15 July 1882, 2.

One rancher constructed artificial lakes just below the Frying Pan River to raise trout. "Down the Roaring Fork," *AT*, 27 May 1882, 2.

them in the market; yet the 'actual settlers' are here in great numbers, and more are constantly arriving.[11] When western pioneers found themselves in this gap before legitimate agencies of law and government were available, they formed protective associations, or claim clubs. The settlers on the Roaring Fork formed a protective association in May 1882.[12]

Claim clubs usually regulated how lands were claimed and recorded, helped register claims, protected squatters from claim jumpers, and helped them purchase the land when it was opened for legitimate settlement.[13] The Roaring Fork association charged Aspenites with infringing on their rights, and swore that no members would be imposed on by jumpers.[14]

Many ranches were claimed by speculators. They did not intend to ranch, but planned to sell the land at a profit. The *Times* criticized these people for being like the Utes who were driven from their reservation because they did not put the land to "practical" use.[15]

As was common in western towns, the local newspapers took on the booster role. Aspen needed the hay, meat, vegetables and fruits at reasonable prices that a local agricultural community could provide. It was in their own best interest, therefore, to promote the Roaring Fork valley as an agricultural paradise. The paper promoted the valley with glowing praise. The editors predicted wonderful changes in the Roaring Fork Valley that summer of 1882, where "now are only waste lands filled with sage brush, generous farms will be seen." And more to the point of why the Aspen newspaper was so interested, they foresaw that "our market will be well supplied with vegetables of all kinds." They looked forward to the time when "all breadstuffs necessary for our

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[11] "Down the Roaring Fork," *AT*, 27 May 1882, 2.

[12] *AT*, 3 June 1882, 3.

[13] George L. Anderson, "The El Paso Claim Club, 1859-1862," *Colorado Magazine*, 13, no. 2 (March 1936): 42.

[14] *AT*, 3 June 1882, 3.

[15] *AT*, 15 July 1882, 2.
Patricia Nelson Limerick observed, "Speculation is extremely disillusioning *if* you are trying to hold on to the illusion that agriculture and commerce are significantly different ways of life, one representing nature and virtue and the other artifice and temptation to vice. In truth, agriculture was not a refuge from or an alternative to commerce. Rather, the two were often intertwined." *The Legacy of Conquest: The Unbroken Past of the American West*, (New York: W. W. Norton & Company, 1987), 68.

inhabitants would be grown in the valley."[16] The newspaper assured the reader that "dwellers of this county will no longer import butter and cheese from the East, but will get their supply at home, and strongly compete with the dairy products of the East. And to these same hills the great cities will look for their supplies of beef and mutton."[17] The conditions were conducive to good farming, the editors explained. The land was good, easily irrigated, and not so extensive that the products would exceed the demand. The newspaper promoted agriculture as an easily profitable venture. Prices were high and farming was thought to be profitable. The editors proclaimed that men could purchase farms at reasonable prices, and "soon be able to live a life of ease and comfort on the natural increase of their stock and crops."[18] The *Times* also took on the role of agricultural agent, by distributing farming information and by displaying samples of crops in the newspaper office.[19] During the summer of 1882 the Aspen *Times* ran a regular column entitled "Ranch and Garden," because they observed that ranching in the Roaring Fork Valley had come to assume "no small share of public attention."[20] Noting that about half the county was good farming and grazing land, while the other half was valuable for timber and mining, the paper proclaimed, "Ranching is a valuable auxiliary to mining, and is sure to become a great factor in Pitkin County success."[21]

In spite of the crowing and glowing predictions, the new ranchers had to start on a small scale with the basics. A typical home was a one room log cabin with a dirt floor and a dirt roof; rooms were added on in a line when needed.[22] Farm implements and teams of horses were scarce, so much work was done manually. As a result, it was

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[16] "Roaring Fork Valley," *AT*, 25 March 1882, 2.

[17] "Down the Roaring Fork," *AT*, 27 May 1882, 2.

[18] "Garfield and Pitkin County's Agricultural Wealth," *AT*, 29 March 1884, 6; and "Farming," *AT*, 13 October 1883, 4.

[19] See, for example, *AT*, 10 November 1883, 4.

[20] "Ranch and Garden," *AT*, 1 July 1882, 3.

[21] "Pitkin County," *AT*, 1 January 1884, 7; and "Ranch and Garden," *AT*, 9 September 1882, 3.

[22] Hart, 4; and "Down the Roaring Fork," *AT*, 27 May 1882, 2.
Some of the ranchmen used their dirt roofs as hot beds and raised crops on them. C. C. Hardsell raised all his cabbage and cauliflower plants on his roof. "Ranch Notes," *AWT*, 3 October 1885, 4.

unusual for a farm to have as much as 20 acres of broken ground in 1882.[23] By the end of the summer of 1882 it was estimated that about 250 acres were broken and planted, on about 100 ranches.[24] Within only two years ranchers plowed and planted larger areas.

Roads were of mixed quality. Farmers could take produce to market using a wagon road between Aspen and the Crystal River, almost 30 miles. However, bridges were scarce and crossing the river was dangerous. The "road" between the Crystal River and [Glenwood] Hot Springs was handled better on horseback than by wagon.[25]

The Ute Reservation Act was passed late in the summer of 1882, almost a year after the Utes had left the reservation. It designated the old reservation as part of the public domain available for sale. Senator N. P. Hill, of Colorado, sponsored the bill, and President Chester A. Arthur signed the proclamation on August 10, 1882.[26] Although the law made the land available for settling, it did not allow use of the Homestead Act.

"Homesteading" is often used as a generic term; many public lands were distributed by the federal government through a variety of other laws. The Ute Reservation Act stipulated that settlers had to pay $1.25 per acre for the agricultural property, so the land had to be claimed via the Preemption Act.[27]

The Preemption Act gave squatters the first priority on buying 160 acres of public lands which they had occupied and cultivated.[28] The law was also used to claim federal lands other than those on the reservation. When settlers claimed land east of Snowmass before it had been officially surveyed (as many did), they used the Preemption Law to

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[23] *AT*, 2 September 1882, 3.

[24] "Ranch and Garden," *AT*, 9 September 1882, 3.

[25] "A Summer Resort," *AT*, 26 August 1882, 3.

[26] Lois Borland, "Ho for the Reservation; Settlement of the Western Slope," *Colorado Magazine*, 24, no. 1 (January 1952): 56, 75-76; Harold Van Horn, "Absorption of Public Lands in Colorado: 1860 - 1890" (M.A. thesis, University of Denver, 1965) 20, 161; *AT*, 29 July 1882, 2; and *AT*, 5 August 1882, 1.

[27] Borland, 76; and James Muhn, U. S. Bureau of Land Management land law historian, interview by author, Lakewood, Colorado, 20 July 1990.

[28] U. S. Department of the Interior, Bureau of Land Management, *Opportunity and Challenge: The Story of the BLM*, by James Muhn and Hanson R. Stuart (Washington, D.C.: G.P.O., 1988), 13.

acquire the land.[29] After the government had surveyed the land, the settlers used other public land laws, such as the Homestead Act.[30]

During the following summer of 1883 settlers continued to change the valley. The *Times* noted that while vegetation had originally been "sparse," it had become "luxuriant" due to irrigation. More roads were built, and the valley was "spider-webbed with fences."[31]

By the end of 1883, most of the fine farming land from Aspen to Woody Creek had been appropriated by settlers. Ranchers on the south side included Timothy Stapleton, John Wustum and Alex Cruikshank; those on the north included Jote Smith, Luther Wellman, and Messrs. Burrow, Corkhill, and McLain. Settlers at Woody Creek included Jack Ryan, and Messrs. Carlison, Frason, Bergh, Foster, Wathen and Boyce.[32] Ranchers located in the Capitol and Snowmass Creek area were John R. (Jack) Williams, Fred Light, Herbert Harmon, Walter Borom, and John White.[33]

Services were established in the valley. Sanderson's Stages traveled between Glenwood Springs and Aspen. They stopped for dinner at the Interval House, the home of County Commissioner Sam Cramer. His Sopris ranch was at the mouth of Sopris Creek. The Emma post office was established on the adjoining Emma Ranch in 1883, and ranch owner Mrs. Emma Garrison was named postmaster.[34]

In the next few years the valley continued to progress. Land sold for $3 to $10 per acre before the U. S. title was obtained, even though there was still some property available from the government.[35] Because ranchers claimed land before it was surveyed, there were disputes concerning ownership.[36]

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[29] The Pre-emption Act was repealed for most places in 1891, although it continued to be enacted on the old Ute Reservation. That same year the Desert Land Act was extended to the old reservation. The Homestead Law was extended to that area in 1902. Muhn, interview.

[30] Muhn, interview.

[31] "Farming Lands," *AT*, 1 January 1884, 6.

[32] "Farming Lands," *AT*, 1 January 1884, 6.

[33] "Capital Creek," *AT*, 1 January 1884, 6; and Hart, 3.

[34] "Farming Lands," *AT*, 1 January 1884, 6; and *AT*, 1 December 1883, 4.
Note that there was a site called Emma years before the railroad came through. It has been said that the railroad crews named the town after the woman who cooked for them there.

[35] "Garfield and Pitkin County's Agricultural Wealth," *AT*, 29 March 1884, 6.

[36] *AT*, 25 May 1884, 6.

People continued to settle in the valley, and more services were provided. By the end of 1885 there were 150 ranches in Pitkin County under cultivation. Though Emma was not a city, it had four stages daily, two stopping places for the stages, freight wagons passing through, a daily mail in two directions, and miles of fences.[37]

There was much new construction in the valley, an indication of good times. The temporary log hut of early days was starting to give way to more substantial homes. New stabling for 60 head of stock was planned at Emma. The owners of Dinkel's stage stop, near present day Carbondale, were building a granary, and adding a second story to the barn. The lower floor was for 60 head of stock and the upper for hay.[38]

Transportation was still difficult in the valley. There was still a lack of good roads, although many had been built. Crossing creeks was often dangerous because of the limited number of bridges, which were often constructed privately. The farmers of the Capital and Sopris Creek valleys built a bridge by subscription. It immediately washed out, but they responded by building a higher, more substantial bridge.[39]

## TRUCK GARDENING

The term truck gardening refers to growing produce in season for the local market; it had been the common practice since ancient times.[1] The term market gardening came to describe growing crops and stock for shipment to distant markets out of season; this system developed nationally after about 1880.[2]

For over a decade truck gardening was the primary form of farming and ranching in the Roaring Fork Valley. The farmers cut hay, and raised crops and stock for the local market. Even as late as 1898, wheat, oats, barley, rye, timothy and alfalfa all found a booming market in Aspen. Truck gardening was reported to be "exceedingly profitable."[3]

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[37] "In Retrospect," *ADT*, 1 January 1886, 4; and "Our Ranches," *AWT*, 26 September 1885, 4.

[38] "The Robinson Ranch," *ADT*, 7 March 1886, 3; and "Ranch Notes," *AWT*, 26 September 1885, 4.

[39] "Our Ranchers," *AWT*, 10 October 1885, 4.

[1] The term was used throughout the 1800's, long before the invention of the motorized truck. It came from the noun truck, meaning small commodities for barter or trade; truck became synonymous with garden produce for market.

[2] U. S., Department of the Interior, Census Office, *Census Reports for the Twelfth Census, 1900*, vol. 6, *Agriculture*, part 2: *Crops and Irrigation* (Washington, D. C.: G.P.O., 1902), 321.

[3] "The Farms of Pitkin County," *Denver Times*, 31 December 1898, 30.

Some of the products were sold to grocers and feed stores, and some were sold to private customers.

## *CROPS*

### ANIMAL FORAGE - NATIVE

The first major produce from the farms in the valley was hay made from native grasses that grew there naturally. The new ranchers cut the grasses, then took them to Aspen in sacks or in bales on burros (usually called jacks). Hay was so scarce in 1881 that it sold for 12 1/2 cents a pound, totaling an astounding $250 per ton. During the spring of 1882 the cost was down to five cents a pound ($100 per ton). In 1883 new hay sold quickly at $35 per ton.[4] The hay was used for the many horses, mules and other livestock used by the miners and freighters. The ranchers encouraged the native grasses by irrigating large meadows.[5]

Blue stem was the common name for the native grass that was prevalent in the valley. This was probably *Agropyrum glaucum*, also known as Colorado Blue Stem; it was abundant in both the mountains and plains. In the higher mountain meadows it was shorter, about ten inches, while along streams on the plains it reached 30 inches. Stockmen spoke highly of its qualities.[6] It is possible that blue stem was *Agropyron smithii.* Although it was sometimes called bluestem or Colorado bluestem, it was more commonly called western wheatgrass.[7] Red Top was another common native grass in the valley. This was probably an *Agrostis*, possibly *Agrostis exarata* or *Agrostis alba.*[8]

Possibly the highest ranch in the state or U. S. was a hay ranch at the top of Smuggler Mountain. J. R. Williams discovered the level park at 11,000 feet, in about 1882. He cut more than 100 tons of native grasses for hay, but he was never able to

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[4] William M. Dinkel, as told to Ivah Dunklee, "A Pioneer of the Roaring Fork," *Colorado Magazine*, 21, no. 5 (September 1944): 186; "Down the Roaring Fork," *AT*, 27 May 1882, 2; and *AT*, 8 September 1883, 4.

[5] *AT*, 2 June 1883, 4.

[6] Colorado, State Agricultural College, Agricultural Experiment Station, *Some Colorado Grasses and their Chemical Analysis*, bulletin 12 (Fort Collins: State Agricultural College, 1890), 138.

[7] Steinel, 110.

[8] Colorado, *Some Colorado Grasses.*

move it down the mountain. Williams abandoned his claim; later Larry Maroney and T. O. Clark took up the ranch and burned the hay.[9]

ANIMAL FORAGE - CULTIVATED

Although native grasses continued to be the dominant hay for several years, "tame grass" gained in popularity and became more important by the late 1880's. Ranchers often mixed the native and cultivated hay, making it, for instance, part timothy, part red top and part blue stem.[10]

When farming started in the valley, no one knew what to expect. White people were new to the area, so the farmers didn't know what the growing season was, what the common temperatures were, how much precipitation fell, or what type of soil there was. Since the Utes were not farmers, there was no track record of crops. As a result, everything the farmer did was an experiment. Only trial and error taught the settlers what worked on valley farms.

Through such experimentation, timothy (*Phleum pratense*) and alfalfa[11] became common hay crops; alsike and red clover were also grown.[12] A few ranchers tried alfalfa in the Roaring Fork Valley in 1882, and thought it was promising.[13] The following year they learned the value of alfalfa, and by 1885 had planted a large amount of the crop. The perennial was hardy and flourished even at high altitudes. It produced three crops per year when watered regularly, and yielded five tons per acre, more than other hays. It was

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[9] "The Highest Ranch in Colorado," *ADT*, 16 January 1891, 3.

[10] *AWT*, 10 October 1885, 4.

[11] As late as 1872 the Greeley *Tribune* said "Alfalfa clover is not much esteemed; it looks like a weed. Possibly it may amount to something; if it does, we shall say so." Within two years Colorado farmers were taking notice of the crop which seemed too good to be true. Steinel, 415.

[12] Jerome C. Smiley, *Semi-centennial History of the State of Colorado*, vol. 1 (Chicago: Lewis Publishing Co., 1913), 560.

Timothy was the most important hay grass in the United States in the early 1880's. U. S., Department of Agriculture, *Grass, The 1948 Yearbook of Agriculture*, (Washington, D. C.: Government Printing Office, 1948), 684.

[13] "Ranch and Garden," *AT*, 9 September 1882, 3.

liked by stock and cattle, and was a good beef and milk producer.[14] In 1889 the State Experiment Station said, "We believe alfalfa to be the best forage plant for Colorado."[15]

By 1885 hay production (of both native and tame grasses) was thriving in the valley. A rancher set the record for hay per ranch with his 200 ton crop.[16] The hay crop in the valley was valued at $100,000, prompting a newspaper to comment, "Surely there are mines on top of the ground as well as beneath the surface."[17]

Grains were also fed to animals. During the first trial season of growing grain, in 1883, farmers produced 10,500 bushels. Oats accounted for 90% of the grain that year; barley, wheat, rye, millet, and buckwheat were also grown, in descending order of quantity.[18] Winter wheat was harvested early in the summer of 1883, and spring wheat was raised with excellent results that year.[19] This wheat was probably used as animal feed.

In the spring of 1884 many ranchers planted oats and wheat. William Tierney plowed about 125 acres on Woody Creek, mostly for oats, wheat and peas. He had three teams of horses and 12 men at work. Near Emma, Stewart and Shafer planted 35 acres of oats and wheat, while Hook and Hopkins sowed 20 acres of oats and ten of wheat.[20]

Grains, especially oats, were well established crops by 1885. About 1,700 acres were devoted to grains, and that year the valley produced seven times more grain than it

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[14] *AT*, 1 December 1883, 4; and "Ranch Notes," *AWT*, 19 September 1885, 4.

[15] Steinel, 417.
Colorado led the country in both acreage and production at the turn of the century. U. S. Department of the Interior, Census Office, *Census Reports for the Twelfth Census, 1900*, vol. 6, *Agriculture*, part 2: *Crops and Irrigation* (Washington, D. C.: G.P.O., 1902), 203.

[16] *AWT*, 10 October 1885, 4.

[17] "Grain in the Valley," *RMS*, 9 January 1886.

[18] "Gleaning," *AT*, 15 December 1883, 1.

[19] "Ranch and Garden," *AT*, 9 September 1882, 3; "Pitkin County's Proclivities to Wheat Raising," *AT*, 10 November 1883, 4; and "Farming Lands," *AT*, 1 January 1884, 6.
Winter wheat was planted during the late summer or early fall and harvested in early summer. Spring wheat was planted in the spring and harvested in August or early September.

[20] *AT*, 17 May 1884, 6; and "Emma Notes," *AT*, 26 April 1884, 1.

had in 1883.[21] Three threshing machines worked in the valley that year to separate the grain from the chaff.[22]

FOOD

Up to 1882, Aspen's diet had consisted primarily of bread, canned goods, and bacon (salt side or salt pork). The residents were understandably excited during that first summer of significant cultivation, when garden and ranch truck greatly improved their provisions. By early June farm products were coming to town from the Roaring Fork Valley.

Farmers experimented during those first years to determine which crops grew in the valley. They learned that warm weather crops and ones that needed a long growing season, such as tomatoes and corn, were not successful. However, cold weather crops grew well, such as peas, parsnips, radishes, lettuce, onions, turnips, beets, sugar beets, cabbage, carrots and potatoes. By the end of the "first" summer of 1882, farming was declared an "unqualified success."[23]

Each farmer planted a variety of crops to learn more about crops, to spread the risk, to supply their animals with necessary feed, and to add variety to their diet. T. J. Burke's ranch on Brush Creek had 40 acres of oats, two acres of barley, two of rutabagas, and four each of potatoes and turnips, plus he cut about 20 tons of hay. Alex McKenzie cut 15 tons of hay on his ranch on Snowmass Creek, plus he had five acres of turnips, four acres of oats, and one of potatoes. He and his wife also had a small herd of milch cows. W. F. Coxhead's truck garden on the Crystal River included turnips, potatoes, and cabbage. In addition, he had 10 acres of oats, 3 acres each of rye, buckwheat, and potatoes, and he cut 15 tons of hay.[24]

Ranchers also experimented with small fruits and fruit trees. Judge and Arthur Waite had a ranch on Snowmass, where they set out several hundred plants and shrubs,

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[21] "Grain in the Valley," *RMS*, 9 January 1886; and "In Retrospect," *ADT*, 1 January 1886, 4.

[22] "Harvest Results," *AWT*, 3 December 1885, 4.
Fred Light threshed a total of 32,127 bushels, all but 145 of which were oats. Amounts ranges from 51 to 2,717 bushels per farm, an average of 606.2 bushels for each of the 53 farmers. The top producers in order were Jote Smith, C. S. Chatfield, the Marion brothers, Tim Stapleton, Fred Light, William Tierney, Bennett & Pock, and W. L. Thomas. Ibid.

[23] "Ranch and Garden," *AT*, 9 September 1882, 3.

[24] "Our Ranchers," *AWT*, 19 September 1885, 4.

including grapes, currants, and strawberries.[25] Mr. Wathan put several thousand strawberry plants and two hives of bees on Dry Woody Creek.[26] Citron was also grown.[27] Apple trees were planted on a farm near Satank, on Rock Creek (Crystal River), and in 1882 it was reported that they were doing well. In 1884 several men set out fruit trees. Most of the trees wintered well, so many farmers planted fruit trees in 1885.[28]

Farmers were hesitant to raise wheat for human consumption because there was no grist mill in the area.[29] W. H. Henry planted winter wheat and rye in late 1885, and was possibly was the first to attempt their culture in the Emma district; this was three years after it was demonstrated that wheat could be grown in the valley.[30] Mr. Hyde finally opened a grist mill near Glenwood Springs in 1886.[31]

In addition to valley farmers, town residents also planted crops. Mrs. J. M. Beach of Aspen planted her yard with strawberries, currants, asparagus, rhubarb and cereals, as well as climbing roses and vines.[32]

Farmers found a ready market for their crops in Aspen, and later in Glenwood Springs. County Commissioner Sam Cramer, whose ranch near Emma was in three counties, opened a depot in Aspen to sell farm and dairy products. He sold all kinds of vegetables and fruits, including potatoes, lettuce, radishes, carrots, parsnips, turnips, beets, spinach, cabbage, cauliflower, apples, pears, peaches, and strawberries; he also sold butter, cheese, and eggs.[33]

The greater availability of crops in the valley brought prices down, though they were still high in comparison to other places. During the spring of 1882 Aspenites had to

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[25] *AT*, 31 May 1884, 6.

[26] *AT*, 14 June 1884, 4.

[27] "Ranch Notes," *AWT*, 26 September 1885, 4. This probably referred to a small hard-fleshed watermelon used in pickles and preserves.

[28] "Ranch and Garden," *AT*, 26 August 1882, 3; and "Our Ranchers," *AWT*, 19 September 1885, 4.

[29] "Pitkin County's Proclivities to Wheat Raising," *AT*, 10 November 1883, 4; and "A Chance for a Grist Mill," *AT*, 15 September 1883, 1.

[30] "Our Ranchers," *AWT*, 5 December 1885, 4.

[31] "Glenwood Notes," *RMS*, 13 February 1886, 3.

[32] "Ranch and Garden," *AT*, 8 July 1882, 3.

[33] *AT*, 21 June 1884, 4.

pay 10 cents per pound for potatoes. By the fall of 1883 the price had dropped to about 2 1/2 cents per pound; this cost remained constant for some years. However, in spite of the decrease, this price was still five times the cost in New York.[34]

The early years of farming were filled with experiments. Farmers found that the area had good markets, water and timber, rich soil which was easily plowed, a productive climate, and that many crops grew there. The success of these tests added to the value of the land around Aspen.[35]

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[34] "Down the Roaring Fork," *AT*, 27 May 1882, 2; *AT*, 30 October 1883, 4; and "Ranch Notes," *AWT*, 5 September 1885, 4.

[35] "Agricultural Experiments," *AT*, 6 October 1883, 4.

## STOCK

### *CATTLE*

The valleys of the Roaring Fork and its tributaries made an ideal grazing place for animals. Since game animals were attracted the area, there was not as much pressure to raise cattle as there was to grow crops. Some men earned their living by hunting. One said he killed 180 deer in a 15 day long hunt during the winter of 1881-82. Hunters brought in wagon loads of deer to Aspen to sell at 5 cents per pound.[36]

In spite of the abundant game, cattle were brought into the valley. As with crops, the cattle were used in the local community. John C. Eames was the first to engage in the cattle business in the Roaring Fork Valley, in 1879.[37] Quite a few settlers came to the valley and established small cattle ranches about the summer of 1882. They included M. H. McLaughlin, M. L. Shippie, Horace Gavin, S. P. Sloss, G. W. King, C. H. Harris, B. Bourg, Fred Light and A. B. Foster (the latter two were later active on the grazing issue). Ranchers who started in the cattle business around 1883 included Ed Banning, J. W. Zimmerman, James T. Dalton, H. B. Gillespie,[38] Mr. Bennett, and R. D. Strang.[39]

The number of cattle and size of herds increased in the next few years. Pitkin County had 150 head of cattle in 1884; this figure didn't include the lower valley in Eagle and Garfield counties, where more cattle were raised.[40] The next year Pitkin County had 250 milch cows, and about 1,500 head of beef cattle.[41] Reefe and Nuckolls brought in the first large herd of cattle to the valley in the summer of 1885 or 86. Mr. Robinson owned more cattle in 1886 than were in the entire county only two years earlier. He had 250

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[36] "Down the Roaring Fork," *AT*, 27 May 1882, 2; and *AT*, 1 December 1883, 4.

[37] "Aspen: the Men Who Led the Way Over the Divide," *AT*, 30 April 1881, 1.

[38] Wilbur Fisk Stone, *History of Colorado*, vol. 1, (Chicago: S. J. Clarke Publishing Co., 1918), 523-24.

[39] *AT*, 27 October 1883, 4; and *AT*, 17 November 1883, 4.

[40] *AT*, 5 January 1884, 2.

[41] "Our Ranchers," *AWT*, 5 December 1885, 4.

head of cattle at his ranch on Spring Creek, off Owl Creek.[42] A few years later I. W. Chatfield had 500 head of cattle on his ranch at Emma.[43]

Cattle that grazed on the open range were branded, and sometimes had their ears marked. These brands and marks were registered with a central agency. The secretary of state was responsible for recording brands and ear marks beginning in 1885. Beginning in 1899 the owners had to pay an annual fee to keep the brand.[44]

Ranchers in the valley acquired their cattle in various places. Some cattle were brought to the valley and sold there. A cattle sale was held in the valley in 1883. A man brought cattle from Buena Vista to sell in the valley in 1886.[45] Usually ranchers went to others places to purchase stock, such as the Eastern Slope (including Denver and Pueblo),[46] Huerfano County and a ranch near the Utah line.[47]

Most cattle were beef cattle, although there were dairy ranches. Donald McLean's ranch was 4 miles down river from Aspen. He had about 40 milch cows in 1885, and supplied much of the city with milk. R. C. Wilson had 30 Holstein cattle. R. D. Strang had a dairy ranch on Cattle Creek, with 90 cows.[48]

The type of beef cattle raised in the valley changed over time. Most of the cattle in the valley in the 1880's and 1890's were of a nondescript variety of Longhorn heritage. There were, however, finely blooded cattle in the valley as early as the fall of 1883 when Col. F. A. Barlow offered such a cow and calf for sale for $75.[49]

Cattlemen slowly improved their herds by crossbreeding rangy cows with purebred English bulls. This process parallelled the activities on the plains, although conversion occurred more slowly in the higher elevations than on the eastern plains. Mountain ranges

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[42] Stone, 524; and "The Robinson Ranch," *ADT*, 7 March 1886, 3.

[43] "Cattle Dying," *ADT*, 9 March 1890, 2.

[44] Ora Brooks Peake, *The Colorado Range Cattle Industry* (Glendale, California: Arthur H. Clark Company, 1937), 187-88.

[45] *AT*, 21 April 1883, 3; and *AWT*, 25 September 1886, 4.

[46] Stone, 523-24; *AT*, 21 June 1884, 4; and *AWT*, 22 May 1886, 2.

[47] *ADT*, 9 August 1887, 4; and *AT*, 10 November 1883, 4.

[48] "Our Ranchers," *AWT*, 10 October 1885, 4; "R. C. Wilson's Ranch," *AWT*, 23 April 1887, 4; and *AT*, 17 November 1883, 4.

[49] *AT*, 27 October 1883, 4.

## PITKIN COUNTY.

Joseph Bogue, Emma.

Benedict Bourg, Aspen. ① r. & l. h. h. b same r. & l. sh.

L. F. Curtis, Aspen.

Foster & McLachlin, Aspen.

Hattie C. Foster, Aspen.

Horace Gavin, Emma.

H. B. Gillespie, Aspen. J L 7 ‖ Wm. Lemond, Aspen.

Ann McKenzie, Aspen. ‖ Jas. McLaughlin, Aspen. //

A. A. Reed, Emma. 6 T ‖ A. Richards & Sons, Aspen.

E. W. Shearer, Aspen. ‖ M. L. Shippy, Emma. 

Ida C. Teller, Aspen. G8 ‖ Ella Tierney, Aspen.

Joseph Thaler, Aspen. ‖ Jos. D. Todd, Aspen. X J

Wheeler & Peiffer, Aspen. 555

T. M. Williams, Aspen. ‖ J. R. Williams, Aspen. 

Colorado Brand Book, (Denver: S. H. Standart, 1887).

required characteristics that were often overlooked in cattle breeding. Mountain cattle had to travel long distances, over steep hills, and be able to forage under difficult conditions. Heavy show-ring bulls couldn't travel easily, so did not reproduce as well in the mountains.[50] However, Durham Shorthorn cattle were found to be well adapted to varied conditions in Colorado, including elevated parks, and this breed was used more than all other improved breeds put together in the mid-1890's. The Hereford, or Whiteface as it was commonly called, was the only other pure breed that was used in large numbers. It was especially adapted to hilly pastures.[51]

The amount of high grade blood in the valley stock increased over the years. In 1885 Judge William Tierney had a herd of about 100 Shorthorn cows, plus about 50 young. Ed Robison imported Shorthorn and Hereford bulls for his herd of 240. A man from Buena Vista sold $17,000 worth of Shorthorns and Holsteins in Aspen in 1886. John White, of Borom and White, purchased 264 head of Shorthorns and Herefords in 1887.[52] However, most of those blooded cattle were not recorded purebreds. In 1890 there were only 22 registered cows in the county, 549 were one-half blood or higher, and 1,685 were common or native cattle.[53]

Cattlemen across the West encountered problems when they introduced cattle into the new habitat. Loco weed was poisonous to cattle, and it was blamed for stock deaths in Aspen. Larkspur was also poisonous to cattle, second only to loco weed in its toll.[54] It was prevalent in the mountains, and was especially dangerous from mid-March to early July.[55] Weather was also difficult for the stock. Many valley ranchers worried about their

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[50] Colorado, *Cattle-Ranch Organization*, 40.

[51] Colorado, State Agricultural College, Agricultural Experiment Station, *Cattle Feeding in Colorado*, bulletin 34 (Fort Collins: Agricultural Experiment Station, 1896), 3.

[52] "Our Ranchers," *AWT*, 10 October 1885, 4; "Our Ranches," *AWT*, 24 October 1885, 4; *AWT*, 25 September 1886, 4; and *ADT*, 9 August 1887, 4.

By the late 1920's Herefords dominated the cattle in Colorado, and far outnumbered the Shorthorns. By that time, Shorthorns were more commonly used for small farm herds. Steinel, 161.

[53] U. S., Department of the Interior, Census Office, *Report on the Statistics of Agriculture in the United States at the Eleventh Census: 1890* (Washington, D. C.: G. P. O., 1895), 279.

[54] *AT*, 14 June 1884, 1; and Peake, 228.

[55] In some areas of the state it was necessary to "ride poison" when cattle were moved to the mountain ranges by having several cowboys herd cattle away from blooming larkspur. Potassium permanganate was a cure, but it had to be administered when the animal first went down, so ranchers carried it with them as they rode the range. Richard Goff and Robert H. McCaffree, *Century in the Saddle* (Denver: Colorado Cattlemen's

cattle during the severe storms in 1884, and some wondered if stock could really be raised in that locale. "Some of the things said in favor of this country for stock raising will have to be taken back and somewhat qualified," the usually optimistic *Times* advised.[56]

The winter of 1889-90 was a turning point for cattle ranchers in the valley. During the early years ranchers had allowed cattle to graze on the range all year, usually without supplemental hay. There had been so much native grass that cattle did well all winter even when the snow was deep. However, as cattle became more numerous, and the lower ranges were used for crops, the range was overgrazed. The grass was cropped so closely that when the snow was deep the cattle couldn't eat. The winter of 1889-90 was hard, and in March 1890 many thousands of cattle died in Western Colorado due to the lack of feed. Stockmen in the Roaring Fork Valley who did not have the means to feed their cattle had heavy losses, and some went bankrupt. Rather than reduce the size of their herds, however, the stock growers decided they had to raise winter feed for their cattle; this had implications for their cash flow, their land use, the condition of the range, and the size of their herds.[57]

*HORSES*

Horses served various functions in the valley, including farm and ranch work (cow horses and draft stock), transportation and entertainment. Eventually the stock in the valley were bred for these specific purposes.

Many of the early horses used in the West were wild, descended from escaped and abandoned horses of the Spanish and Indians. The availability of these herds of mustangs made the price of horses low in the 1880's and early 1890's. As the herds diminished and the demand for horses increased, stockmen turned their attention to breeding, using foundation stock that came from outside the state.[58]

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Centennial Commission, 1967), 235-36; and Peake 231.

[56] *AT*, 23 February 1884, 4.

[57] "Farming," *AT*, 13 October 1883, 4; "Cattle Dying," *ADT*, 9 March 1890, 2; "The Cattle Loss," *ADT*, 21 March 1890, 4; and Ed P. Wilbur, as told to J. N. Neal, "Reminiscences of the Meeker Country," *Colorado Magazine*, 23, no. 6 (November 1946): 274-75.

[58] Smiley, 610-11.

Horses were necessary for ranch work; about 500 work horses were in Pitkin County in 1885.[59] When horses were bred for improved qualities, Percherons were the favored draft breed in the valley. They were spirited and quick in their movements, and well suited for general farm work. The prevailing color in the area was black or dark brown, though occasional gray or bay animals were also seen. Percherons weighed from 1450 to 1700 pounds. The ponderous Belgian horses introduced and bred by J. D. Brunton on his Glendale Stock Farm were larger and moved at a slower gait than the Percherons. Cleveland bays were also used as light draft and riding horses.[60] Various breeds were used for riding stock and cow horses. In later years Morgan stallions were introduced and ranged with brood mares at the Fred Light ranch[61]

Later, syndicates of stock farmers across the state organized to purchase imported stallions of the improved breeds, and it was not unusual for them to pay $3,000 to $5,00 for them.[62] The Roaring Fork Percheron Horse Breeding Association, a band of farmers, purchased "Boston," the blue ribbon winner at the local Horse Show in 1905. He then won the silver cup for the best stallion on exhibition at the Glenwood Springs fair.[63]

Ranchers also bought and bred race horses. Hambletonians were a common choice; they were a Standardbred horse that had been developed for harness racing. Horse races were popular in the valley. Woody Creek was a favored racing area from the mid-1880's. Pairs of horses from ranches in the valley raced against each other, in one to three races per event day. Considerable money changed hands.[64] In the late 1880's the races were moved to the new course at the athletic park in Aspen.[65]

By 1900 the interest in racing had developed beyond local horses. The Aspen Driving and Athletic Association hosted an annual horse race on their grounds; it attracted race horses from all over the western United States. The three day event offered $3,000 in

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[59] "Our Ranchers," *AWT*, 5 December 1885, 4.

[60] Hart, 23; and "A Great Horse Ranch," *ADT*, 10 March 1889, 4.

[61] Hart, 23.

[62] Smiley, 610-611.

[63] "'Boston' Wins Silver Cup," *ADT*, 30 September 1905, 1.

[64] "The Woody Races," *AWT*, 25 September 1886, 3; *AWT*, 28 September 1886, 2; and "Ranch Notes," *AWT*, 26 September 1885, 4.

[65] *ADT*, 19 May 1889, 4.

prize money, and drew 1500 people.[66] Although primarily a racing event, contests included steer roping, bucking bronco, and steer riding.[67]

Two ranchers who were noted for their blooded horses were Eugene H. Grubb and prominent mine owner H. B. Gillespie. Grubb often went to Illinois to buy horses. Originally, he purchased horses for both the Grubb brother's Mount Sopris Ranch near Satank on the Crystal River and for Gillespie's El Jebel ranch near Emma. Later Grubb brought back carloads of horses to sell in the valley. During one typical trip he purchased 15 brood mares, a pair of road mares and a Hambletonian stallion, along with a Hambletonian road mare for Mrs. Grubb. He sold five mares for an aggregate of $2,200.[68]

Other ranchers also purchased and bred graded stock. M. L. Shipper and Horace Gavin raised blooded horses on the south side of the large Emma Flat. R. C. Wilson took great pride in his blooded horses; he had 27 Hambletonians, and many others, on the range west of Rock Creek.[69]

Thefts of the horses also occurred. A pair of dappled grey Norman (Percheron) mares were stolen from A. McPherson, from his ranch just below Aspen. He had paid $500 for them. His neighbor R. R. Bowles had a horse taken the same night. In another incident, J. I. Stewart, who took a prominent part in the races at the athletic park, was arrested for stealing a horse. Stewart was Mackey's driver in the trotting races and reportedly took one of Mackey's horses, valued at $125. The driver also owned several horses himself.[70]

The character of the Colorado horse changed in the decades around the turn of the century. The small, wiry, vicious bronco and cow pony were replaced by the large strong horses like Percherons, Belgians and Cleveland Bays and quick race horses like Hambletonians. These breeds were successful in the valley because they suited the needs of the residents.

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[66] *Aspen Tribune*, 24 August 1900, 4; "The Races a Great Success," *Aspen Tribune*, 25 August 1900, 4.

[67] *Denver Republican*, 27 August 1900.

[68] "A Fine Lot of Horses," *AWT*, 1 May 1886, 1; "Blooded Horses," *AWT*, 23 April 1887, 2; and "A Great Horse Ranch," *ADT*, 10 March 1889, 4.

[69] "Our Ranchers," *AWT*, 5 December 1885, 4; and "R. C. Wilson's Ranch," *AWT*, 23 April 1887, 4.

[70] "Horse Stolen," *AWT*, 8 October 1887, 4; "Arrested for Stealing Horses," *ADT*, 10 August 1890, 4.

IMPLEMENTS AND TECHNIQUES

It was difficult to obtain large farm equipment before the railroads started serving Aspen in late 1887. Most of the work was done by hand, or with horse power. The new farmer first faced the difficult task of clearing the land. Sagebrush could be killed by watering, and the dead brush cleared by dragging. Jack oak, chokecherry and service berry bushes had to be grubbed (uprooted) by hand using a grubbing hoe. Aspen trees were first cut down, then the stumps were removed by pulling or grubbing. There were also a great many rocks to remove. Small stones were put on stoneboats or drags then thrown into piles; big boulders were blasted into pieces which were then hauled away with the small rocks.[1]

Fences were constructed mainly by manual labor. Scrub cedar or pinon made durable fence posts, and extra large jack oak was also used when available. Aspen trees were used only for temporary purposes since they soon rotted.[2]

Some supplies could be ordered through the mail or purchased locally. Farmers ordered fruit trees, strawberry plants, flowers and shrubs, and other nursery products from a company in Kansas City, Missouri through Judge Warner A. Root, the local agent. Seeds were often ordered from a mail order house, especially D. M. Ferry of Detroit. Ranchers could also purchase seeds, farming tools, and other supplies from local dealers such as Cowenhoven & Co., though at high prices.[3]

Early farmers used simple tools and a lot of manual labor. William Dinkel cut hay with a butcher knife. He made an irrigation ditch without surveying instruments, establishing the grade by watching the water flow then correcting the slope. Dinkel purchased an Oliver Chilled Turn plow, a span of mules and harnesses in Aspen, and his partner plowed for neighbors at $5.00 an acre. Dinkel dropped onion seed from a bottle with a quill in the cork, and covered oats by dragging a log over the field. They cradled the oats and bound them by hand. He threshed the grain by throwing it in the air and letting the wind carry away the chaff.[4]

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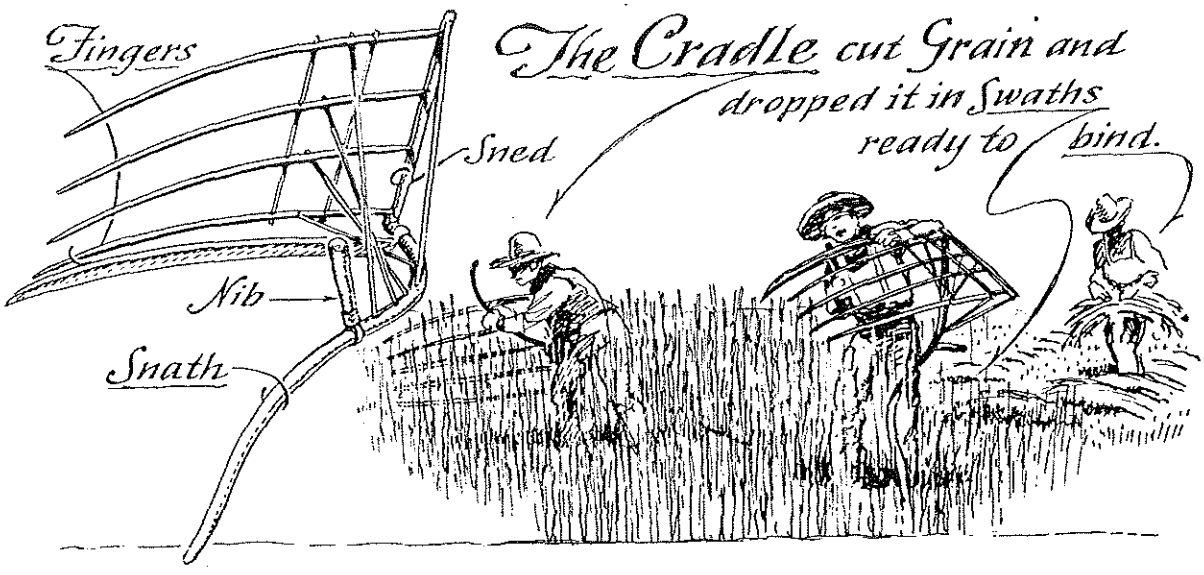
[1] Hart, 21-22.

[2] Hart, 22.

[3] *AT*, 15 December 1883, 4; *AT*, 18 February 1882, 2; "Ranch and Garden," *AT*, 9 September 1882, 3; and *AT*, 5 May 1883, 4.

[4] Dinkel, 189.




Eric Sloane, Seasons of America Past (New York: Wilfred Funk, Inc., 1958), 70.

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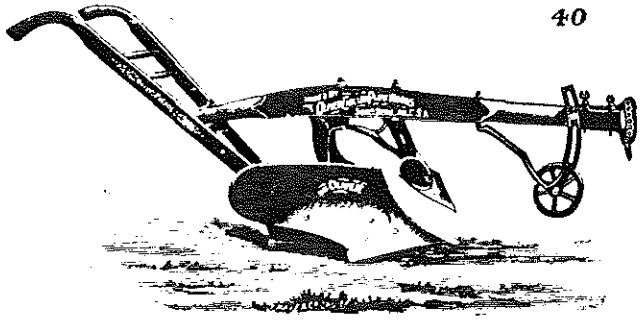

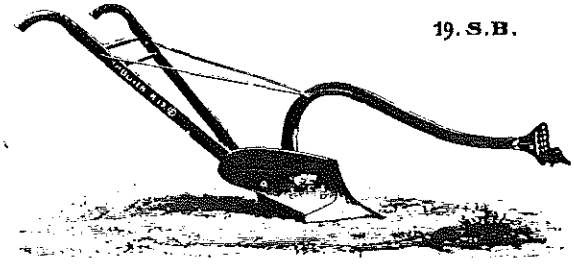

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RobertK. Mills, ed., Implement and Tractor: Reflections on 100 Years of Farm Equipment (Overland Park, Kansas: Intertec Publishing Corp., 1986), 16.

Since it was difficult to obtain large farm equipment, it was notable when the machines entered the valley. They were often lent or rented to fellow ranchers. The first two threshing machines in the county were purchased by Fred Light, and by David Brown for Cowenhoven and Co. in 1883.[5] These threshers were powered by about six teams of horses. The first steam engine thresher was acquired in 1886 by J. W. Brandis and Al Quate; the engine was horse-drawn. Threshing took place in the fall after harvesting. It was quite a social event, involving all the farmers in the valley. The machines traveled from farm to farm, accompanied by groups of farmers who helped their neighbors. The men worked hard all day, and the entire hungry crew was fed by the hosting farm women. The women were involved in friendly competition to try to set the best table in the valley, and they prepared for the event for weeks in advance.[6]

Other machines also came into the valley. A mowing machine was purchased by Fred Light in 1882.[7] Quate, of Emma, purchased the first twine self-binder, in 1884.[8] That same year, John T. Peck, of Red Mountain Ranch, brought the first patent incubator to the county. It was called the Success, and had a capacity of 400 eggs. It was heated by lamps, and had an electric battery attachment to regulate the heat and turn the eggs.[9] Walter Borom and John White purchased a Dietrich hay baler for $700 in 1885; it baled a ton of hay per hour. The machine was delivered as far as Granite (east of the divide), and the ranchers' teams brought it from that town. Borom and White contracted to bale hay for their neighbors.[10] Ed Robinson brought the first sulky plow to the valley that same year. Jote Smith, on Woody Creek, had a large hay press, to which the surrounding ranchmen came to bale their hay. O. D. Smith, the agricultural dealer, demonstrated a Flying Dutchman plow on some land that had proven to be impossible to plow with even

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[5] Timothy Stapleton was first to have his oats threshed. Light threshed the grain in the valley for farmers for a number of years.
*AT*, 8 September 1883, 4; *AT*, 5 November 1883, 1; *AT*, 17 November 1883, 4; and "Harvest Results," *AWT*, 3 December 1885, 4.

[6] Jake Lucksinger, "Reminiscence 'As I Remember'" typescript, n.d., Aspen Historical Society Archives; "Grain in the Valley," *RMS*, 9 January 1886; and "Roaring Fork Valley," *AWT*, 3 December 1887, 4.

[7] "Ranch and Garden," *AT*, 15 July 1882, 3.

[8] *AT*, 24 May 1884, 6.

[9] *AT*, 14 June 1884, 4.

[10] "Ranch Notes," *AWT*, 3 October 1885, 4; "Ranch Notes," *AWT*, 10 October 1885, 4; and "Our Ranches," *AWT*, 24 October 1885, 4.

the heaviest plow and four horses. The Flying Dutchman and two horses made quick work of the land.[11]

## IRRIGATION

> "To write about Colorado agriculture and say nothing concerning irrigation, would be like enacting the play of Hamlet, leaving out the principal character therein."[12]

Many of the early ranchers raised crops without irrigation, although they chose their ranch sites so they had access to water. Early settlers did not have basic information concerning water in the valley; the streams had not been measured, no one knew the amount of rain, nor the amount of snowfall, and water supply was considered inexhaustible; it was commonly believed that a river water would always be available to irrigate the fields. As much as the *Times* praised agricultural opportunities in the valley, the paper wasn't always blind to reality. They warned: "To those who intend to locate in the valley this year we would say 'Study well the art of irrigation.'"[13]

Land that had access to water was claimed first. Land on the steppes just down river from Red Butte were untouched until a group of Aspen businessmen announced they would build a ditch from Hunter's Creek to the upper steppe, a distance of seven or eight miles. As a result, all the land was quickly claimed.[14]

The settlers learned through trial and error the best way to apply the irrigation water. One author recommended flooding grain once or twice per year; and that for vegetables water should run in furrows more frequently.[15]

The sequence in which ditches were claimed was important because of the water law in Colorado. The state constitution stipulated that the doctrine of "prior appropriation" governed all water usage; that is, the first to claim water had the highest priority in its use (or first come, first served). Five ditches were claimed in the Roaring Fork Valley in

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[11] "Our Ranchers," *AWT*, 3 October 1885, 4; "Notes from Woody," *AWT*, 12 December 1885, 4; and "Nothing Stumps It," *AWT*, 15 May 1886, 2.

[12] William E. Pabor, *Colorado as an Agricultural State: Its Farms, Fields, and Garden Lands* (New York: Orange Judd Company, 1883), 37.

[13] "Roaring Fork Valley," *AT*, 25 March 1882, 2.

[14] *AT*, 30 October 1883, 4; and "Down the Roaring Fork," *AT*, 27 May 1882, 2.

[15] Pabor, 46.

1880; the first was the Waco Ditch on Woody Creek. The following year 14 ditches were claimed, and in 1882 31 were appropriated; a similar number were claimed in the following years.[16] The ditches were small, mainly under five miles long, and were owned and controlled by the irrigators.[17]

As the demand on the water in Colorado increased, more careful control was required, so the state was organized into water districts. The valley was in water district 38, which consisted of all lands irrigated by waters taken from the Roaring Fork and its tributaries.

## OCCUPATIONS

Some miners became ranchers, some ranchers became miners, and some men kept their hands in both fields. Dan Feeley transferred some mining property to James T. Stewart, John B. Robinson and Mr. Breese in exchange for part of their ranches.[18] Simon Wheatley, foreman of a mine in Leadville, moved with his family to a ranch below Snowmass. Walter Borom & John White of Ashcroft bought a hay ranch to feed their teams and jack trains, which hauled the ore from the Montezuma and Tam O'Shanter mines to the Aspen Smelter. The Grubb brothers were engaged in mining at Tourtelotte Park.[19]

Some ranchers were involved in two occupations at once. Judge Watson owned a ranch. J. C. Eames was proprietor of the Aspen Livery, Sale and Feed Stables. Alex Cruikshank was a builder and contractor. John Jett was a blacksmith at Dinkel's.[20]

Some ranchers hired others to manage their ranch. J. W. Muir was head gardener on the Connaughton Ranch on Red Mountain. Captain Thatcher's ranch on Brush Creek was superintended by Mr. Hayward. P. Wall managed C. H. Jacobs' ranch.[21]

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[16] Colorado, State Engineer, *Biennial Report for the Years 1889 and 1890* (Denver: Collier and Cleaveland Lth. Co., 1890), 413-422.

[17] U. S., Department of the Interior, Census Office, *Report on the Statistics of Agriculture in the United States at the Eleventh Census: 1890*, (Washington, D. C.: G.P.O., 1895), 125.

[18] *AT*, 5 May 1883, 4; and *AT*, 18 August 1883.

[19] *AT*, 17 November 1883, 4; *AT*, 1 January 1884, 6; and *AT*, 8 July 1882, 1.

[20] "The Ranches," *AT*, 24 March 1883, 2; *AT*, 11 June 1881; *AT*, 19 August 1882, 1; and "Our Ranchers," *AWT*, 3 October 1885, 4.

[21] "Ranch and Garden," *AT*, 15 July 1882, 3; *AT*, 29 July 1882, 3; and *AT*, 1 January 1884, 6.

Pitkin County didn't have many women farmers. One example was Mrs. Cruikshank, who had a 300 acre ranch six miles from Aspen on the south bank of the Roaring Fork, just above the mouth of Brush Creek. Her daughter Emma assisted her mother in the "management of domestic affairs."[22]

Ranches also served as stopping places for the stages, and as hotels. W. M. Dinkel and R. W. Zimmerman were proprietors of the stopping place known as Dinkel's, near Carbondale. For a time they had the only store between Aspen and Glenwood Springs. They also had stables for animals, a saloon and a blacksmith shop.[23] Foster and McLachlin had a stopping places below Woody.[24] Mrs. Ottawa Tanney had a 20 room hotel called the Ottawa House near the Crystal River.[25]

## AN AVERAGE FARM IN THE ROARING FORK VALLEY

The typical farmer came to the Roaring Fork Valley in 1882 during the land rush. He located 160 acres, and later filed his preemption claim with the government. His first crop was the native grass that he cut for hay. At first he only planted about a dozen acres with garden truck, and fenced perhaps half of that. The remainder of the land was unplowed. He and his neighbors started planning an irrigation ditch, though it took years to build. The farmer had a team of work horses and had a few cattle which grazed on the mountain sides in both summer and winter. His home was a simple log cabin. The farmer experimented with a variety of garden crops such as cabbages, radishes, peas, onions, strawberries, currants, rhubarb, asparagus, potatoes, beets, turnips, squash, watermelon, spinach and cucumbers. He also experimented with cereals for his stock. He found that most cool weather crops could be grown, but that oats and potatoes were especially successful.

The farmer took his produce to Aspen on a spring wagon or sleigh (later he also sold in Glenwood Springs). He was welcomed heartily by the miners who had been living

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[22] "The Local Mirror," *ADT*, 11 August 1887, 4.

[23] They had two farms, and produced 1,800 bushels of oats in 1885.
"Our Ranchers," *AWT*, 10 October 1885, 4.

[24] "Ranch Notes," *AWT*, 3 October 1885, 4.

[25] Tanney was called "the pioneer woman of the Rock Creek valley;" she and her husband settled at her ranch in 1880, before any other woman had ventured below Aspen. In 1886 she sold her hotel and ranch property for $2,500.
"Our Ranchers," *AWT*, 3 October 1885, 4; and *AWT*, 28 September 1886, 2.

on bread, bacon and canned goods. The miners and freighters quickly purchased his hay to feed their stock. The farmer sometimes bought his supplies in Aspen, though prices were so high that he preferred to acquire goods elsewhere. People kept saying that farming was profitable, but the expensive supplies cut into his earnings.

In a short time the farmer had acquired a few chickens, pigs, milk cows, and more beef cattle. After supplying his family, he sold the remainder of the fryers, eggs, milk, butter, beef and pork during weekly or bi-weekly trips to town. He kept hay for his horses and cattle, to feed them over the winter. He built a new farm house, replacing his cabin. His neighbor started raising horses to sell in the valley; his stock included draft, riding and race horses.

By 1890 the farmer had improved about 70 acres of his land, around 60 of which were irrigated. He planted several acres of garden truck, about 15 acres of oats, 2 acres of wheat, 1/2 acre of barley, 3 acres of potatoes, and 4 acres of alfalfa. He mowed about 30 acres for hay. His livestock included 15 beef cattle and five milk cows. The value of his farm products was about $1,200 that year, though the value of his land, buildings, implements and livestock was about $4,000.[26]

In summary, the 1880's were a time of settlement, experimentation and establishment of activities. The farmers and ranchers first arrived with great hopes, but little knowledge about the country. They experimented with native grasses, crops, livestock, implements, techniques, irrigation, and markets. They shared information with their neighbors. They learned the characteristics of the climate and soil, what crops and animals could be raised, how and what to feed the animals, how to irrigate, the limits of their water supply, how much to charge for their goods, and where and when to sell their products. By 1890 Aspen was at its peak as a mining center, and Glenwood Springs was becoming a popular resort; both provided growing markets. During the decade of the 1880's the valley farmers converged on a standard mix of crops and stock. Their foundation of information and experience gave them the confidence to pursue further goals.

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[26] U. S., Department of the Interior, Census Office, *Report on the Statistics of Agriculture in the United States at the Eleventh Census: 1890* (Washington, D. C.: G. P. O., 1895), 101, 201, 279, 359, 425, 463.

## COMMERCIALIZATION, ORGANIZATION AND CONFRONTATION, 1890 - 1910'S

During the decades after 1890 the farmers and ranchers in the Roaring Fork Valley continued to develop the crops and stock that were successful in the 1880's. Their activities shifted focus, however, when railroad transportation became available. They gradually developed outside markets for their products, which influenced their operations. Cattle and potatoes were raised in greater numbers to satisfy the larger market. In addition, the residents worked cooperatively through numerous associations that were established and flourished during this time. The federal government began controlling grazing lands, and the ranchers adamantly defended their rights to free grazing. Their local associations gained state-wide popularity and influence among ranchers and politicians.

### CATTLE

The cattle business in the early days was based on cheap land, cheap cattle, and low operating costs. As these factors changed, the ranchers had to change. After the early 1890's, cattle relied more on hay during the winters. The government started controlling grazing on its property. More blooded cattle were introduced, and cattle rustling became a perennial problem. The emphasis shifted from local trading to distant markets.

The costs of cattle raising increased after the early 1890's. One reason was that the rancher had to supply his stock with more hay, due to overgrazing of the range. In the early days a Colorado cattle rancher's investment in land was less than one-fourth the investment in cattle. A cow only needed one-fourth ton of hay. However, as more cattle came in, feeding had to be increased until the ranchers in mountain areas raised an average of 1 1/3 acres of hay and feed crop per head of cattle.[1]

Pitkin County ranchers continued to add more good quality stock to the herds. Several ranchers bought registered Hereford and Shorthorn bulls at the Western National Live Stock Show held in Denver in 1908. These ranchers included John White, and the Williams brothers of Snowmass, and William Finley and Charles Hart of Capitol Creek.[2]

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[1] J. N. Neal, "Ranching in Rio Blanco Country," *Colorado Magazine*, 34, no. 2 (April 1957): 111; and Colorado Agricultural College, Colorado Experiment Station, *Cattle-Ranch Organization in the Mountains of Colorado*, by R. T. Burdick, Martin Reinholt, and G. S. Klemmedson, bulletin 342 (Fort Collins, Colorado Experiment Station, 1928), 30.

[2] "Fine Stock for Pitkin County," *ADT*, 28 January 1908, 1.

Jack Brunton started the Glendale Stock Farm on Owl Creek in 1912. He raised prize Hereford cattle and prize Belgian horses. Brunton's herdsman, Jens Christiansen, took care of the prize cattle and traveled with them to Texas, California and Iowa on the show circuits.[3] Brunton's father was D. W. Brunton, the well known mining engineer who was co-owner of the Taylor & Brunton Sampling Works founded in Aspen during the silver era. This company sampled the ore for the Holden Works in 1891 while Holden's sampling building was still under construction.[4]

As more blooded stock was introduced, the cattle became more valuable, and ranchers became more concerned about protecting their herds. Death in mountain herds averaged 3.1% in the 1920's. Causes included poisonous plants, the loss of cows and calves at calving time, diphtheria in calves, and blackleg (although vaccinations were developed which prevented widespread attacks of this disease).[5]

When cattle were introduced to the mountain ranges, many grazing animals such as deer and elk were displaced. As a result, predatory animals were a problem for cattle ranchers. The Colorado Legislature passed new bounty laws in 1889 and 1893 on wolves, coyotes, bears, and mountain lions. In 1903 the state gave County Commissioners permission to poison prairie dogs.[6]

Cattle rustling was an ongoing problem. Beginning in 1891 the Roaring Fork and Eagle River Stockgrowers' Association offered a reward of $250 for evidence which would lead to a conviction for stealing stock from an association member. However, all suspects were released by the district court, even though the association believed that the evidence had "conclusively shown" that the suspects had stolen stock. The ranchers criticized the statutes, and they accused the prosecution of being lame and the jury of being blind. They observed that cattle rustling had become an art "cunningly employed." They withdrew their offer of a reward in 1900, nonetheless, they were determined to "crush cattle rustling regardless of expense and labor." The judge of the Ninth Judicial District, Thomas A. Rucker, had advised some of the association members to "run the cattle thieves out of the

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[3] Mary Eshbaugh Hayes, "From This Valley the Old West is Going," *Aspen Times*, 4 April 1974, 8-C. Jens and his father, Mads, bought the ranch from Brunton in 1924, along with the yearlings of the cattle and the Belgian horses.

[4] T. A. Rickard, *Interviews with Mining Engineers* (San Francisco: Mining and Scientific Press, 1922), 88.

[5] Colorado, *Cattle-Ranch Organization*, 41.

[6] Peake, 234-35.

country as that was the only way to get rid of them." The association members stated that, although they were "peaceful and law abiding citizens" and desired to remain so, that until they received adequate protection, they would follow Judge Rucker's advice. They resolved to appeal to the state legislature for better laws.[7] The problem continued to plague the stock owners.

Railroads entered the valley in late 1887. This enabled the ranchers to sell stock to markets outside the valley. Outside markets were especially important after the Silver Panic of 1893, when the population of Aspen plummeted.

Late each summer, cattle were brought down off the range and fattened. Cattle were then transported to Denver and other eastern markets.[8] The center of the market in Denver was the Denver Union Stock Yards and nearby packing companies. An important boost in the industry occurred in 1906 when the National Packing Company, representing three of the largest packers in the country, purchased controlling interest in the stock yards and packing plants.[9]

## SHEEP

Sheep were not introduced into Pitkin County in any large numbers until the 1890's. In 1890 there were only three sheep; ten years later there were almost 6,000 "woolies."[10]

However, about 60,000 sheep were shipped into the valley annually from Utah. They summered around Thomasville, the head waters of the Frying Pan River, and the area between Tennessee Pass and Independence Pass. The cattlemen in the Roaring Fork and Eagle River Stockgrowers' Association were especially concerned about the "threatened invasion of the range by sheep" in the neighborhood of Thomasville. The cattle ranchers were concerned that they would be crowded out by the sheep. Territories were established by all interested parties, and there was no trouble as long as the sheep kept off the cattle

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[7] "Down," *Glenwood Springs Avalanche Echo*, 20 December 1900, 1; "Will Wipe Out Cattle Thieves," *Denver Times*, 4 August 1903, 2.

[8] "Will Wipe Out Cattle Thieves," *Denver Times*, 4 August 1903, 2; "Guard Against Invasion," *Denver Times*, 3 August 1903, 3.

[9] Smiley, 611-12.

[10] Colorado, Board of Agriculture, *Agricultural Statistics of the State of Colorado: 1887* (Denver: The Collier and Cleaveland Lithographic Company, 1889), 18; U. S., *Report on the Statistics of Agriculture: 1890*, 240; and U. S., Department of the Interior, Census Office, *Census Reports*, volume 5 *Agriculture*, part 1 *Farms, Live Stock, and Animal Products* (Washington D. C., 1900), 423.

range. However, the cattlemen believed that the sheep had attempted to cross the boundaries several times, and trouble was narrowly avoided. [11] Although there was tension between sheepmen and cattlemen apparently there was no violence between the groups in the valley, as there was in nearby areas.[12]

Range sheep in the valley were crosses between ewes of wool breeds and rams of mutton breeds.[13] In the 1890's the ewes were Merino, which produced good wool and were hardy on the open range. Then the Rambouillet, a fine wooled breed, were increasingly popular. After the 1910's Rambouillet was the base stock for ewes, although some were a cross with the Columbia breed (a rugged breed developed by the U. S. Department of Agriculture). The ewes were bred with rams that were mutton breeds; Hampshire, Suffolk or Shropshire were popular in the valley. By the 1920's Southdown and Oxford breeds were also used.[14]

The majority of sheep raised in Colorado in 1895 were used either for home consumption and home markets, or were sold to feeders in Nebraska and Kansas. In later years Pitkin County sheep were transported to markets in Denver, Omaha and Kansas City.[15]

Range flocks required two men to manage them, a herder and a camp tender. The herder stayed with the sheep, moved them to the next grazing ground, guarded against predatory animals, avoided poison weed localities, cared for sick animals, and kept the

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[11] "Guard Against Invasion," *Denver Times*, 3 August 1903, 3.

[12] "Great Convention," *Glenwood Springs Avalanche Echo*, 22 February 1900, 1.

[13] Until the late 1880's sheep raised in Colorado were used only for their wool; Merino sheep were the only sheep in Colorado. However, wool prices and profits dropped around 1887-88 so it wasn't profitable to raise sheep only for wool. Colorado ranchers turned to mutton sheep, which included Southdown, Shropshire and Cotswald breeds, but they didn't survive well on the open range. The Merinos were then bred with the mutton sheep; care was taken not to get too far from the original Merino blood. By 1895 there were practically no pure-bred mutton sheep on the range. The sheepmen usually used a ram of one breed for two or three years, then changed to another breed. Pabor; and Colorado, Agricultural College, Agricultural Experiment Station, *Sheep Feeding in Colorado*, by W. W. Cooke, bulletin 32 (Fort Collins: Agricultural Experiment Station, 1895), 8-9.

[14] Hart, 24; "Fine Stock for Pitkin County," *ADT*, 28 January 1908, 1; and Colorado, Agricultural College, Colorado Experiment Station, *Sheep Production in Colorado*, by Charles I. Bray, bulletin 304 (Fort Collins: Colorado Experiment Station, 1925), 7.

[15] Colorado, *Sheep Feeding in Colorado*, 6; and Hart, 24.

sheep from straying or mixing with other bands. The camp tender kept the herder in supplies, moved the camp equipment and looked for new camp grounds.[16]

## POTATOES

Early white settlers to the West brought potatoes with them because it was a staple that could be transported easily. They saved some of the potatoes for seed stock to plant on their farms and in their gardens. Potato growing became a large industry around mining towns such as Central City, Black Hawk and Denver.[17]

The Roaring Fork farmers were very pleased with how well potatoes grew in the valley. In 1881 two-pound potatoes were grown, and during the following summer farmers brought wagon loads of potatoes to town. William M. Dinkel planted two acres of potatoes in 1882, and harvested 200 sacks to the acre.[18]

However, farmers became disappointed when they observed that the potato production declined each year the vegetable was planted on the same site. It wasn't until 1886 that state agriculturalists learned that rotating alfalfa with potatoes increased production.[19]

The first attempt at selling potatoes outside the valley occurred in 1891, when Dinkel shipped a carload of potatoes out of the valley. The business venture wasn't successful, however, and commercial production in the valley didn't begin until the late 1890's.[20]

Once the potatoes were grown commercially, the Roaring Fork-Eagle River Valleys quickly became the principal potato raising district on the Western Slope. The district consisted of the valleys of the Eagle, Crystal, Roaring Fork and Frying Pan Rivers, with Carbondale as its center. This was the smallest of the four commercial potato districts in Colorado, but the highest average yields per county were obtained here, and there were few

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[16] Colorado, *Sheep Production*, 39.

[17] Chamblin, 43.

[18] "Aspen: History of the Mining Discoveries of Pitkin County," *AT*, 7 January 1882, 2; *AT*, 5 August 1882, 3; and Dinkel, 189.

[19] Colorado, Agricultural College, Agricultural Experiment Station, *The Potato Industry of Colorado*, by C. L. Fitch and E. R. Bennett, bulletin 175 (Fort Collins: Agricultural Experiment Station, 1910), 20.

[20] Dinkel, 195; Colorado, *The Potato Industry*, 4; and Colorado, Agricultural College, Colorado Experiment Station, *Growing Potatoes in Colorado*, by C. H. Metzger, bulletin 412 (Fort Collins: Colorado Experiment Station, 1934), 16.

competitors in quality of the product. The district hit its peak production about 1909, but continued strongly into the 1940's (see appendix).[21]

The Carbondale area became famous because of the excellent conditions for potato growing, including both the soil and the climate. The soil was mainly a red or blackish sandy loam on the mesas with a somewhat gravely soil on the river bottoms. Cold winters allowed almost disease-free production.[22]

Varieties grown in the valley around the early 1900's included Pearl, White Beauty, Carmon No. 1, Challenge, and Triumph, but the most popular variety in the district was the Perfect, or Improved, Peachblow.[23] The Peachblow was almost spherical in shape, the skin was light pink on a yellow background, and it was red or magenta around the few eyes. The Peachblow was grown on a commercial scale exclusively in the Eagle Valley-Carbondale district.[24] A large percentage of the potatoes grown in the valley were sent to special markets for hotels and railroad dining car service. These included the New York Central Lines, the Pullman Railroad Car Company and the Brown Palace Hotel. The remainder of the crop supplied mountain towns or were sent to the same markets as other Colorado potatoes.[25]

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[21] Colorado, *Growing Potatoes*, 16; and Colorado, Agricultural College, Agricultural Experiment Station, *Colorado Potato Industry*, by E. R. Bennett, bulletin 117 (Fort Collins: Agricultural Experiment Station, 1907), 5.

Eagle, Pitkin and Garfield Counties, in that order, had the highest average yield to the acre in Colorado. The district also produced potatoes with the best chemical composition and cooking quality in the state. Colorado State College, Colorado Experiment Station, *Growing Better Potatoes in Colorado*, by C. H. Metzger, bulletin 446 (Fort Collins: Colorado Experiment Station, 1938), 20.

[22] Colorado, *Colorado Potato Industry*, 5; Colorado, *The Potato Industry*, 17; Colorado, Agricultural College, Agricultural Experiment Station, *Potato Culture in Colorado*, by E. P. Sandsten, bulletin 243 (Fort Collins: Experiment Station, 1918), 21; and Chamblin, 43.

[23] Colorado, *Colorado Potato Industry*, 5; and Colorado, *The Potato Industry*, 73.

There are conflicting accounts of how the Perfect Peachblow was developed, and how it came to be in the Roaring Fork Valley. Grubb stated that the original Peachblow was one of the oldest varieties in existence, and that Peter Henderson, a New York seedsman, developed the Perfect Peachblow. Grubb reported that this type was brought to the Roaring Fork Valley in 1883. Shoemaker reported that Thomas F. McClure came to his ranch near Catherine in 1885, and by experimenting with the Early Rose potato developed the Perfect Peachblow. The type was sometimes known as the Red or White McClure. State agriculturalists resisted calling the Perfect Peachblow the McClure, because of a similarly named potato grown in southern and eastern states. Eugene H. Grubb and W. S. Guilford, *The Potato: A Compilation of Information from Every Available Source* (Garden City: Doubleday, Page & Company, 1912), 376-77; Shoemaker, *Pioneers*, 131; and Colorado Agricultural College, Colorado Experiment Station, *Ideal Types for Colorado Standard Potato Varieties*, by C. H. Metzger, bulletin 359 (Fort Collins: Colorado Experiment Station, 1930), 15.

[24] Colorado, *Growing Potatoes,* 30; and Colorado, *Ideal Types*, 15.

[25] Grubb, 208; and Colorado, *Colorado Potato Industry*, 5.

Local farmers took the advice of the Agricultural College to plant certain new varieties in the 1910's. Irish Cobblers were grown for an early crop, and Russet Burbank, Rural and Peoples were the late varieties grown. The Russet Burbank variety became increasingly popular, so by 1918 it and the Peachblow accounted for 80% of the potatoes grown in the Carbondale district.[26] The Peachblow still dominated, for it was acknowledged that the variety reached its perfection in this district.[27] However, there was some objection to a colored potato for the main crop as the market was somewhat limited. As a result, the acreage planted with Peachblow was on the decline.[28]

The district was ideal for potatoes; unfortunately this meant that the seed stock deteriorated so gradually that the growers didn't notice it. Continued use resulted in a high percentage of virus or degeneration diseases. Giant hill, mosaic, spindle tuber, and leaf-roll were unusually high in the Carbondale Eagle River district. By the early 1930's the soils became badly infected with scab, to which Peachblow was susceptible. The home district of the Peachblow could longer grow that variety. The Russet Burbank was the most resistent to scab of any variety known, and so it was virtually the only variety that could be grown in the district. The Rural New Yorker was also grown to some extent in the 1930's in the Carbondale-Eagle River Valley district.[29]

The Russet Burbank, also called the Netted Gem and the Idaho Russet, had skin which was heavily russeted, or netted. It was considered one of the highest quality varieties grown, but was also the hardest of the Colorado varieties to grow. It required more fertile soil, an even moisture supply, and would not tolerate heavy soil or hot weather. The variety grew best between 6,000 and 8,000 feet in altitude. In the Carbondale district it was grown for market and for certified seed. The color of the skin depended on the soil in which it was grown. Carbondale's red soils produced the famous "Red Soil Russets." They were sold mainly on the Denver market and were the highest priced potato in the country.[30]

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[26] Colorado, *Potato Culture in Colorado*, 21.

[27] Colorado, *Potato Culture*, 21; Colorado, *The Potato Industry*, 73; and Colorado, *Growing Potatoes*, 30.

[28] Colorado, Agricultural College, Agricultural Experiment Station, *Potato Growing in Colorado*, by E. P. Sandsten, bulletin 220 (Fort Collins: Experiment Station, 1916), 25.

[29] Colorado, *Ideal Types*, 16; and Colorado, *Growing Potatoes*, 17, 30, 36, 57.

[30] Colorado, *Growing Potatoes*, 35-36; Colorado, *Ideal Types*, 11, 19.

Farm machinery was commonly used on potato farms in Colorado in the 1910's. Equipment included planters, cultivators, sprayers, hoes, diggers and sorters.[31]

The Colorado Potato Growers' Exchange was a model cooperative marketing organization which received national attention. It formed in 1923 from seven local cooperatives, including one in the Roaring Fork Valley (possibly the Roaring Fork Potato Growers' Association). It was the first state-wide cooperative organization in Colorado to be formed on a commodity basis, and was only the second potato marketing association in the country. The organization was the sales agency for 2,000 members in 20 local associations, including Carbondale-Basalt.[32]

Some of the valley farmers were active in the potato industry. Lou D. and Frank E. Sweet owned the Crystal River Land Company, generally known as the Sweet Ranch, near Carbondale. It had ideal conditions for potato growing and had large yields. Lou was the president of the Potato Association of America, and also served as the head of the Colorado Potato Growers' Association.[33]

Eugene H. Grubb (Lloyd's brother) was another active potato farmer. His Mount Sopris Farm at Carbondale was supplying New York Central with potatoes in 1905, and a few years later he started supplying the Vanderbilt system dining cars with Challenge potatoes. He was a member of the State Board of Agriculture, and acted as an agricultural consultant. Grubb was a noted expert on potatoes, and traveled to Europe as a representative of the United States government to investigate potato growing. He wrote *The Potato: A Compilation of Information from Every Available Source* (Doubleday, 1912).[34]

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[31] Grubb, 119-126.

[32] Hafen, vol. 2, 155; and Steinel, 326.

[33] Steinel, 428.

[34] Grubb, 156, 373, 378; and Steinel, 428.

## IRRIGATION

During the 1890's, Colorado became the leading state in percentage of land under irrigation, and was second in the number of irrigators and in the value of irrigated crops. During the decade the amount of improved farm lands which were irrigated rose from 48.8% to 70.9%.[35]

By the end of 1901, the Roaring Fork Valley had about 300 ditches, but had only five headgates in good repair and about 35 rating flumes in good condition. There was litigation and ill feelings between farmers concerning water. The water commissioner of the district thought if all the ditch owners put in a self-regulating devices it would eliminate the arguments and need for lawyers. The commissioner made a special effort to instruct the farmers on how to make more efficient use of water. As a result, crop production did not fall below average in 1902, although Western Slope streams were the lowest in 20 years.[36]

## ASSOCIATIONS

### *FARMERS' ASSOCIATIONS*

As farmers and ranchers became established, they joined associations to learn more about agriculture, for socializing, and to take advantage of collective influence. By the early 1890's agriculture was an important industry in Colorado. The growth of mining camps induced farmers across the state to further expand their operations. However, with the continuing deflation, discriminatory rates of the railroads, and tax collectors and creditors, the farmers increasingly faced foreclosure. These financially hard times of the early 1890's were a strong time for the farmers associations in the West. The Grange, the Farmers' Alliance, and the Populist party exemplified this trend.

Although the Grange had been established in Colorado in the late 1860's, it had languished through the 1880's. However, during the early 1890's, farmers across the country joined the Grange in increasing numbers. Twenty nine Granges were organized in Colorado in only one year, 1890. The Roaring Fork Valley formed two subordinate grange

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[35] U. S., Department of the Interior, Census Office, *Census Reports for the Twelfth Census, 1900*, vol. 6, *Agriculture*, part 2: *Crops and Irrigation* (Washington, D. C.: G.P.O., 1902), 832.

[36] Colorado, State Engineer, *Biennial Report for 1901 and 1902* (Denver: Smith-Brooks Printing Co., state printers, 1902), 95, 100.

chapters which formed at that time in Carbondale. The Union Grange, No. 113, was created in 1890, and a year later the Eureka Grange, No. 125, was organized.[37]

Populism spread throughout the West and Midwest in the 1890's, and it was especially strong in the Roaring Fork Valley. People felt that the two major political parties were not responsive to their needs, so they formed the People's Party. It was a coalition of various groups; the two main factions in Colorado were farmers and miners. Some people see populism as the forerunner of the liberal reform movement (exemplified by progressivism and the New Deal), while others see it as reactionary or Marxist. The party recommended a variety of reforms, including the use of silver as a currency base, mine safety measures, railroad rate controls and regulation of water companies.

The Grange endorsed many measures similar to populist reforms, such as state ownership of irrigation ditches and federal ownership of railroads and telegraphs. However, the Grange warned against political activities, and distanced itself from the Populist Party. The farmers of the West and Midwest backed populism so ardently that they left the Grange and shifted their allegiance to the Farmers' Alliance.[38]

After the decline of populism, Colorado farmers returned to the Grange, especially during the decade from 1909 to 1919. The Mount Sopris Grange, No. 239, started in Snowmass in 1915.[39]

The Farmers' Alliance and Industrial Union filled the need for political activism and offered a broader view of reform than the Grange. It was a nation-wide, secret organization which blamed the farmers' economic crisis on the banking system, the railroads, the marketing system, and federal monetary policy.[40] Members worked for legislation to remedy these problems. The organization became part of the Populist movement in the 1890's. In the Roaring Fork Valley, the Pioneer Farmers' Sub Alliance No. 119 was created in 1891. That same year the local group built the Farmers' Alliance Hall in Watson (now called Gerbazdale), about eight miles above Basalt. The building was later known as Watson Hall and Gerbazdale Hall, and was used as the community center for

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[37] Wayne E. Fuller, "The Grange in Colorado," *Colorado Magazine*, 36, no. 4 (October 1959): 260; and Colorado State Grange, *Colorado State Grange History* (Denver: Colorado State Grange, 1975), 106.

[38] Fuller, 262.

[39] Fuller, 262; and Colorado State Grange, 109.

[40] Fuller, 262; and James E. Wright, *The Politics of Populism: Dissent in Colorado*, (New Haven: Yale University Press, 1974), 44.

about 40 years.[41] The Alliance remained prominent throughout the populism movement. However, both died out after the 1890's as the farmers' opinions moderated.

After populism faded away, the Farmers' Alliance was succeeded by the Farmers' Educational and Cooperative Union, popularly known as the Farmers' Union. The Colorado state organization was formed in 1908 and Snowmass rancher Fred Light was on the board of directors. Their original goals included "educating the farm class in scientific production, marketing, ... and bringing about closer business and fraternal relations between the producing classes." The motto of the Union was "To the producer belongs the product of his toil." They lobbied the state legislature on behalf of farmers, and they offered insurance policies.[42]

Another organization was the Farmers' Club of Pitkin, Eagle and Garfield Counties, which was active around the turn of the century. It offered educational lectures, represented the interests of farmers (including a lawsuit against silver mill owners), and sponsored the annual District Fair for the three counties.

The Farmers' Club was an active advocate of farmers' needs. It lobbied the local railroads concerning equitable payment for damaged goods.[43] The club announced in the fall of 1898 that they would bring charges against the mill owners of Aspen for polluting the Roaring Fork River. The farmers declared it was "an abominable outrage" that the river was used as a "dumping ground for the tailings from their concentration works."[44] The farmers insisted this made the water useless for domestic, stock raising and irrigating purposes. The mill owners convinced the group that legal proceedings were not necessary, and assured the farmers that they would take immediate steps to stop the pollution. However, by the following spring the farmers said that nothing had been done to stop it. The club took the mill owners of Aspen to court. However, the case was dropped by the judge due to legal technicalities. The Farmers Club continued to criticize the mill owners.[45]

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[41] Len Shoemaker, Pioneers of the Roaring Fork (Denver: Sage Books, 1965), 167-68.

[42] LeRoy Hafen, ed., vol. 2, *Colorado and Its People* (New York: Lewis Historical Publishing Co., 1948), 155; and Steinel 343-44.

[43] "Farmers Club," *Glenwood Springs Avalanche Echo*, 20 December 1900, 1.

[44] "Semi-Annual Gathering," *Glenwood Springs Avalanche Echo*, 1 March 1900, 1.

[45] "Roaring Fork Farmers Mad," *Denver Times*, 9 March 1899, 3; *Aspen Tribune*, 14 February 1900, 4; and "Semi-Annual Gathering," *Glenwood Springs Avalanche Echo*, 1 March 1900, 1.

The club also sponsored the District Fair for the three counties. They may have sponsored activities with the Aspen Driving and Athletic Association. The latter group hosted an annual horse race, as discussed above in the section on horses. The Farmers' Club hoped to work with the racing association, even if a few of the racers thought farmers were "made of mud or [were] every day common pumpkin rollers."[46]

The first Tri-County Fair held in Aspen opened October 3, 1906, and it attracted about 1,500 each day. Exhibits were in tents, earning the site the name of the "City of Tents." The agricultural college had an exhibits, along with displays of needlework and fine arts. Races and contests were popular. Humorous contests included a burro race in which riders had to change mounts; a cowboy tug-of-war; a greased pig contest; the band box race during which the cowboys had to change into women's clothes; and the potato race in which riders picked up one potato at a time from a pile while still riding on their horses. There were a variety of horse races, as well as bronco busting, team pulling, livestock judging, and single and double hand drilling. Other awards included best reinswoman, best dressed cowgirl, and best equipped cowboy. The Farmers' Institute had a lecture illustrated with lantern slides at the Wheeler Opera house.[47]

Permanent buildings were constructed the following year for the second Tri-County fair held in Aspen. The main building was the Crystal Palace. It was shaped like a maltese cross, each cross section being 30 x 100 feet. At the building's center was a fountain and fish pond which contained mountain trout. The building contained displays of minerals, farm products, needle work, art flowers, fine arts, china, pyrography and photography. Another building which the town was proud of was the women's comfort building. There were also livestock barns, a large restaurant building, and an Elks building.[48]

Another organization in which the valley farmers participated was the Colorado Farmers' Congress. It was organized by the Colorado Board of Agriculture in 1910. Comprised of representatives of the agricultural industry, the organization's mission was to propose solutions to problems, which would insure the future welfare of the industry. Meetings were held annually, and the group made many recommendations which resulted

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[46] "Farmers Club," *Glenwood Springs Avalanche Echo*, 20 December 1900, 1.

[47] "A Successful Opening," *ADT*, 4 October 1906, 1; "Fair Now a Memory," *ADT*, 6 October 1906, 1.

[48] "Permanent Good to the City," *ADT*, 27 September 1907, 1; "Fair Passes into History," *ADT*, 5 October 1907, 1.

in laws and other activities which influenced the industry. Roaring Fork residents took part in the Congress, and in 1913 Lou D. Sweet of Carbondale was elected first vice-president.[49]

*STOCKGROWERS ASSOCIATIONS*

There were several local stock owners' associations, in addition to the state and national organizations. Additional information on their activities is included in the section "Grazing on Public Lands."

A group of Roaring Fork Valley cattlemen met in 1886 to discuss whether to form their own local organization. They decided instead to join the existing Grand River Stock Growers' Association. Fifteen stock owners in the Roaring Fork and Rock Creek valleys were elected to the association. The new members from Pitkin County were William Tierney and John R. Williams from Aspen; and Charles and William Harris, and Edward Robinson of Emma.[50]

By 1900 a strong new organization, the Roaring Fork and Eagle River Stock Association, was active. They promoted cattle ranchers' rights concerning controlled grazing.[51]

The Pitkin County Stock Growers' Association organized around 1907. The *Times* reported that the stockmen throughout the county were becoming interested in the association and membership was growing. W. S. Copeland, the president, was a prominent supporter of Roosevelt's leasing policies.[52]

On the state level, the Colorado Stock Growers' Association was organized in 1867. It changed its name in 1876 to the Colorado Cattle Growers' Association. Membership increased rapidly in the 1880's. It went through a series of additional organizational and

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[49] Steinel, 353.

[50] "Roaring Fork Cattlemen," *AWT*, 9 January 1886, 2; and "Glenwood Notes," *RMS*, 13 February 1886, 3.

Other new members included Mrs. H. E. Robinson and J. H. Dinkle; Edson Banning, George Haley, P. P. Haley, and William M. Dinkle of Satank; and James N. Bennett, W. E. Lewis, and R. D. Strang of Cattle Creek.

[51] "Great Convention," *Glenwood Springs Avalanche Echo*, 22 February 1900, 1.

[52] "Pitkin County Stock Growers' Association," *ADT*, 17 January 1908, 1; "Political Influence Exerted," *ADT*, 23 January 1908, 1.

name changes, until it became the Colorado Cattlemen's Association in 1949.[53] Local associations that cooperated with the Colorado Stockgrowers' Association in the 1930's included the Pitkin County Stock Growers' Association, Snowmass; the Basalt Mountain Stock Growers' Association, Basalt; the Sopris Livestock Association, Basalt; the Frying Pan Stock Growers' Association, Sloss; North Thompson Four Mile Stock Association, Carbondale; and the Roaring Fork Stock Growers' Association, Carbondale. [54]

Ranchers across the country decided that a national organization should be formed. Nearly 1,000 delegates attended the meeting in Denver to organize the National Livestock Association in 1898.[55] Disagreements arose in that association concerning grazing on public lands, so in 1901 a group split off to form the American Cattle Growers' Association. The two groups again merged, in January 1906, to become the American National Livestock Association.[56]

## GRAZING ON PUBLIC LANDS

The cattle and sheep owners of the Western Slope built a livestock economy which depended on the use of the public domain. The land on the Western Slope lacks the carrying capacity of that on the plains, plus much of the land on the Western Slope is owned by the federal government. Thus, the cattlemen and sheepmen came to depend on the public lands for their summer and early fall pasturage. When pioneers first turned out cattle to graze in the forests there was no control of the grazing. "First come first served" was the unwritten rule. As a result many areas were overgrazed.[57]

In the last half of the nineteenth century most Americans felt that land existed to be exploited. This feeling was based on some of the same concepts that supported their belief in Manifest Destiny: Americans were chosen by God to recreate their society in the wilderness, the rich lands of the West were there for the use of Americans, and it was the

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[53] Richard Goff and Robert H. McCaffree, *Century in the Saddle* (Denver: Colorado Cattlemen's Centennial Commission, 1967), viii.

[54] Peake, 316-18.

[55] Thomas S. Chamblin, ed. *Historical Encyclopedia of Colorado* (n.p.: Colorado Historical Association, 1975), 59; and John C. Pine, "The *Denver Record Stockman*, Defender of Colorado Cattlemen," *Colorado Magazine*, 31, no. 2 (April 1954): 138.

[56] Peake, 160; and Chamblin, 59.

[57] Colorado, *Cattle-Ranch Organization*, 11.

duty of the pioneer to make constructive use of the wilderness.[58] Yet in the last 20 years of the nineteenth century an awareness grew that the land would be destoyed if people continued to exploit it. This nationwide conservation movement reached a high point just after the turn of the century. Two of the most visible representatives were Theodore Roosevelt and Gifford Pinchot.

One of the early controversies concerned the creation of forest reserves. These lands would be closed to homesteading. Up until this time most federal lands had been available to the citizens, and the government encouraged people to settle there. The idea of prohibiting settlement was a new one. Opponents argued that it was basic to American society to take civilization into the wilderness, creating a farm out of the waste land. Taming the wilderness and progress went hand-in-hand. They feared that future generations would be denied the ability to follow in the footsteps of the pioneers, and there would be no more independent farmers.[59] Supporters of the reserves argued that the lands had to be protected to have them available for future generations. As scientists uncovered the rules of ecological systems, people realized that resources would not be available infinitely if they were not used carefully.

Congress authorized the withdrawal of public lands into forest reserves in 1891, although administration was almost nonexistent. In 1898, a Forest Reserve Service was established within the Department of the Interior. It announced there would be a system of permits and allotments to control grazing in the forests. Opposition to this policy was strong in Colorado, especially on the Western Slope. Ranchers complained that the federal government was using police power to control their industry and public lands. They predicted that it would have a damaging effect on the grazing industry for years, and would drive ranchers out of business.[60]

Roaring Fork ranchers were adamantly opposed to controlled grazing, and argued against it actively in local, state and national stock associations. Ranchers had been in the valley for 16 years without restrictions, and they resented the government interfering in their livelihood. They felt that the easterners were calling the ranchers aliens on their own land.

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[58] G. Michael McCarthy, *Hour of Trial: The Conservation Conflict in Colorado and the West, 1891-1907* (Norman: University of Oklahoma Press, 1977), 4.

[59] McCarthy, 22-24.

[60] Peake, 87.

However, large plains ranchers supported the government's grazing policy. At the second convention of the National Live Stock Association convention, in Fort Worth in 1899, the group adopted a resolution which favored leasing public lands to stockmen. The small stock owners and sheepmen in the organization, including Roaring Fork ranchers, strenuously opposed the resolution.[61]

In an important move, the powerful Roaring Fork and Eagle River Stock Growers Association called a meeting in February 1900 at Glenwood Springs. Several hundred cattlemen attended, representing nine Western Slope counties, including Pitkin, Eagle, and Garfield. They passed a resolution voicing their "alarm" at the National Live Stock Association passing resolutions in favor of leasing public lands for grazing purposes; they stated that the group did not represent the live stock industry of the arid west. The Western Slope cattlemen attacked the concept of the reserves and grazing permits, denounced leasing of federal or state lands to stock owners, and protested the idea of arid lands being ceded to states. They feared that a leasing system would discriminate against small stock owners, eventually allowing large cattle syndicates to "get a lease from the government and fence them out."[62] They charged that range syndicates and large corporations sought to "grab every range for their own selfish interests."[63] They also were afraid that sheep would be driven over the open range, "backed by the United States army."[64] The enthusiastic crowd of ranchers cheered, stomped their feet and waved their hats in the air throughout the day. One of the attendants was Fred Light of Watson, formerly state representative from Pitkin County.

That cattlemen's meeting formed the Western Range Stock Growers' Association to continue their fight. W. Lloyd Grubb, of Carbondale, was elected president. A. D. Foster, of Emma, was elected Pitkin County's representative on the new executive committee.[65]

Next, the Western Range Stock Growers' Association formed a state-wide organization in Denver in April 1900, when almost 600 ranchers elected Grubb as president. The group was dedicated to free range for cattlemen only. Their reasons for

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[61] Smiley, 608.

[62] "Great Convention," *Glenwood Springs Avalanche Echo*, 22 February 1900, 1.

[63] *Rocky Mountain News*, 18 February 1900.

[64] *Glenwood Springs Avalanche Echo*, 22 February 1900, 1.

[65] Ibid.

opposing the federal plan included: the presence of free land enhanced the value of nearby agricultural lands; leasing was impossible for small cattlemen; small farms would be swallowed by large corporations; there would be too much power in the hands of the administrative officials, and sheep ruined the range.[66]

The group was active that year spreading information about their cause. They lobbied politicians, and were instrumental in having an anti-leasing plank included in the platform of each of the four major political parties in Colorado in 1900.[67] The group's popularity grew, and by the fall of 1900 it was larger than the Colorado Cattle Growers' Association. The latter group realized its position was threatened, so its leaders met with officers of the new Western Range association. Two changes resulted from negotiations between the two groups. The Western Range Stock Growers' Association became the state organization, under the new name Colorado Cattle and Horse Growers Association. In addition, the leasing issue was to be passed up to the National Livestock Association. Grubb was elected president of the newly named organization, and Foster was on the executive committee. The Roaring Fork and Eagle River Stock Growers Association was one of 28 member organizations.[68]

In 1905 the administration of the forest reserves was transferred to the U. S. Forest Service, under the Department of Agriculture; Gifford Pinchot was chief forester. That autumn the Forest Service announced its plan concerning grazing, which included charging a fee for grazing permits. The Aspen *Times* supported the Forest Service and stated "with men so capable at its head [locally], we should look for much good in the community."[69] However, the Glenwood Springs *Avalanche Echo* observed that among ranchers "indignation

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[66] Goff, 153-154.

[67] The Roaring Fork ranchers had many political allies over the years. Elias M. Ammons, a rancher, state senator and later governor of Colorado, led the opposition to federal controls of grazing. Senator Henry Teller called it an "insane notion". Senator Thomas Patterson constantly referred to the "eastern conspiracy" which tried to destroy the western economy. Colorado Governor Charles Thomas, Congressman and later Governor John Shafroth, and Senator Edward Wolcott were also opposed and helped the movement. Steinel, 157; and McCarthy, 7, 103.

[68] Goff, 154-55, 223-24.

The Colorado Cattle and Horse Growers Association was comprised mainly of ranchers with small herds of under 600 head. It was a political organization determined to improve the conditions and profits of the live stock industry. After it became the state organization in 1901 the members lobbied the state government for industry related issues such as railroad rates, laws concerning infectious diseases, regulation of brands, and predatory animals. A trend toward legislation favoring livestock interests was started. Grubb continued as the president until 1903, when he sold his Colorado land and moved to California. Pine, 138-139; and Goff, 229.

[69] "Our Forest Reserves," *ADT*, 29 September 1905, 1.

was at a fever heat," and a large group of ranchers denounced the fee proposal.[70] The forest rangers viewed the area as "the hotbed of the west."[71]

The members of the Roaring Fork and Eagle River Stockgrowers Association were outraged and again took on a leadership role in protesting. They invited Pinchot to a mass meeting in Glenwood Springs at which they would present evidence against the permit and fee system; Pinchot accepted the invitation. About 200 ranchers and farmers came to the December 1905 meeting and all day they attacked the fee.[72] One of the speakers was Fred Light. The local rangers dismissed him as a "tinhorn orator," but his fellow ranchers respected him because he was he was so steadfast in his rebellion.[73] Through it all, Pinchot sat quiet and unruffled. When the locals finished, Pinchot spoke for an hour and a half, confident, diplomatic and persuasive. He told them that the grazing tax would go into effect, and that ranchers who used the reserves would pay it. When he completed his talk, the room was silent.[74] However, even if the federal government won this battle, the war was far from over.

The following month, the Roaring Fork and Eagle River Stockgrowers Association held a rowdy meeting at which they passed resolutions which declared that the tax was illegal. A year later the group met in Basalt and members decided that they would refuse to pay the grazing fee. Only when the Forest Service threatened them with prosecution did most of the members yield. Fred Light, however, offered to continue to refuse to pay the fee, to initiate a court case to test the constitutionality of the system.[75]

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[70] Glenwood Springs *Avalanche Echo,* 12 October 1905.

[71] Len Shoemaker, *Roaring Fork Valley* (Denver: Sage Book, 1958), 228, cited in McCarthy, 180.

[72] Glenwood Springs *Avalanche Echo*, 7 December 1905, 3.

[73] Leonard C. Shoemaker, "Hist of the Holy Cross National Forest" typescript, Colorado Historical Society, Denver.

[74] McCarthy, 160.

[75] McCarthy, 164-65, 180.

Light was, in many ways, typical of ranchers in the valley. In fact, his ranch was reproduced in miniature and exhibited as a representative ranch of Colorado at the Louisiana Purchase Exposition in St. Louis in 1904. Light had settled on his ranch in the Capitol Creek area, near Snowmass, in the early 1880's. He had acquired about 1,000 acres, which made his ranch the second largest in the valley. It was called the Box L Ranch, and his brand was a square enclosing an L. His crops included potatoes, hay, oats, wheat, and barley. Light had a many cattle and made considerable consignments to Eastern markets. He was dependent on the range for grazing.[76]

Light was not shy about stating his opinions, and was active in politics and associations. He was elected in 1895 to the state legislature on the Populist ticket and served two terms. He was vice-president of the State Cattle and Horse Growers' Association, and was president of the Roaring Fork and Eagle River Stockgrowers Association.[77] The *Glenwood Post* called Fred Light "the most cantankerous of all the kickers against the forest reserves" in Colorado.[78]

Fred Light allowed his cattle to graze in the Holy Cross National Forest on which he had neither acquired a permit nor paid grazing fees. He was arrested for trespassing. The Colorado Cattle and Horse Growers Association and the American National Livestock Association joined Light in defending the suit. The District Court ruled for the government, so Light appealed to the U. S. Supreme Court. That court ruled in 1911 that neither the national forest system, nor regulated grazing and timbering violated the constitution.[79]

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[76] Goff, 160; Shoemaker, *Pioneers*, 70; Hart, 14; and "Capital Creek," *AT*, 1 January 1884, 6.

[77] Shoemaker, *Pioneers*, 70.

[78] Glenwood *Post*, 10 March 1906.

[79] Steinel, 461; U. S., Department of the Interior, Bureau of Land Management, Colorado Office *The Valley of Opportunity: A History of West-Central Colorado*, by Steven F. Mehls (Denver: Bureau of Land Management, 1988), 198; Goff 158-60; and Len Shoemaker, *Saga of a Forest Ranger* (Boulder: University of Colorado Press, 1958), 130-31, 147.

After this court decision, much of the furor over grazing died down. Gradually the anti-conservation, anti-reserve, anti-fee contingent quieted. In 1917 more than 3,500 permits were issued for forests in Colorado, for 1,266,000 cattle and sheep. About 85% of the ranchers grazed fewer than 100 head of stock each.[80]

Representative Edward T. Taylor, of Glenwood Springs, sponsored the Taylor Grazing Act of 1934, which established a grazing bureau in the Department of the Interior. The new agency administered grazing on public lands in ten range states. Self-governing grazing districts were organized, and the ranchers contributed to the decision making process. The law was widely accepted by stockmen because it solved many of the major public land problems which had erupted when the national forests were established.[81]

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[80] Colorado, Board of Immigration, *Year Book of the State of Colorado* (Denver: Brock-Haffner Press, 1918), 27.

[81] Mehls, 209; Chamblin 61; and Goff, 186.

Pitkin County, along with parts of Garfield, Eagle and Mesa counties, were in Rifle District No. 7. Goff, 194.

## THE MAROLT RANCH, 1881 - 1986[1]

### THE MIDLAND RANCH

A parcel of ranch land that is of special interest to us is the property that became known as the Midland, then Marolt, Ranch. The history of agriculture in the Roaring Fork Valley provides us with a context in which to study the Marolt Ranch. The background information enables us to understand if the Marolt operation was representative of ranches in the area. On the other hand, by studying this one place in detail, we can learn more about valley ranches in general.

The earlier history of the Marolt property includes several well-known characters of Aspen's past, including H. P. Cowenhoven, D. R. C. Brown, Jerome Wheeler, J. J. Hagerman, Edward Holden, and A. E. Carlton. It is possible that the bulk of the land was owned exclusively by speculators until the Marolts purchased it in 1927.

In the early 1880's four men each acquired property from the U. S. government. The parcels were contiguous, and just west of the Aspen townsite. The Roaring Fork townsite was probably located on their property.[2] Within a few years each man sold his property, and by 1886 Jerome Wheeler owned all four parcels. (See map.) Eventually, the combined four parcels became known as the Stitzer Ranch, the Midland Ranch and the Marolt Ranch.

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[1] The section on the Marolt Ranch is based on the following interviews by the author, except in the section on the Midland Ranch and where noted. The interviews are available on cassette tape at the Aspen Historical Society.

Opal Peterson Marolt, 13 July 1990; Vicki Marolt Buchanan, 17 July 1990; Peggy Marolt, 20 July 1990; Keith Marolt, 4 September 1990.

[2] The Roaring Fork Townsite Company was formed in 1880 by Leadville speculators. Dr. A. A. Smith (the postmaster of Leadville) was president, and Judge J. W. Hanna was also involved. The company sent Hezekiah T. Buckley, a deputy U. S. surveyor, to survey the land between Castle and Maroon Creeks, at the foot of Maroon Mountain (Red Butte?). The surveyor made a plat of Roaring Fork City, and it was exhibited at the Clarendon Hotel in Aspen. The town was widely promoted and many lots were sold, especially in Leadville. Smith arranged for a post office to be established in the new town, and a cabin for the post office was partly built on the site. Buckley was appointed post master on April 13, 1880. In the following months much was heard about the company, but there was little activity, and the scheme soon collapsed. Buckley's appointment as post master was terminated on July 29, 1880. The post office, the only cabin in the "town", was later moved to Aspen.

Frank L. Wentworth, *Aspen on the Roaring Fork* (Lakewood, Colorado: Rizzari, 1950), 37-38; Warner A. Root, "Aspen: The Men Who Led the Way Over the Divide," part 1, *AT*, 23 April 1881, 1; and U. S., Post Office, "Register of Appointments of Post Masters," record group 28, National Archives, Washington, D. C.

The first of these four men was Samuel Flanagan, who acquired 120 acres from the U. S. government. He sold the property to Henry P. Cowenhoven in December 1883.[3] George Elrod, the second man, preempted 160 acres, then in March 1884 sold his property to Henry P. Cowenhoven. That same month Jerome B. Wheeler joined Cowenhoven in an undivided half interest in the 280 acres of Flanagan and Elrod property. In February 1886 Wheeler acquired full title to the Elrod and Flanagan property.[4]

William Stone, the third man, preempted 40 acres, then sold them to D. R. C. Brown in August 1885. Brown transferred the property to Jerome B. Wheeler in February 1886.[5] John B. Stitzer, the fourth man, preempted about 107 acres. Stitzer sold his parcel to John R. Williams in June 1884; that same day Williams sold it to Margarette Cowenhoven. She sold the property to J. B. Wheeler in February 1886.[6] It is not known if the four original men farmed on their properties (although Flanagan did have chickens).[7] It is possible that they purchased the land for speculative reasons, since the location near Aspen was desirable. It is also possible that they tried farming, found they didn't like it, and so sold out quickly.

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[3] "Receipt," U. S. Receiver to Samuel Flanagan, 15 November 1883, book B, p. 531; "U. S. Patent," to Samuel Flanagan, 15 November 1890, book 55, p. 33; and "Warranty Deed," Samuel Flanagan to Henry P. Cowenhoven, 22 December 1883, book 3, p. 36.

All citations in this section are located at the office of the Pitkin County Clerk.

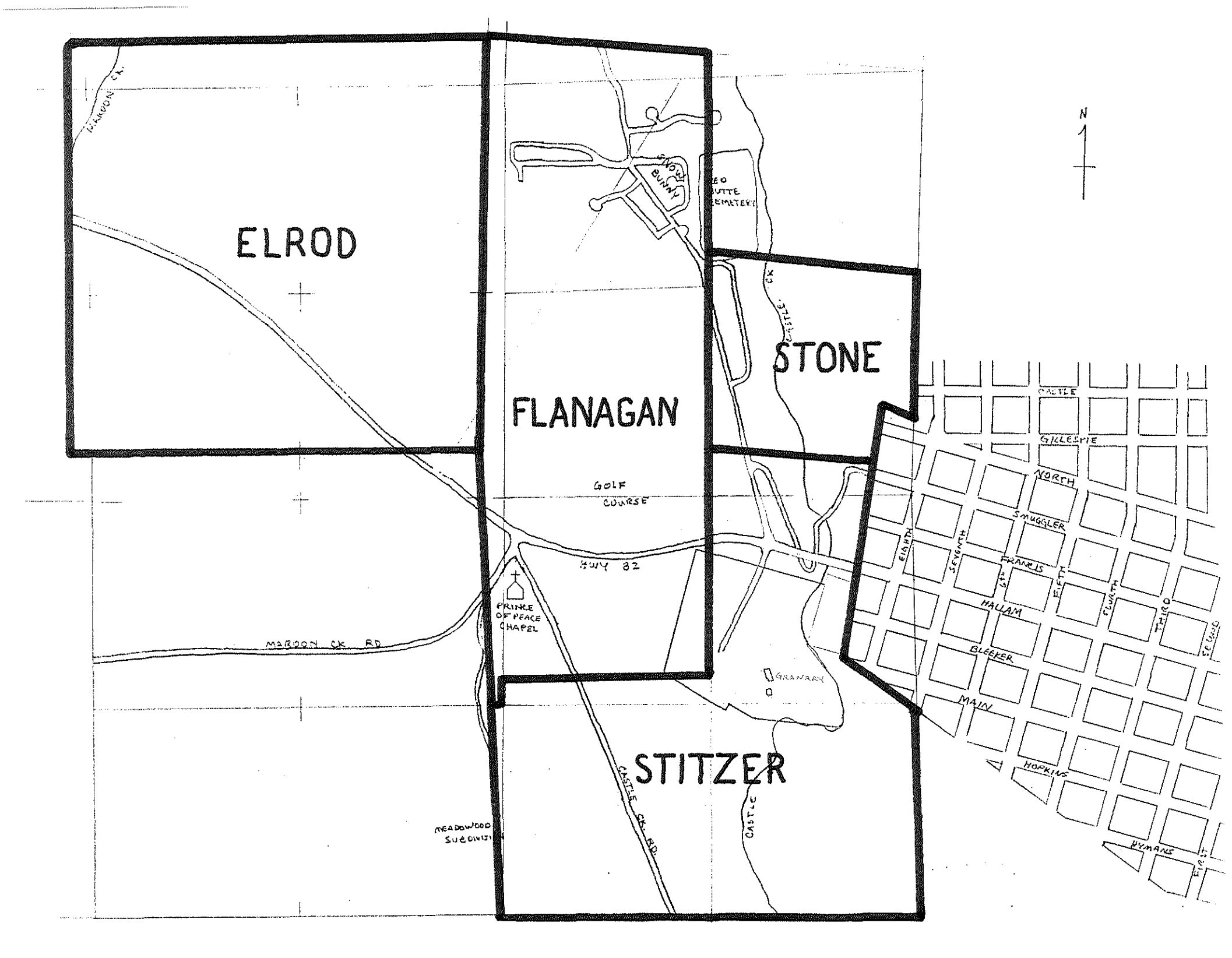
[4] "U. S. Patent," U. S. General Land Office to George Elrod, 15 November 1890, book 55, p. 31; "Warranty Deed," George F. Elrod to Henry P. Cowenhoven, 21 March 1884, book 3, p. 48; and "Warranty Deed," Henry P. Cowenhoven to Jerome B. Wheeler, 8 March 1884, book 3, p. 59.

[5] "Receipt," U. S. Receiver to William Stone, 13 July 1885, book 19, p. 296; "U. S. Patent," U. S. General Land Office to William Stone, 8 August 1890, book 55, p. 32; "Warranty Deed," William E. Stone to David R. C. Brown, 19 August 1885, book 3, p. 86; and "Quit Claim Deed," D. R. C. Brown to Jerome B. Wheeler, 12 February 1886, book 29, p. 74.

[6] "Receipt," U. S. Receiver to John B. Stitzer, 12 May 1884, book 27, p. 291, and book 17, p. 121; "U. S. Patent," U. S. General Land Office to John B. Stitzer, 20 October 1890, book 55, p. 35; "Warranty Deed," John B. Stitzer to John R. Williams, 3 June 1884, book 3, p. 57; "Warranty Deed," John R. Williams to Margarette Cowenhoven, 3 June 1884, book 3, p. 58; and "Warranty Deed," Margarette Cowenhoven to Jerome B. Wheeler, 12 February 1886, book 3, p. 112.

[7] Flanagan let his chickens run loose, which caused some commotion locally. He had Cochin Chinas, Brahmas, Dominiques and various high bloods. *AT*, 30 June 1883.

Brahmas were a sub-variety of the Cochin. They had been two of the most popular breeds of chickens, however, their popularity decreased as their exaggerated fluff and leg feathers increased.


ELROD
FLANAGAN
STONE
STITZER
N
MARDON CK
SNOW BUNNY
CASTLE CK
GOLF COURSE
HWY 82
PRINCE OF PEACE CHAPEL
MARDON CK RD
GRANARY
MEADOWOOD SUBDIVISION
CASTLE CK RD
CASTLE
GILLESPIE
NORTH
SMUGGLER
FRANCIS
HALLAM
BLEEKER
MAIN
HOPKINS
HYMANS
FIRST
SECOND
THIRD
FOURTH
FIFTH
SIXTH
SEVENTH
EIGHTH

Once Wheeler had acquired the Flanagan, Elrod, Stone and Stitzer properties, he sold them to James J. Hagerman, trustee of the Colorado Midland Railroad, in 1886. That was the beginning of a long association of the Midland and the property. Hagerman transferred the property to Henry C. Lowe, trustee of the Midland, in 1888.[8]

On August 1, 1890 the Colorado Midland Railroad granted M. L. Chapman (a Holden Smelting and Milling Company investor) an option to buy what was known as the Stitzer Ranch, but had been the Flanagan, Elrod, Stone and Stitzer properties. Apparently the Holden company did not make the first payment and the contract was forfeited, because the Midland retained title to the property.[9]

Some agreement must have been reached, however, because the Holden Works was constructed in 1890-91 on a 20 acre parcel within the 400 acre parcel. The Midland deeded this 20 acre parcel to Holden's representative, J. B. Wilbur, in December 1891. That same month Wilbur transferred the title of the 20 acres to the Holden Smelting and Milling Company; this land became known as the Holden Tract.[10]

The Midland Ranch (minus the Holden Tract) was leased to area ranchers for many years. T. O. Clark leased the Midland Ranch for several years around the turn of the century. Then Billy Tagert and Lou Teuscher leased the ranch starting in 1908.[11]

By the late 1910's the Colorado Midland Railroad was in bad financial straits so the U. S. District Court ordered the trustees to sell the railroad's property. Albert E. Carlton purchased the property in August 1917, and became the new owner and president of the Colorado Midland Railroad. Along with land in various other locations in Colorado, his purchase included what had been the Flanagan-Elrod-Stone-Stitzer property (except the 20 acre Holden Tract) which had come to be known as the Midland Ranch. Seven months

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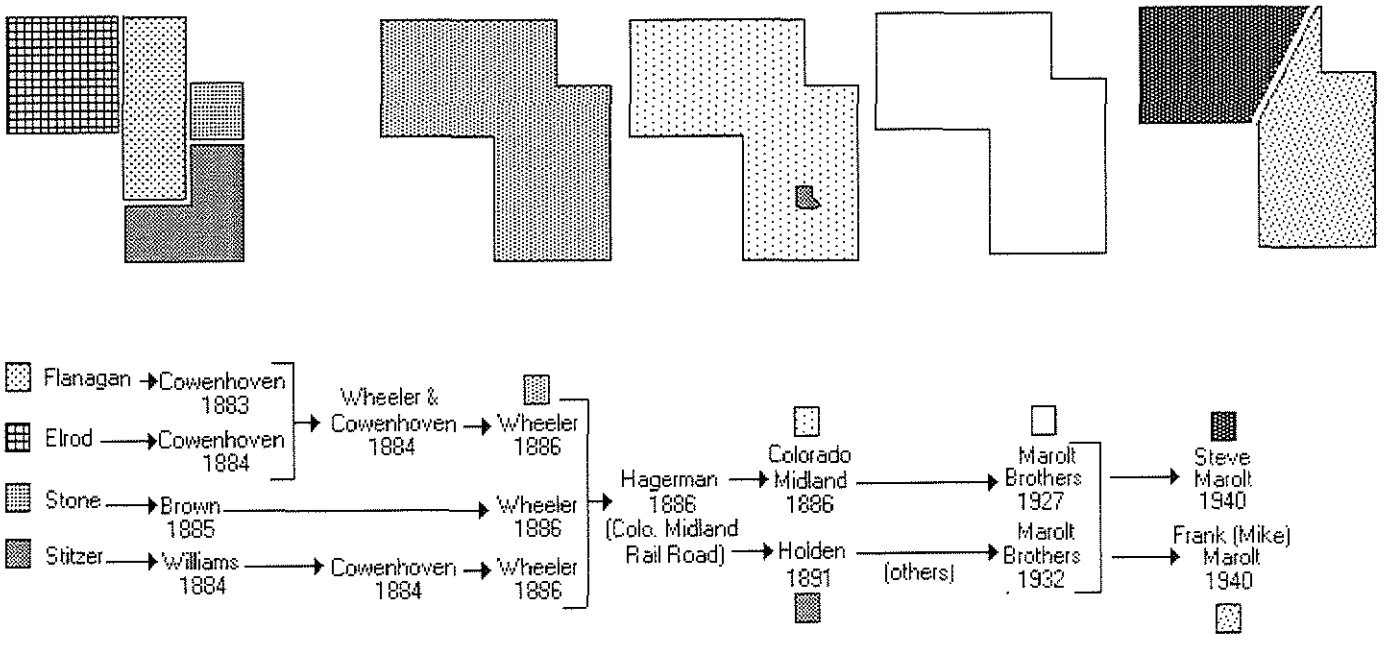
[8] "Warranty Deed," J. B. Wheeler to James J. Hagerman, trustee, 11 May 1886, book 3, p. 136; "Quit Claim Deed," J. B. Wheeler to J. J. Hagerman, trustee, 11 May 1886, book 29, p. 275; and "Quit Claim Deed," J. J. Hagerman, trustee, to Henry C. Lowe, trustee, 18 January 1888, book 30, p. 499.

[9] "Option," Colorado Midland Railway Company to M. L. Chapman, 1 August 1890, book 80, p. 315.

[10] "Deed," Henry C. Lowe, trustee, to James B. Wilbur, 9 December 1891, book 92, p. 445; "Quit Claim Deed," James B. Wilbur to the Holden Smelting and Milling Company, 31 December 1891, book 92, p. 443.

[11] "Lew Tuescher is Going to be a Farmer," *ADT*, 5 February 1908, 1.

# Schematic Chain of Title



later Carlton transferred the title back to the Colorado Midland Railroad. The company dissolved in 1922; the land was again purchased by Carlton in 1923.[12]

The ranch apparently continued to be leased to area ranchers. Fred Cullet may have rented the Midland Ranch and farmed it around 1922-23.[13]

Carlton sold the Midland Ranch in March 1927 to Frank Jr., Rudolph, William and Stephen Marolt; the ranch entered a new era. Each brother had an undivided share in the property. William Marolt sold his interest to the other brothers two years later.[14] Frank, Rudolph and Steve acquired the 20 acre Holden Tract in 1932.

## MAROLT FAMILY HISTORY

The Marolt brothers who purchased the Midland Ranch and Holden Tract were sons of Frank and Frances Marolt. The parents immigrated to the United States in the late 1800's; they were from that part of Austria-Hungary which today is Yugoslavia.[15] The Marolts lived in Leadville for a time, then they moved to Aspen. Frank operated a saloon in town, and the family lived above it. Frank and Frances had twelve children, born in the following order: Mary, Pauline, Rudolph (Rudy), Elsie, Frank Jr., William (Bill), Louis, Stephen (Steve), Dorothy, Michael Christopher (Mike, born in Aspen in 1909), Rosaline (Rose), and Theodore (Ted).

In time, Frank and Francis and their children moved to a ranch west of Aspen; Meadow Wood subdivision was later built on the property. The 14-member family lived in a tiny two bedroom house, which is still standing near the Prince of Peace Church. Most of the children slept in the barn. The family enjoyed their ethnic traditions, including foods like meats, breads, and sauerkraut. Frances sewed all of the family's clothes, and did all the customary family and ranch chores although one of her arms was paralyzed from a stroke.

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[12] "Trustee's Deed," George Vallery, et al, trustees, to Albert E. Carlton, 18 September 1917, book 156, p. 48; "Receiver's Deed," George Vallery, et al, trustees, to Albert E. Carlton, 18 September 1917, book 156, p. 52; "Quit Claim Deed," Albert E. Carlton to Colorado Midland Railroad, 5 March 1918, book 156, p. 82; "Notice of Dissolution," Colorado Midland Railroad, 28 April 1922; and "Certificate of Purchase," Public Trustee to Albert E. Carlton, 9 May 1923, book 159, p. 214.

[13] Amelia Trentaz, interview by author, telephone, Aspen, 2 August 1990.

[14] "Warranty Deed," Albert E. Carlton to Frank Marolt, Jr., et al, 1 March 1927, book 158, p. 316; and "Warranty Deed," William Marolt to Frank, Rudolph and Stephen Marolt, 13 November 1929, book 158, p. 416.

[15] Yugoslavia was established in 1918.

When Rudy, Frank Jr., Steve and Bill grew up, they purchased the Midland Ranch, which was near their parents' ranch. The brothers owned undivided interests in the ranch. This land was originally the Elrod-Flanagan-Stone-Stitzer property, and did not include the Holden Tract. (The Holden Smelting and Milling Company had once had an option to buy this 400 acre parcel). During the next years the brothers worked the ranch, although they apparently lived elsewhere. In 1929 Bill sold his interest in the ranch to the three other brothers.[16]

A few years later, in May 1932, Frank Jr., Rudy, and Steve Marolt acquired the 20 acre Holden Tract from W. C. Tagert for one dollar.[17]

It isn't clear how the Holden Tract had been used for the prior three decades. About 1922-23 Fred Cullet's family lived in the building that had served as the office of the Holden Works. During that time Cullet rented nearby ranch land, possibly the Midland Ranch.[18]

When the Marolts bought the Holden Tract there were five buildings still standing which had apparently been built for the lixiviation works: the office/assay building, the sampling works, the salt warehouse and two small buildings. The majority of the mill had been demolished over the years and area residents had salvaged its lumber and hardware. After buying the tract, the brothers remodeled the office building; Frank eventually lived there for a short time.

The three brothers continued to ranch on the property until 1936, when Rudy Marolt died intestate. His interest in the ranch was divided among nine heirs, but soon Steve and Frank received quit claim deeds to the ranch from the other seven heirs.[19]

Up to June 7, 1940 the Marolts had undivided interests in the ranch. At that time Steve and Frank (the only remaining owners) divided the Marolt Ranch into two parts.

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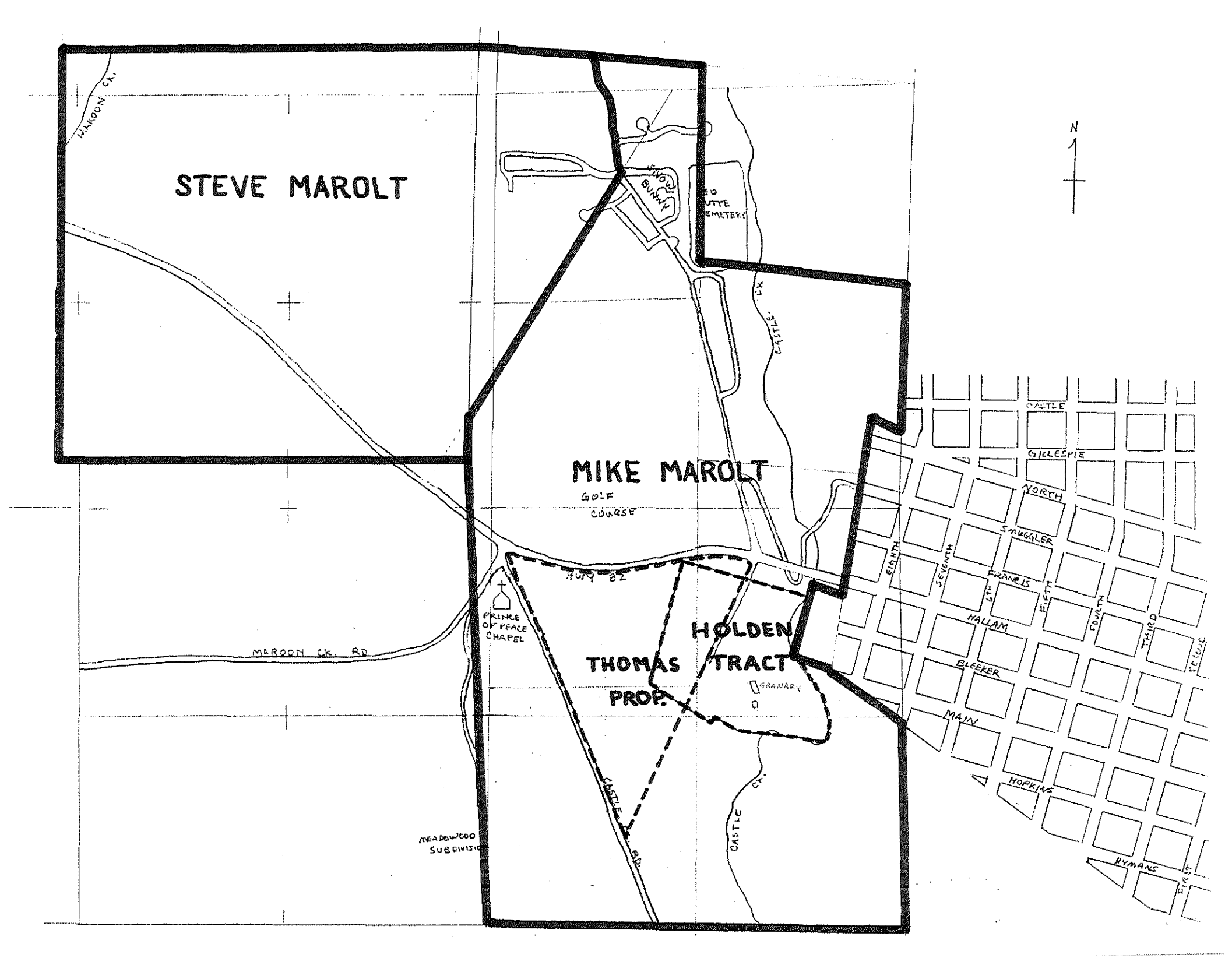
[16] "Warranty Deed," Albert E. Carlton to Frank Marolt, Jr., et al, 1 March 1927, book 158, p. 316; "Option," Colorado Midland Railway Company to M. L. Chapman, 1 August 1890, book 80, p. 315; and "Warranty Deed," William Marolt to Frank, Rudolph and Stephen Marolt, 13 November 1929, book 158, p. 416.

[17] "Quit Claim Deed," W. C. Tagert to Frank, Rudolph and Stephen Marolt, 16 May 1932. Book 157, p. 356.

[18] Amelia Trentaz, interview by author, telephone, Aspen, 2 August 1990.
Trentaz was Cullet's daughter and was very young when she lived on the Holden Tract.

[19] "Heirship," County Court to Frank Marolt, et al, 10 November 1939, book 167, p. 283; "Quit Claim Deed," Heirs to Stephen and Frank Marolt, 23 February 1940, book 157, p. 621.


STEVE MAROLT
MAROON CK.
MIKE MAROLT
GOLF COURSE
SNOW BURNT
CASTLE CK
PRINCE OF PEACE CHAPEL
MAROON CK RD
HOLDEN THOMAS TRACT PROP.
GRANARY
CASTLE CK. RD.
CASTLE CK.
MEADOWOOD SUBDIVISION
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CASTLE
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NORTH
SMUGGLER
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FRANKLIN
HALLAM
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THIRD
BLEEKER
MAIN
HOPKINS
HYMANS

MIKE MAROLT

Steve owned the western part, and Frank owned the eastern part (including the Holden Tract).[20] Two weeks after the division, Frank died. His wife Elsie Helen Marolt was his sole heir.[21]

## MIKE AND OPAL MAROLT BUY THE RANCH

Elsie Marolt sold the recently inherited the ranch (the eastern part of the Marolt Ranch including the Holden Tract) to Frank's brother, Mike, in September 1940.[22]

At that point the ranches of Ted, Steve and Mike were side-by-side. Up to that time Mike and Ted had ranched on the land which had belonged to their parents, but now Ted took over the old ranch. Steve owned land on the present site of the golf course. (He also had acreage for cattle pasture between Buttermilk and Snowmass and had a cabin by a lake on that property.) Mike owned the Holden mill site, part of the present golf course, and the site of Snow Bunny subdivision, the community gardens, and the hospital. The three brothers were very close, and saw each other almost daily. Ted lived with Mike Marolt's family for about 15 years. Ted then built a house on the east side of Castle Creek on land he bought from Mike. The house has since been torn down. Soon after Mike acquired his ranch, the army considered the site as a location for Camp Hale of the 10th mountain division. His family was relieved when they were able to keep their land.

## *OPAL PETERSON MAROLT FAMILY HISTORY*

Mike's wife Opal Matilda Peterson Marolt had grown up in Aspen. Her grandparents, Andrew and Matilda Holmstrom, immigrated from Sweden. They had lived in Leadville, where Opal's mother, Alma, was born. The family then moved to Pitkin County, and ranched the area where Aspen Airport is now. Alma married Andrew "Riley" Peterson, a Swedish immigrant, at a ceremony held on the Holmstrom ranch. Riley and Alma Peterson lived in Aspen, where their daughter Opal was born in 1914. She attended Aspen schools, several grades behind Mike Marolt. Mike's younger sister Rose was a good friend of Opal's, and as a result, Opal and Mike got to know each other. Opal and Mike married, and raised a family of four children: Keith, Judy, Peggy and Vicki.

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[20] "Warranty Deed," Stephen Marolt to Frank Marolt, 7 June 1940, book 166, p. 148; "Warranty Deed," Frank Marolt to Stephen Marolt, 7 June 1940, book 166, p. 147; "Quit Claim Deed," Stephen to Frank Marolt, 7 June 1940, book 170, p. 1.

[21] "Administrator's Deed," Elsie H. Marolt to Michael Marolt, 23 September 1940, book 167, p. 316.

[22] "Warranty Deed," Elsie H. Marolt to Michael Marolt, 27 September 1940, book 166, p. 158, 159; and "Administrator's Deed," Elsie H, Marolt to Michael Marolt, 18 December 1941, book 167, p. 416.

Mike and Opal's ranch was the focal point for the extended Marolt family and friends. People came to the ranch on Sundays to visit, and they often went on picnics. The kitchen was the heart of house; on winter mornings Mike, Steve and Ted gathered in the kitchen, drank coffee, and talked about ranching, investments, and the world at large. Opal often joined in their conversations. Mike belonged to the Eagles' Lodge, and also the Elk's Lodge; Saturday nights were often spent socializing with that group. The family also took part in activities at the Catholic Church. Mike was a quiet and shy man, who was well liked. He was kind and gentle, with a good sense of humor. Though he was a determined man, he was also sincere and fair. Opal was also well liked. She was a delightful person, with a ready smile and chuckle. She was a hard worker, and was self sufficient. In her leisure time she enjoyed reading poetry.

## STRUCTURES ON THE RANCH FROM THE HOLDEN WORKS

### *OFFICE/HOME*

Mike and Opal's family lived in the building that had been the office and assay works for the Holden lixiviation works. The Marolt brothers had done some remodeling in the 1920's and 30's, but Mike and Opal continued to make the house more comfortable. The safe from the mill was in the building (Peggy has it in storage).

### *SAMPLING WORKS/GRANARY*

One of the buildings on the site was the sampling works; the Marolts called it the granary. For many years it had three roles: grain storage, a work shop and a hen house. During this time there was only one big room, and only the main floor; it was open to the rafters. Mike put in partitions on the east side, to make four or five grain bins. They were used to store mainly oats and barley, and some wheat. The grain was delivered from the threshing machine via an auger through doors or windows into the bins. There was a hammer mill on the west porch near the north door; grain was brought out to it to be ground. Originally, the west porch had served as the loading platform for the Colorado Midland Railroad side track which ran along the building.

Mike built a shop just inside the southerly door that was on the west wall. The shop included a work bench and a forge. Mike was a skilled blacksmith; he shaped horse shoes, fixed plow shares and potato cultivators and sharpened equipment. He also enjoyed doing woodworking.

The chicken coop was inside the granary, on the south end. There was a partition and wire fence around the area. The chickens kept flying up to the rafters, so the Marolts had to clip their wings.

There was a cupola on the roof of the granary. When Mike re-roofed the building he removed the obstruction to make his roofing job easier. The cupola had probably enclosed an ore elevator when the building was part of the Holden Works.

In the 1950's, Mike and his son Keith built an open lean-to on the outside of the south end of the granary to protect machinery and animals. Keith worked side-by-side with his father on the ranch. He took care of many ranching responsibilities through his high school years, then worked there summers during his college years of 1954-58.

The granary changed function and floor plan as ranching activities changed. When the Marolts stopped raising chickens, a new work shop replaced the hen house in the south end of the granary. Keith and Mike built the new shop, including the cabinets, around 1954-58. It was heated with a coal burning stove. In their construction projects they reused all the materials they could. They used wood from old Castle Creek bridge, (which had been built for the Holden company) and salvaged roofing and masonite from Camp Hale.

About that same time, Mike stopped keeping cattle year round, and he also stopped growing grain. The granary was divided into two sections, following the large support beams. On south side was the woodworking shop, and the north was used for storage.

The Marolt children often played in the granary. They played in the grain (getting terribly itchy), and tried to prevent their "foes" from entering the building. There was an area with linoleum on the floor near the shop which the younger girls used as a playhouse. When their cousin Bill Marolt Jr. was in high school he set up ski lift inside the granary, using old rope from the music festival tent. The plan wasn't foolproof, however, and he fell and broke his arm, making him unable to play football that year. He later became a well known ski racer.

After Mike's death in 1967, Opal rented the building to Don Westerlind for storage for his construction business; he built a second floor within the structure.

*SALT WAREHOUSE/BARN*

Another building from the Holden Works was the salt warehouse south of the sampling works/granary. The Marolts called this building various names over time, including the old barn, the horse barn, and the milking shed.

The Marolts horses and milk cows were kept together in the building. The area had a problem because in the winter the sun didn't shine on the site because of the shadow cast by Aspen Mountain. The Marolts decided to build a new barn, north of the granary, and a new corral. The building was originally over 80 feet long. They tore

down the east part of the old barn shortly after World War II and used the lumber to build the new barn. The corral fence was built of lodgepole pines, and the posts were oak from the railroad on the Frying Pan River. The corral included the area between the granary and the old barn, west to the ditch.

When the building was first remodeled, the Marolts had riding horses, not draft horses. These animals were kept in the barn briefly when the Marolts needed them close at hand. By about 1954, the bottom of the walls were rotting, so Mike and Keith cut off the lower part of the timbers and replaced them with a cinder block foundation. They also put in cement floor. The building was then used as a milking barn. Later a hay loft was added. The building again changed uses when horses and tack were kept there. After Mike died, Steve Marolt put a new roof on the old barn.

*SHEDS*

There were two other small buildings that were probably remnants of the Holden company. One was located just southwest of the Marolt house, and was about the size of a two-car garage. The Marolts stored machinery and equipment in it until the roof collapsed under a heavy snow. The other building was a tiny two-story shed about 30 feet below the house on the ditch bank, just outside the fence. It was called the saddle shed and was used for storing tack.

*REMAINS OF THE MILL*

When Mike and Opal Marolt acquired the ranch, the mill on the hillside was in ruins. However, the two smokestacks from the Holden Works were still standing. (These were discussed in the section on the physical plant of the Holden Works). Both chimneys were disassembled, to reuse the brick.

The smaller chimney was dynamited, possibly in the early 1940's, by Bill Tagert (who had earlier owned the Holden Tract). Although Tagert planned to sell or reuse the brick, he used too much dynamite and all the brick was destroyed.

The tall chimney was a landmark in Aspen for over sixty years. The 165 foot stack originally provided draft for the Stetefeldt furnace, and smoke spewed from it for nineteen months while the Holden Works operated. Below the chimney was an inclined flue which led to a large dust chamber, and then to the furnace. Mike Marolt used the dust chamber as a meat locker. He hung butchered beef there, and smoked his sausage there.

Jake Lewis took down most of the larger chimney in the early 1950's. He lived on the Marolt property, in a shack he built next to Castle Creek, near the mill site. Lewis

learned from Tagert's misfortune with the shorter stack, so he was very careful about dismantling the taller chimney. He first built a chute that went back and forth inside the chimney to bring the bricks down. He climbed the chimney using the rungs that were on the outside of the stack, and started dismantling it one brick at a time, and sent them down the chute. However, the bricks came out of the chute broken. Lewis abandoned that method, and instead put a pile of sawdust at the bottom of the stack. The bricks didn't break when he dropped them one at a time onto the soft pile. Lewis sold the brick, and several buildings in Aspen contain that brick today. Holden's "Crescent H" symbol and the date "1891" were on the top of the chimney. The rumor had been that they were made of solid copper, so local service station owner Leroy Waterman bought them. He learned too late that they were made of wood covered by tin. Lewis didn't completely disassemble the stack. When Keith Marolt went to college in the mid 1950's he removed more brick and sold them to help pay for his school expenses.

STRUCTURES ON RANCH NOT FROM HOLDEN WORKS

There were several other buildings on ranch, not from the Holden Works. The red cattle barn was a long building north of the granary, in an east-west orientation. It had a corral and feeding bins, and there was a long open section where calves were kept while they were weaned. Milk cows were put in the closed part. Cattle were branded and dehorned here. After Mike's death, Opal rented the building to Terry Morse; he built furniture in it. The building burned in about 1968 - 70.

There were several hay sheds on the ranch. Mike and Keith built the open hay shed northeast of the house in the early 1950's. At that time they stopped stacking hay and started baling it. There was also a hay and cattle shed on the Colorado Midland right of way, just west of where the community gardens are now, but the shed blew down about 1954-55. Mike then built a replacement behind the garage; but it also blew down.

## EARLY OPERATIONS OF THE MIKE MAROLT RANCH

### *ANIMALS*

### CATTLE

The Marolts owned a herd of beef cattle and a few milk cows. Beef cattle were the center of the activities on the Marolt ranch, either directly or indirectly. For many years, the Marolts raised cattle year round. The animals grazed in the national forest land in the summers and were fed in a pasture during the winters. The bull, and some of the heifers, were registered Herefords.

Spring was a busy time on the ranch. Calves were born then, and required much attention. The cattle were branded and dehorned. Mike's brand was X111 (X one eleven). He chose this symbol because it could be accomplished with one iron, the 1 shape. Steve's brand was U1/. Both of these brands can be seen on the doors of the granary. Registered cattle were marked with blue dye on their ears.

The cattle grazed in the National Forest during the summer. The Marolts paid the Forest Service a fee to use the land. In the 1940's their range permit allowed 44 cows, not including calves and the bull. Five or six ranchers (including Sam Stapleton and Reny Duroux) shared the grazing area. At the beginning of the season the ranchers got together and drove the cattle past the first gate south of the Dean's T Lazy 7 Ranch on Maroon Creek. They were required to move the cattle several times during the season. Later in the summer, the cattle were moved to the second gate, above the first area. By the end of the season, the cattle had been driven up East Maroon Creek to the Sunset district, then to an area called High Bridge near East Maroon Pass. In earlier years they also moved towards Maroon Lake. Each time the cattle were moved, the men got together to round them up on horseback. At the end of the summer the cattle were rounded up before hunting season started in mid-October. If it snowed before that, the cattle came down off the mountain on their own.

During the winter the cattle were kept in the pasture west of house. Typically, there was about three feet of snow on the ground all winter, so the Marolts fed the cattle daily. They took hay on a horse drawn sled to an area where the cattle had trampled down the snow. By the end of the winter the whole pasture had been fertilized with manure.

The Marolts didn't lose many cattle through the year. The most common cause of death was brisket disease, which caused the chest to swell up. The stock was inoculated for blackleg. The ranchers rode the range a lot in summer, and doctored the animals when they could. There was a patch of larkspur, poisonous to cattle, just above the fence by high bridge. The ranchers drove the cattle beyond the plant, so didn't have trouble with it. One year the Marolts couldn't find their bull on the summer range. A friend flew over the area in a plane to look for him, but he was never found.

The Marolts also owned milk cows. They kept up to five of them at times, and their products were mainly for family use. Opal separated the milk, and made butter. Any extra cream or butter was taken to the railroad station and shipped to creameries in Glenwood Springs or New Castle.

OTHER ANIMALS

Mike also raised pigs when the price of pork was high. If the price of pork was low, he didn't buy pigs, and instead sold the grain that he'd raised for their feed. He bought pigs when ground was frozen solid so they couldn't root. They were kept in the old barn while the milk cows were there. The hogs were butchered for their meat; Mike made sausage in the basement of the house.

Opal raised chickens for fryers and eggs. She ordered them through the mail, and she picked up the chicks at the post office. They were kept in a room in the house while they were young and needed the heat. Then they were moved to the hen house in the granary.

*CROPS*

The Marolts raised a combination of alfalfa, timothy and brome grass for hay. The first cutting was after July 4, and it was a combination of the three. The second cutting, in September or early October, was mainly alfalfa with some brome. They got only two cuttings because of the altitude, while around Basalt ranchers got three or four cuttings. The Marolts stacked hay until the early 1950's, when they started using a wire baler. Mike was careful to keep his hay from getting dusty; the Deans at the T Lazy 7 ranch bought his hay because of that. The alfalfa mixture was rotated with potatoes, and barley or oats.

The Marolts grew Burbank potatoes. They planted potatoes with a machine in the spring. In the fall extra people were hired to harvest potatoes with potato digger. The Marolt potato cellar was on the north side of highway 82; there is a traffic light to go to Snow Bunny near there today. They sold the crop to an agent in New Castle, and shipped the potatoes by railroad. When Mike stopped growing potatoes, his brother Bill continued to grow them at the south end of Mike's field, in an area they called the picnic grounds. Today employee housing is being built on that site. Bill's family lived in town for a while. Later, they built a house on Castle Creek Road, south across field from Mike's house.

The Marolts raised oats and barley, and a smaller amount of wheat. The grain was used to fatten cattle and pigs. They made a mash for the hogs by mixing grain with skim milk and molasses. In the early years the threshing operation was similar to that of the nineteenth century. A threshing machine worked its way up the valley for three or four weeks in October. Benny Smith owned the thresher and Case tractor, along with a

welding shop in Aspen. A crew of neighboring farmers worked together during the season. Opal cooked the meals for the entire crew when they worked on the Marolt Ranch.

Opal had a garden in which she raised vegetables for the family. Her produce included onions, lettuce, carrots, beets, string beans, corn, spinach, cauliflower, and cabbage. They made sauerkraut from the cabbage.

*OTHER ACTIVITIES*

The Marolts had water rights on two irrigation ditches. The upper ditch ran along base of the hill below Castle Creek and crossed highway 82, ran through picnic grounds. The lower ditch, which was bigger, ran from Castle Creek, through their yard between the house and the granary and into the area that is now the golf course. Ranchers with rights to the water got together in the spring to clean the ditch.

In the 1940's the Marolts used horse drawn equipment. They had an old Case plow which was later replaced by an International. They had an old 1928 or 29 binder that was run by horses. Later they put a short tongue on it and ran it with a tractor. They also used horse drawn mowers and rakes. They did have a D 2 caterpillar for plowing, and later got wheel tractors.

## LATER OPERATION OF MAROLT RANCH

In the mid to late 1950's the Marolts started decreasing the level of their ranching activities, and sold large parcels of their land. Several factors contributed to this change. The Forest Service decreased the number of cattle that the Marolts could graze on the on their range, the family needed money for the children's college educations, and Mike's health was deteriorating.

In the late 1950's Mike stopped raising cattle year round. Instead, he bought cattle in the spring at an auction in Glenwood Springs or Rifle. After grazing them through the summer, he sold them in the fall. As a result he didn't have to feed the animals during the winter, so he didn't have to raise, mow or bale hay; nor did he have to take care of the cows and their offspring during calving.

Throughout the time that Mike owned the ranch, he sold small parcels of the land to various individuals; these included L. P. Teas, Herbert Vandemoer, Betty Harbour, Louis

Pastore, Craig Lasley, James Snobble, Frederick Russell, John McTarnaghan, George McHose, and George and Elsie Rinker.[23]

In the spring of 1955, Mike Marolt sold a large parcel to Walter B. Mills, and a year later Steve Marolt also sold a large parcel of his ranch to Mills. These parcels are now part of the golf course. Mike also sold the land for Snow Bunny subdivision. He sold another large parcel to Leonard M. Thomas in the fall of 1957, although Mike was allowed to keep cutting hay there. Thomas later sold the parcel to the city for open space; this is where the community gardens are today.[24]

All of the Marolt children attended the University of Colorado. Today Keith is an engineer, Judy and Vicki are lawyers, and Peggy is an interior designer and certified counselor. Michael Marolt's health declined until he died on August 30, 1967. Opal continued to live on the ranch until she moved to Boulder in July 1986.[25]

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[23] "Warranty Deed," Michael Marolt to: L. P. Teas, 15 September 1943, book 166, p. 248; Herbert R. Vandemoer, 16 April 1946, book 166, p. 147; Betty Harbour, 13 January 1950, book 176, p. 29 and 9 July 1951, book 172 p. 186; Louis and Irene Pastore, 15 August 1950, book 172, p. 158; Craig Lasley, 1 October 1951, book 176, p. 117; James and Mary Snobble, 6 November 1951, book 172, p. 199; Frederick Russell, 11 August 1952 book 176, p. 185; John McTarnaghan, 6 April 1954, book 176, p. 243; George and Genevieve McHose, 20 May 1954, book 172, p. 318; George and Elsie Rinker, 20 August 1957, book 182, p. 183.

[24] "Warranty Deed," Michael Marolt to Walter B. Mills, 15 April 1955, book 180, p. 558; "Quit Claim Deed," Stephen Marolt to Walter Mills, 15 April 1956, book 169, p. 437; "Warranty Deed, Michael Marolt to Leonard M. Thomas, 13 September 1957, book 185, p. 98.

[25] "Release of Inheritance Tax Lien," Inheritance Tax Division to Michael Marolt, 30 July 1968, book 235, p. 683.

## SUMMARY

The Holden-Marolt site is a special place in Pitkin County. The two main historical industries of Pitkin County, mining and agriculture, were both represented on the location. In the 1890's the Holden lixiviation mill operated on the site; it used a process which is significant in mining and Western history. In the twentieth century the land was part of the Marolt Ranch, which represents the vital agricultural industry in the valley. It is especially fortunate that two principal aspects of the county's history are represented on this one site.

Edward R. Holden was a perceptive businessman who was a leader in the mineral production industry. He formed the Holden Smelting and Milling Company in 1890, built the Holden Lixiviation Works the following year, and opened the mill in November 1891. It was one of the largest and most complete lixiviation plant constructed.

From a business point of view, the company was probably marginal. Reasons included a continual decline in the price of silver, along with problems in the lixiviation process. Adjustments were made to improve its recovery rate. However, we will probably never know if the last "improvement" was successful. If it was effective, it would have tipped the scales to make the company profitable. Unfortunately, the panic of 1893 struck Colorado at that time; the silver economy in Colorado, along with the Holden Smelting and Milling Company, came to an end. Several attempts were made to operate milling businesses in the Holden plant, none of which were successful. Absentee owners controlled the Holden Tract for the next three decades. The site entered a new era when it was added to the Marolt Ranch in 1932.

In the early years of its history the Aspen mining camp suffered through a shortage of agricultural products. They needed the vegetables, fruits, meat, and hay at reasonable prices that a local agricultural community could provide. The Roaring Fork Valley underwent a surge in white population after the opening of the Ute Reservation. The summer of 1882 marked the beginning of significant agricultural production in the valley. The 1880's were a time of settlement, experimentation and establishment of activities. They experimented with native grasses, crops, livestock, implements, techniques, irrigation,

and markets. They converged on a standard mix of crops and stock, and effective methods. For over a decade truck gardening was the primary form of farming and ranching in the Roaring Fork Valley.

During the decades after 1890 the farmers and ranchers in the Roaring Fork Valley continued to develop the crops and stock that were successful in the 1880's. Their activities shifted focus, however, with the availability of railroad transportation. They gradually developed outside markets for their products, which influenced their operations. Cattle were raised in greater numbers to satisfy the larger market, and the region became known for its potatoes. In addition, the residents worked cooperatively through numerous associations that were established and flourished during this time. Their local organizations gained state-wide popularity and influence among ranchers and politicians. Although ranchers adamantly defended their rights to free grazing, they finally submitted to government controls.

The Marolt Ranch presents a case study in operating a ranch in the twentieth century. The land was owned for many years by the Colorado Midland Railroad, a significant economic force in the valley. A portion of the ranch was the site of the Holden Works, an important facet of the mining industry. When the Marolts bought the land, the buildings which remained from the mill were adapted for ranching use. The sampling building became a granary, the salt warehouse was adapted as a barn, and the office was remodeled as a home. The Marolt ranching operations were representative of agricultural activities in the valley. They raised cattle, grazing them on national forest lands in the summers. The family raised hay and grains for the stock, and potatoes were their cash crop. In time, the family scaled down their operations, and sold parcels of the ranch; some parcels were developed, some remain as open space.

Both agriculture and mining were of primary importance in the history of Pitkin County. Thousands of people have taken part in these activities, and many still are involved in agriculture. The industries were interrelated, depending to some degree on each other, especially in the early years. Both pursuits developed the natural resources that were found in the area. Their operations changed over time, partly due to larger economic influences. The Holden-Marolt site offers us a unique opportunity from which we can learn about the influential mining and agricultural industries of Pitkin County.

APPENDIX A:

RUSSELL LIXIVIATION MILLS

(listed in approximate order of installation)

Ontario Mill, Park City, Utah - 1883 experimental plant
Tenabo mill, Cortez, Nevada - 1886 - Russell construction[26]
Cusihuiriachic mill, Chihuahua, Mexico - 1886 conversion
Sierra Grande mill, Lake Valley, New Mexico - 1886
Yedras mill, Sinaloa, Mexico - 1887 conversion
Silver Reef, Utah
Silver City, New Mexico
Chloride, New Mexico
Pioche, Nevada
Rubio mill, Parral, Mexico
Sala, Sweden
Mount Cory Mill, Nevada
Marsac Mill, Park City, Utah - 1888 conversion
Blue Bird mill, Butte, Montana - 1889 Russell construction
Sombrerete mill, Zacatecas, Mexico - 1889
Holden Smelting and Milling Company, Aspen, Colorado - 1891 Russell construction
San Juan Chief Mining and Milling Company, Mineral Point, San Juan County, Colorado
Bi-Metallic Mining Co., Phillipsburg, Montana - 1894

[26] Photographs of the Tenabo mill site are in Hardesty, 19, 51, 52.

APPENDIX B:

EMPLOYEES OF THE HOLDEN SMELTING AND MILLING CO.

AS LISTED IN THE *ASPEN CITY DIRECTORY* FOR 1892

| | |
|---|---|
| Lungwitz, Emil | assayer & chemist |
| Raff, W. B. | bookkeeper |
| Springer, William | carpenter |
| Croasdale, Stuart | chemist |
| Davis, Chas. M. | chemist, asst. |
| Harrigan, Chas, D. | engineer |
| Horgan, Chas. | engineer |
| Leake, J. E. | engineer |
| Bartlett, C. H. | fireman |
| McNider, W. S. | foreman |
| Morse, W. S. | general manager |
| Alexander, C., colored | laborer |
| Alexander, J., colored | laborer |
| Anderson, Olaf | laborer |
| Andre, John | laborer |
| Benson, Chas | laborer |
| Campbell, Geo. | laborer |
| Cass, Wm. | laborer |
| Chandler, Jacob | laborer |
| Chinn, J. T. | laborer |
| Clemons, Sam | laborer |
| Cochaver, Jos. | laborer |
| Curless, H. C. | laborer |
| Deming, Frank | laborer |
| Dibert, R. H. | laborer |
| Dougherty, J. F. | laborer |
| Erdalc, Paul | laborer |
| Fink, I. P. | laborer |
| Fora, Peter | laborer |
| Gamsby, Jas. | laborer |
| Gibson, G. M. | laborer |
| Gummesen, John | laborer |
| Helmer, S, K. | laborer |
| Kelly, Pat. | laborer |
| Krause, Jacob | laborer |
| Kreber, Frank | laborer |
| Ladd, James | laborer |
| Lawson, Alex | laborer |
| Lawson, John M. | laborer |
| Matt, All | laborer |

| | |
|---|---|
| McGregor, James | laborer |
| McNabb, -- | laborer |
| Mickelson, Peter | laborer |
| Miller, J. F. | laborer |
| O'Connor, Frank | laborer |
| Orb, Mark | laborer |
| Peterson, John | laborer |
| Pickeem, N. | laborer |
| Popech, George | laborer |
| Richardson, William | laborer |
| Riss, Jacob | laborer |
| Schak, Antone | laborer |
| Sott, Frank | laborer |
| Stangler, Jos. | laborer |
| Sundean, Samuel | laborer |
| Swanson, John | laborer |
| Tandy, J. W. | laborer |
| Tourk, Ignaz | laborer |
| Wallace, J. C. | laborer |
| Waters, J. H. | laborer |
| Watt, J. | laborer |
| Watt, William | laborer |
| West, Thos. | laborer |
| Whitley, P. F. | laborer |
| Henderson, John M. | leacher |
| Peterson, John | millman |
| Burke, S. L. | millwright |
| Jackson, M., colored | porter |
| Godshall, L. D., Dr. | superintendent |
| Aymer, Robt. | timekeeper |

*Aspen City Directory* ([Aspen]: D. J. Sayer, 1892).

APPENDIX C:

DITCHES AND CANALS IN WATER DISTRICT 38 (THE ROARING FORK RIVER AND ITS TRIBUTARIES) IN ORDER OF PRIORITY OF WATER RIGHTS[27]

| NAME OF DITCH | STREAM FROM WHICH WATER WAS TAKEN | DATE OF APPROPRIATION |
|---|---|---|
| Waco Ditch | Woody Creek | 18 June 1880 |
| Evergreen Ditch | Owl Creek | 2 July 1880 |
| Little Brush Ditch | Little Brush Creek | 2 July 1880 |
| Aspen Ditch | A spring in Spar Gulch | 12 July 1880 |
| Jacobs Ditch | Sopris Creek | 20 Sept. 1880 |
| Prince Ditch | Antler Creek | 1 April 1881 |
| Pioneer Ditch | Thompson Creek | 1 May 1881 |
| Harris Ditch | Harris Creek | 5 May 1881 |
| Boram and White Ditch | Capitol Creek | 5 May 1881 |
| McPherson Ditch | Owl Creek | 15 May 1881 |
| Little Woody Ditch | Woody Creek | 17 May 1881 |
| Wenger Ditch | Springs | 22 May 1881 |
| Stapleton Ditch | Owl Creek | 12 June 1881 |
| West Channel Ditch | Sopris Creek | 15 June 1881 |
| Hatch Ditch | Sopris Creek | 10 July 1881 |
| Chatfield Reservoir Ditch | Sopris Creek | 15 July 1881 |
| Bivert Ditch | Owl Creek | 16 July 1881 |
| Luchsinger Ditch | Luchsinger Creek | 15 August 1881 |
| Four Mile Ditch | Four Mile Creek | 6 Nov. 1881 |

[27] Colorado, State Engineer, *Biennial Report for the Years 1889 and 1890* (Denver: Collier and Cleaveland Lth. Co., 1890), 413-414.

APPENDIX D:

COMPONENTS OF MIDLAND RANCH

| NAME | DESCRIPTION OF PARCEL | SECTION | ACRES |
|---|---|---|---|
| Samuel Flanagan | W 1/2 of the NW 1/4 and NW 1/4 of the SW 1/4 | 12 | 120 |
| George Elrod | NE 1/4 | 11 | 160 |
| William Stone | SE 1/4 of the NW 1/4 | 12 | 40 |
| John B. Stitzer | SW 1/4 SW 1/4;<br>lot 3 (a portion of the NE 1/4 SW 1/4);<br>lot 6 (a portion of SE 1/4 SW 1/4) | 12 | 107 |
| Holden Company | portion of the SW 1/4 | 12 | 20 |

All land in Township 10 South, Range 85 West, Pitkin County, Colorado.

# APPENDIX E

Historical Statistics on Agriculture in Pitkin County

| | 1890 | 1900 | 1910 | 1920 | 1930 | 1940 |
|---|---|---|---|---|---|---|
| Land Use | | | | | | |
| Number of Farms | 116 | 170 | 191 | 179 | 180 | 169 |
| Ave. Farm Size | 182 | 208 | 237 | 276 | 333 | 414 |
| Land in Farms | 21,066 | 35,363 | 45,286 | 49,389 | 59,888 | 70,018 |
| Livestock | | | | | | |
| Horses | 543 | 1,206 | 1,530 | 1,376 | 1,245 | 802 |
| Mules | 53 | 22 | 12 | 38 | 25 | |
| Asses & Burros | 43 | 29 | 7 | 10 | 6 | |
| Cattle | 2,256 | 6,740 | 6,548 | 7,247 | 7,306 | 7,427 |
| Beef | 1,724 | 5,633 | 5,670 | 6,611 | 6,552 | 6,857 |
| Dairy | 532 | 1,107 | 878 | 636 | 754 | 570 |
| Sheep | 3 | 5,940 | 301 | 2,657 | 17,473 | 13,610 |
| Swine | 392 | 371 | 1,188 | 1,262 | 899 | 1,159 |
| Selected Crops | | | | | | |
| Oats (bushels) | 49,328 | 60,290 | 97,201 | 86,281 | 87,451 | 42,130 |
| Wheat (bushels) | 3,563 | 6,910 | 16,458 | 25,942 | 12,882 | 21,440 |
| Barley (bushels) | 999 | | 4,188 | 7,919 | 3,432 | 5,940 |
| Rye (bushels) | 50 | 160 | 647 | 1,255 | 230 | |
| Hay (tons) | 4,237 | | 16,246 | 18,944 | 19,481 | 14,667 |
| Timothy & Clover | | 6411* | 5,891 | 13,225 | 10,406 | |
| Clover | | 30 | 24 | 3 | 2 | |
| Alfalfa | | 10,157 | 5,420 | 5,040 | 8,188 | 9,177 |
| Wild Grasses | 284+ | 542 | 22 | 84 | 367 | |
| Potatoes (bushe | 23,816 | 40,185 | 225,934 | 205,478 | 196,872 | 184,200 |

* Other Tame & Cultivated Grasses
\+ 1887 figure

Compiled from:
U. S., Department of the Interior, Census Office, Report on the Statistics of Agriculture in the United States at the Eleventh Census: 1890 (Washington, D. C.: G.P.O., 1895);
U. S., Department of the Interior, Census Office, Census Reports, volume 5, Agriculture, part 1, Farms, Live Stock, and Animal Products (Washington D. C., 1900);
U. S., Department of the Interior, Census Office, Census Reports for the Twelfth Census, 1900, vol. 6, Agriculture, part 2, Crops and Irrigation (Washington, D. C.: G.P.O., 1902);
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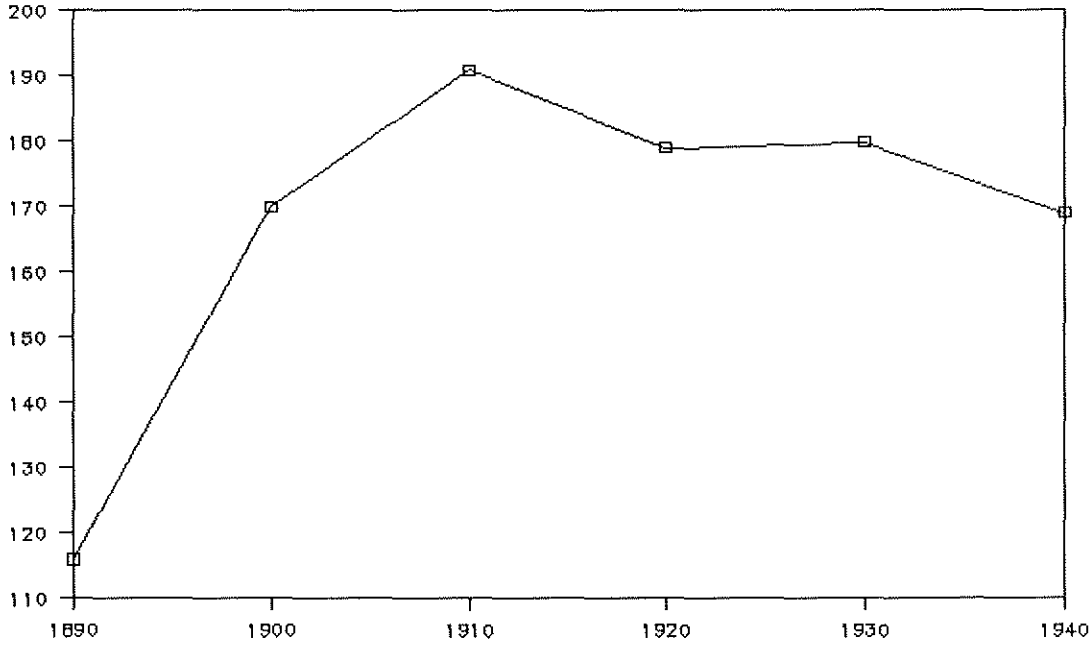
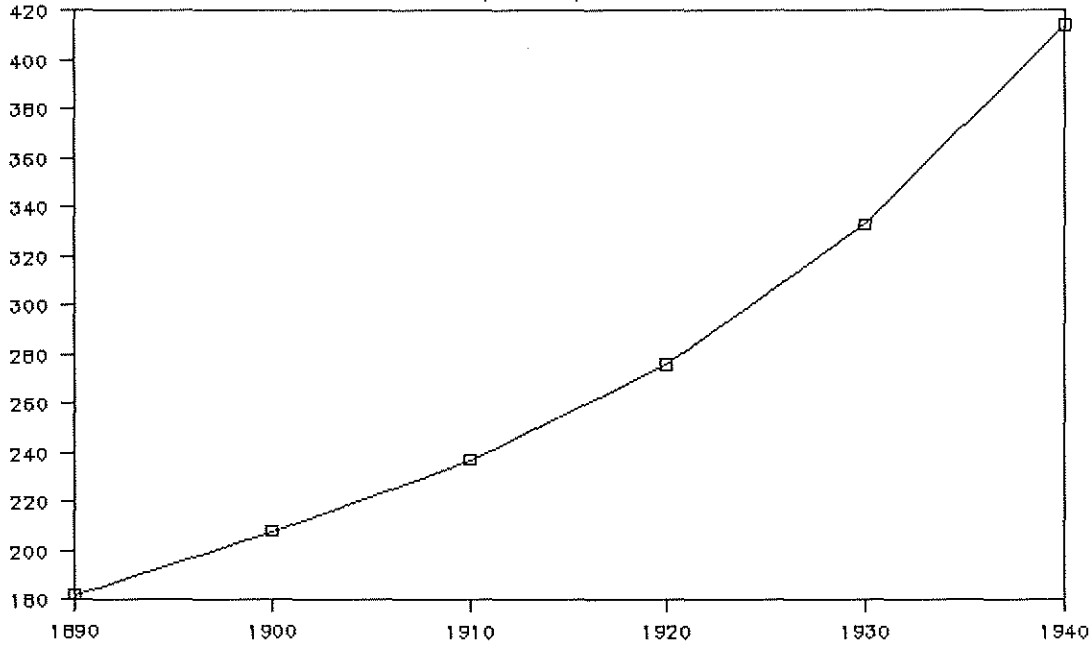
U. S., Department of Commerce, Bureau of the Census, Fourteenth Census of the United States: 1920, volume 6, Agriculture, part 3, The Western States and Outlying Possessions (Washington, D. C.: G.P.O., 1922);
U. S., Department of Commerce, Bureau of the Census, Fifteenth Census of the United States: 1930, volume 2, Agriculture, part 3, The Western States (Washington, D.C.: G.P.O., 1932); and
U. S., Department of Agriculture, Agricultural Marketing Service, Division of Marketing Statistics, in cooperation with Colorado State Planning Commission, Colorado Agricultural Statistics (Denver, 1940).

## Number of Farms




## Average Farm Size

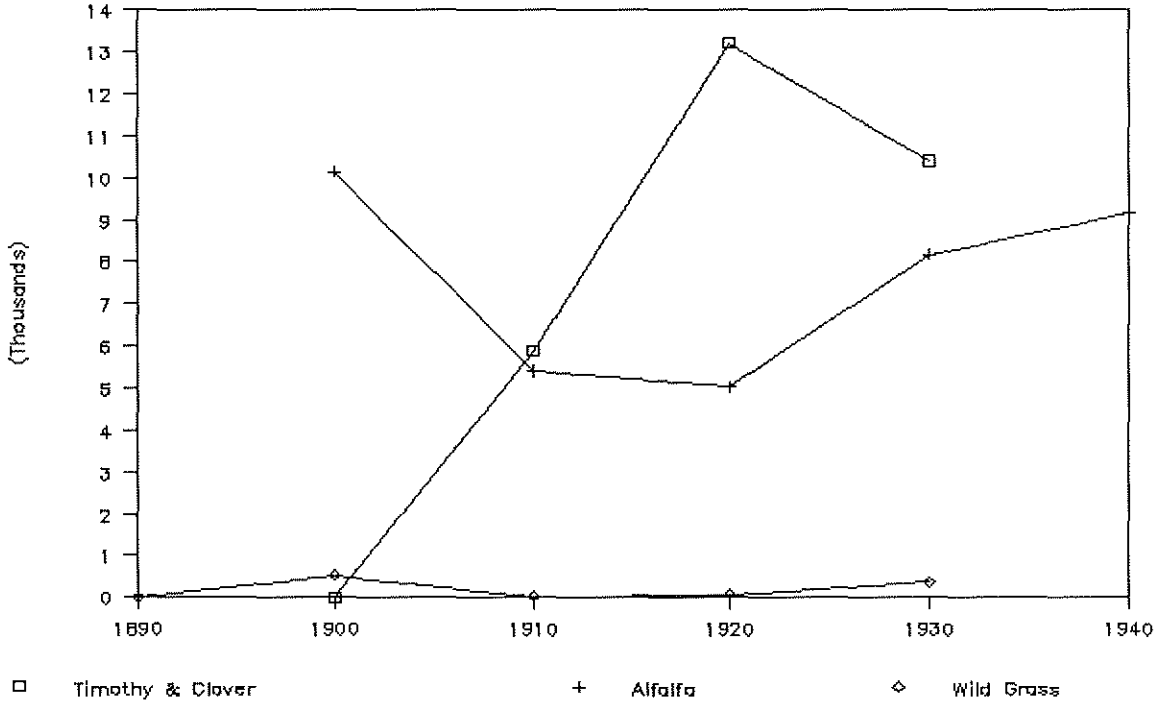
(in acres)



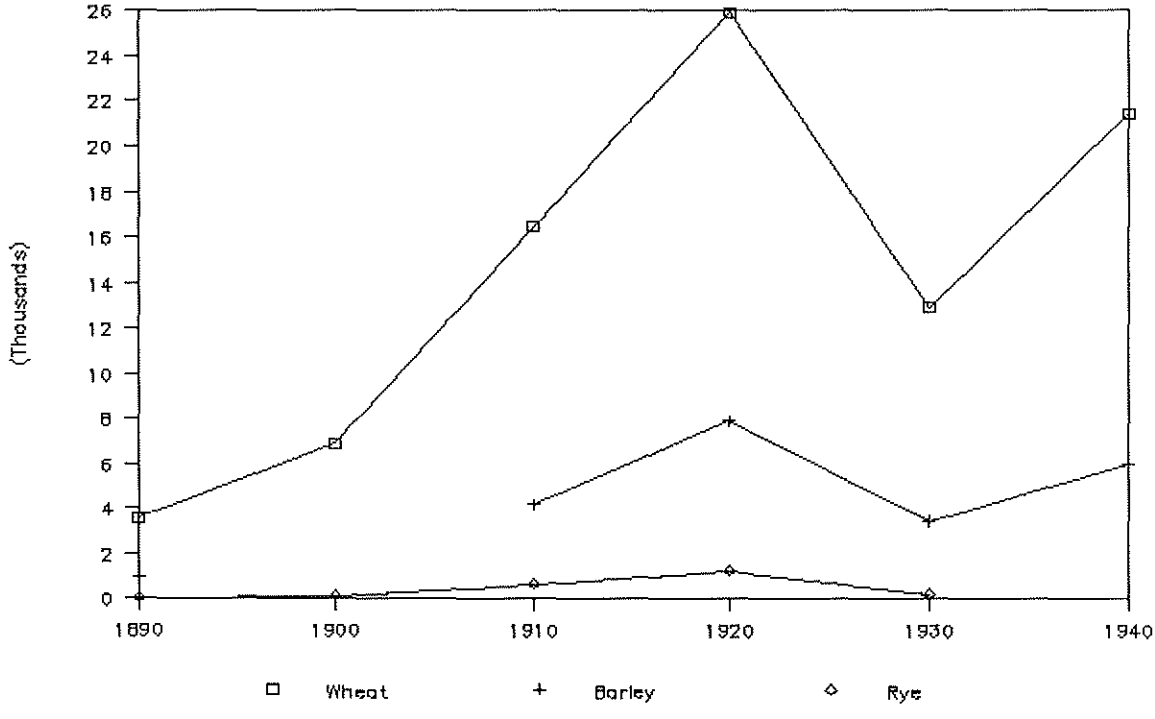
## Number of Sheep

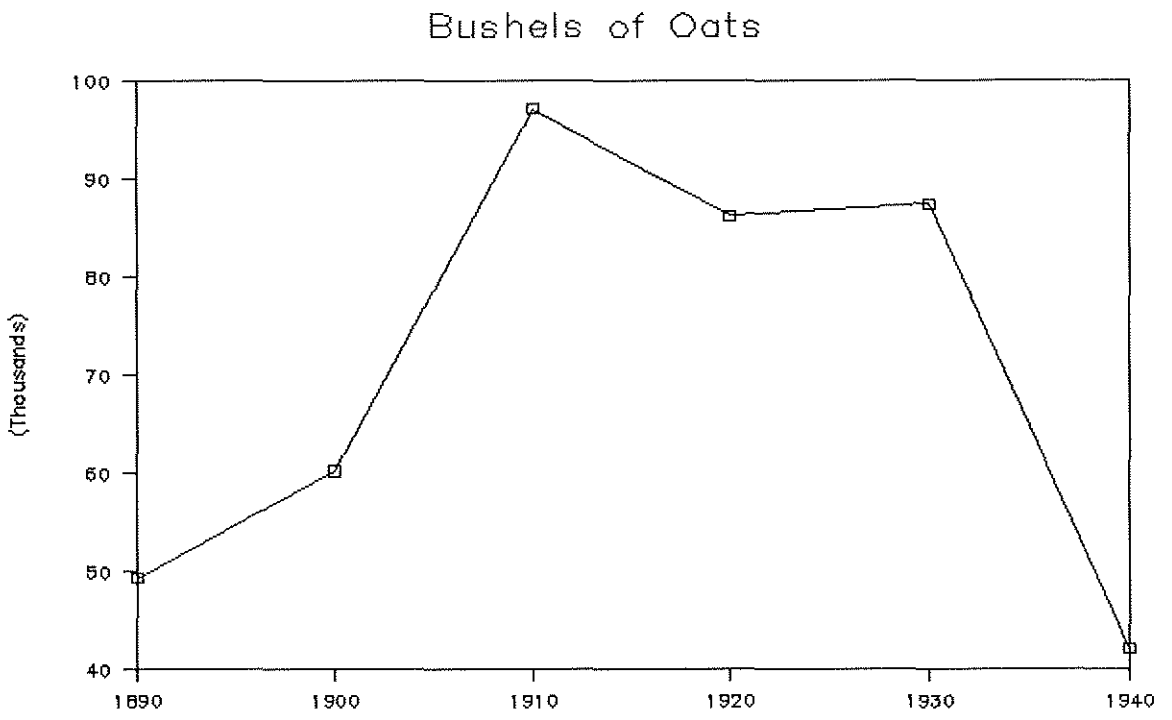
## Number of Swine

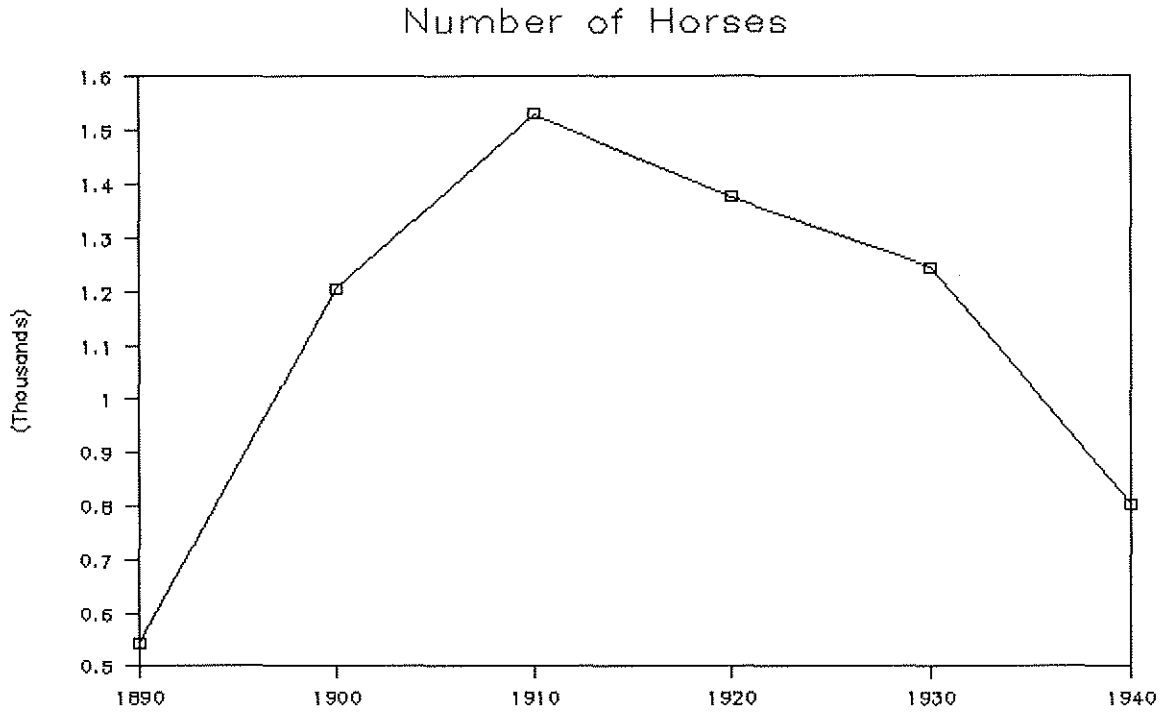
## Tons of Hay




## Bushels of Wheat, Barley, Rye

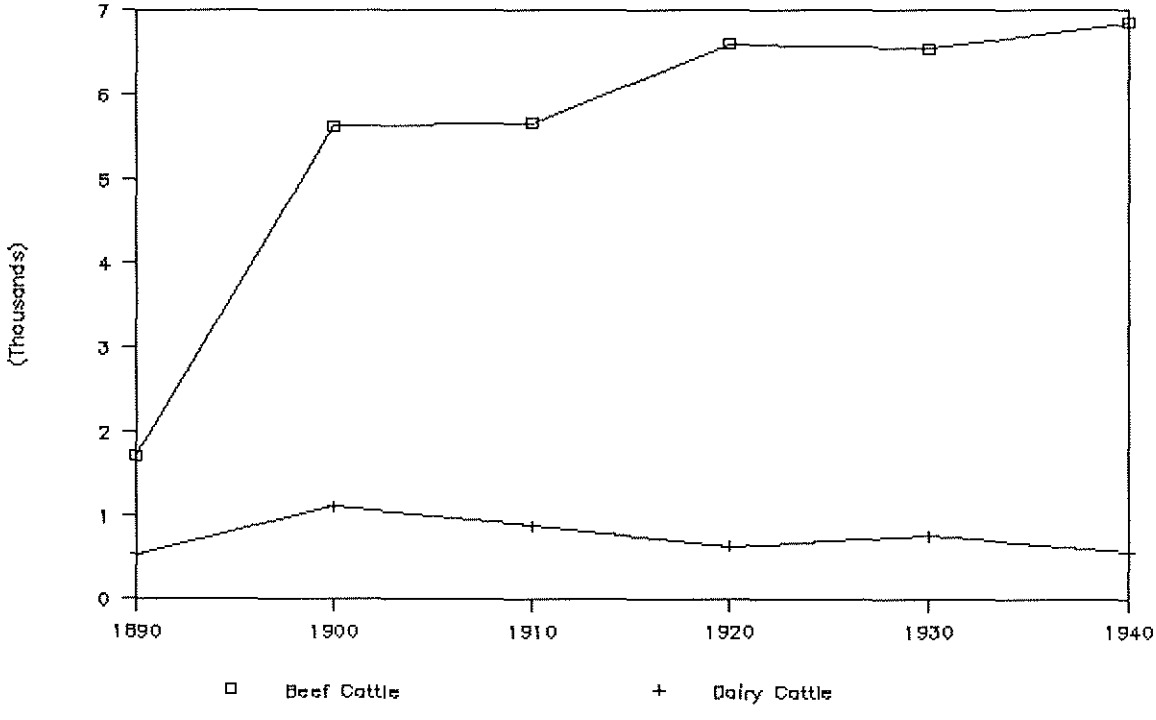



Bushels of Oats
(Thousands)
100
90
80
70
60
50
40
1890
1900
1910
1920
1930
1940


Number of Horses
(Thousands)
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
1890
1900
1910
1920
1930
1940

## Bushels of Potatoes

## Number of Cattle



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AIME = American Institute of Mining Engineers

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*NEWSPAPER ARTICLES*

In Chronological Order

*ADT = Aspen Daily Times*
*AT = Aspen Times*
*AWT = Aspen Weekly Times*
*RMS = Rocky Mountain Sun*

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