HISTORIC OVERVIEW OF THE RUSH CREEK AND LEE VINING CREEK HYDROELECTRIC PROJECTS

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INTRODUCTION

The Rush Creek and Lee Vining Creek hydroelectric systems are early expressions of hydroelectric generation technology in California. Now owned and operated by Southern California Edison Company (SCE), these systems are sufficiently old to warrant consideration as historic properties. SCE, as a requirement for project relicensing by the Federal Energy Regulatory Commission, is currently evaluating these systems to determine their historical significance and potential eligibility for inclusion on the National Register of Historic Places (NRHP). The results of the evaluation process will also aid SCE and regulatory agencies in future management of the systems.

This report provides a historical overview of the Rush Creek and Lee Vining Creek systems. This is best considered a first phase of work, which must be completed prior to field inventory, evaluation of individual properties, and assessment of historical significance.

Location and Geography

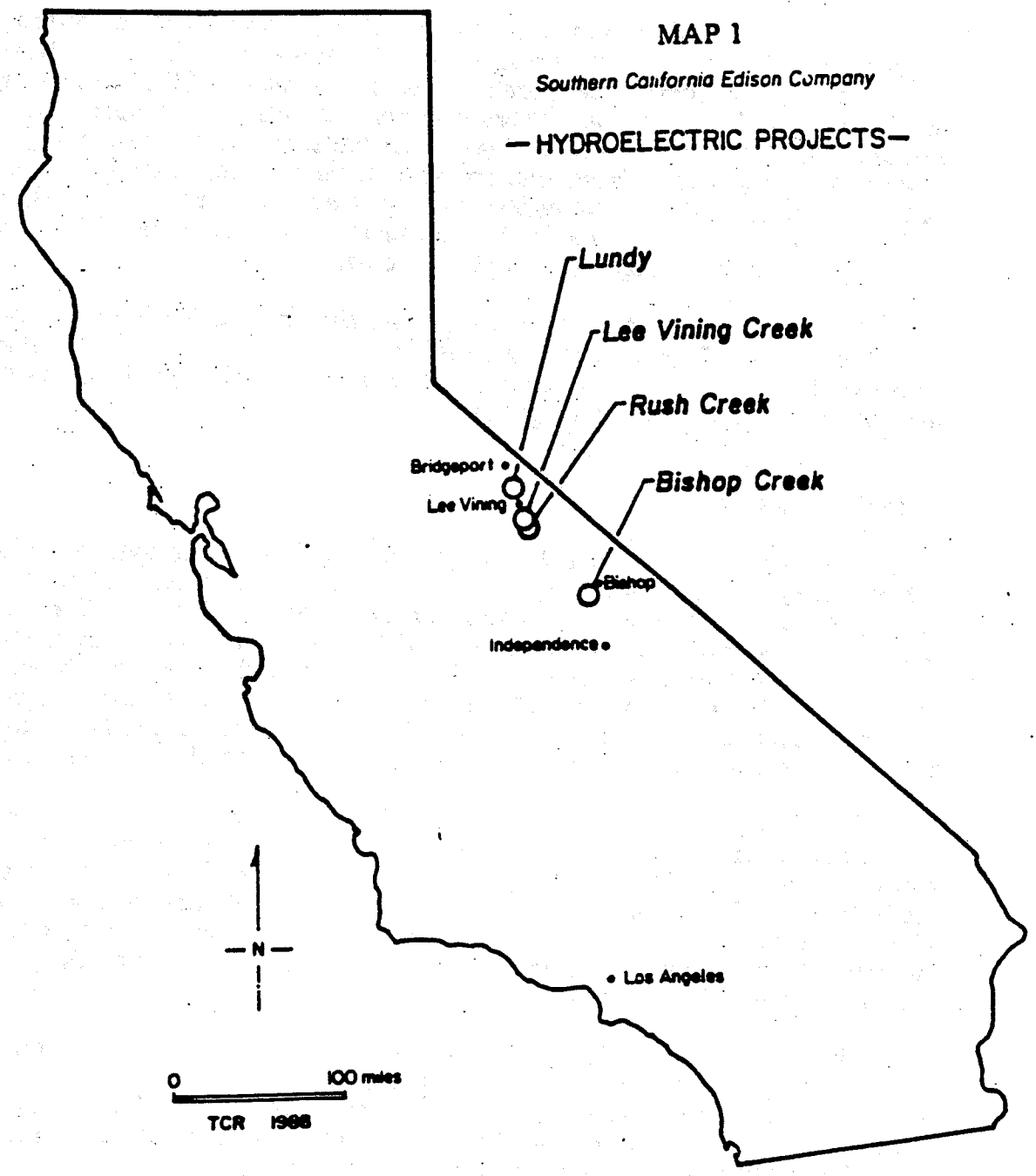
The Rush Creek and Lee Vining Creek hydroelectric systems, along with two other SCE systems, Bishop Creek and Lundy, are located on the steep eastern slope of the central and southern Sierra Nevada Range (Map 1). The Sierra Nevada creates a vast rain shadow, with most of the precipitation falling as rain and snow on its more gentle western slope. However, at high elevations there is sufficient snowfall on the eastern side of the crest to create permanent, easterly flowing streams. This hydrologic regime, combined with the precipitous mountain slope, provided the basis for early and successful development of hydroelectric generation.

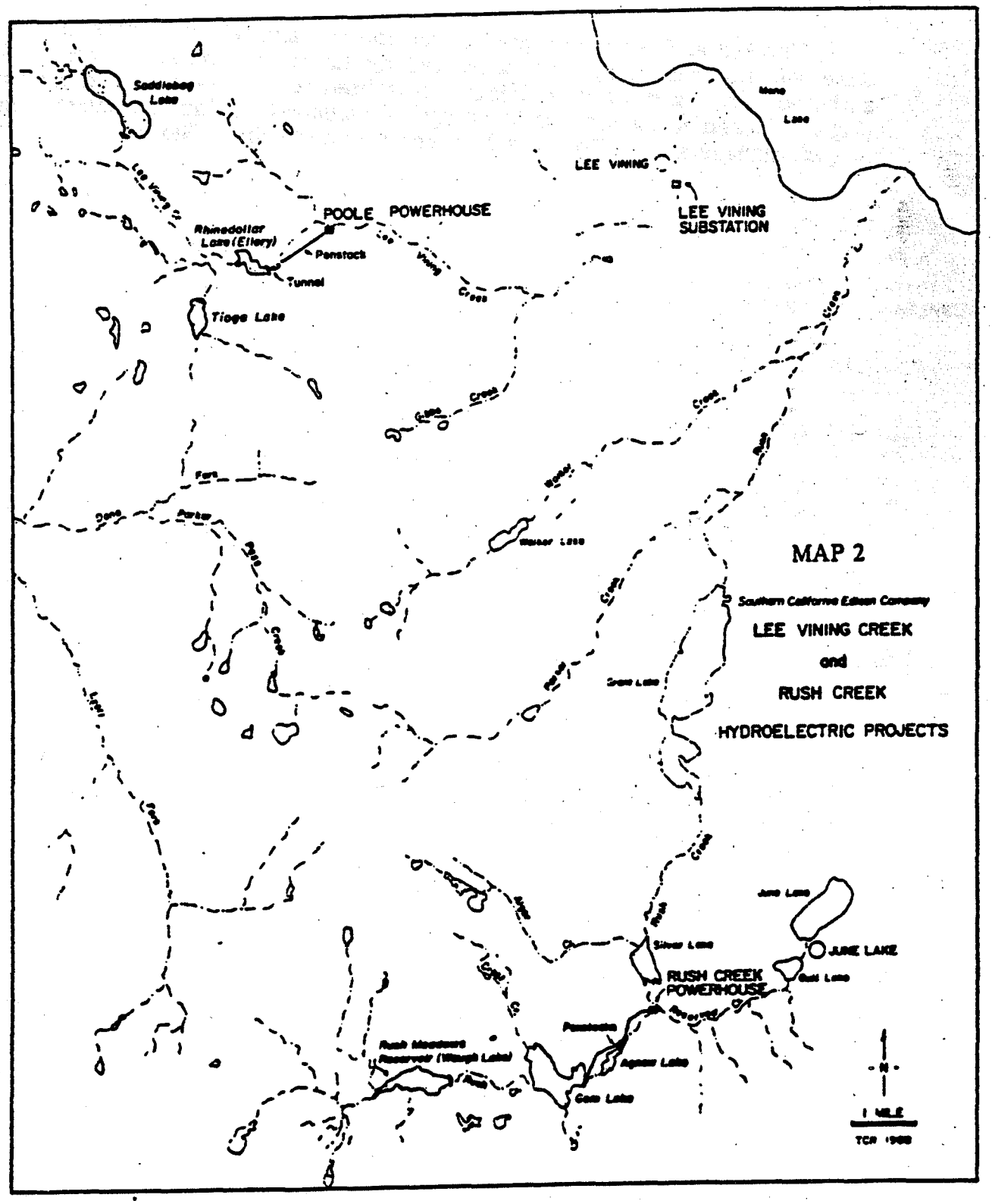
The Lundy, Rush Creek and Lee Vining Creek systems are approximately 270 air miles north of Los Angeles and directly east of Tioga Pass and Yosemite National Park. The Lundy Project has been previously assessed and recommended as ineligible for NRHP (National Register of Historic Places) listing by White (1985). The neighboring Bishop Creek Hydroelectric System has been recommended as a historic district, and is currently being evaluated by the Office of Historic Preservation (OHP) for NRHP eligibility (TCR 1988).

The Lee Vining Creek System consists of three reservoirs (Saddlebag, Rhinedollar [Ellery], and Tioga) and a single powerhouse (Poole) along the upper reaches of Lee Vining Creek, and a substation in the town of Lee Vining. The Rush Creek System is comprised of three reservoirs (Rush Meadows [Waugh], Gem, and Agnew) and one powerhouse (Rush Creek) (Map 2).

Research Goals

The purpose of overview research on Rush Creek and Lee Vining Creek systems was to document the development of these systems. This historical background will be used to evaluate the architectural and other potentially historic elements of the systems and, if appropriate, the National Register eligibility of one or both of the systems.


MAP 1
Southern California Edison Company
—HYDROELECTRIC PROJECTS—
Lundy
Lee Vining Creek
Rush Creek
Bishop Creek
Bridgeport
Lee Vining
Bishop
Independence
Los Angeles
N
0
100 miles
TCR 1988


Saddlebag Lake
Lee Vining
POOLE POWERHOUSE
LEE VINING
LEE VINING SUBSTATION
Rhinedollar Lake (Ellery)
Penstock
Tunnel
Tioga Lake
Mono Lake
MAP 2
Southern California Edison Company
LEE VINING CREEK
and
RUSH CREEK
HYDROELECTRIC PROJECTS
June Lake
Silver Lake
JUNE LAKE
RUSH CREEK POWERHOUSE
Gull Lake
Reservoir
Penstocks
Agnew Lake
Gem Lake
Rush Meadows Reservoir (Waugh Lake)
N
1 MILE
TCR 1988

Personnel

This research was conducted during the fall and winter months of 1987–1988. Research for the study was conducted by historian Valerie Diamond, who also authored the report. Robert Hicks contributed to the research and produced the maps. Mildred Kolander was in charge of technical editing and report production. Project managers were Dorothea J Theodoratus and Clinton Blount.

CHAPTER 1

PURPOSES AND METHODS

This report is a historic overview of the Rush Creek and Lee Vining Creek hydroelectric systems located in Mono County. The overview provides background information on the plants and describes their historic significance in the context of local and regional history.

In September 1987, while at Bishop Creek conducting research for an architectural evaluation of the Bishop Creek Hydroelectric System (TCR 1988), research began on the history of the power plants at Rush and Lee Vining creeks. For this study, a broader variety of printed and documentary resources had to be examined to provide information necessary for the historical overview. The Division Office's files contain drawings, maps, plans, brief historical summaries, and other materials which were helpful in this phase of study. One of the most important finds located in these files was the Agreement of Sale and Purchase between Southern Sierras Power Company and the City of Los Angeles' Department of Water and Power, which would later prove the key to understanding the controversy over water rights in the Mono Basin area.

At the Division Office, discussions were held with many Southern California Edison employees, several of whom had also worked for California Electric Power Company. Through these communications, valuable details were obtained regarding the system's operation and repairs and changes made over the years. Additionally, the spouse of one of Southern California Edison Company's Bishop Creek employees, who is currently compiling a history of the Bishop Hydro Division, was interviewed, and a draft copy of her work was obtained for future study.

Also during the September visit, local repositories in Inyo County were explored for both published and unpublished documents and records. The Inyo County Free Library in Bishop possesses numerous newspaper articles, pamphlets, and local and regional histories containing information about Inyo and Mono counties' hydroelectric power history. Of importance in this collection was W. A. Chalfant's *The Story of Inyo* (1933), a county history of considerable detail.

Following the trip to Bishop Creek, a visit was made to the Corporate Offices of Southern California Edison Company in Rosemead. In the Hydro Generation Office, current files on the Rush and Lee Vining power plants were canvassed for possible historical details. (The office's historic files stored in a different repository were unavailable for study due to earthquake damage at the archive.) At the Corporate Library, Nevada–California Electric Corporation and Sierras Service bulletins were found rich in detail on both the corporate and construction history of the various plants. William Myers of Southern California Edison Company's Corporate Communications was also consulted for his insight into the printed, documentary, and photographic resources available for study. Mr. Myers volunteered the use of valuable Annual Reports of Nevada–California Power Company—one of the few available sources on the early history of the power plants.

In Sacramento and San Francisco, state and city repositories were visited and the standard sources consulted for information on the Rush Creek and Lee Vining Creek power plants. At the California State Libary and the San Francisco Public Library, county histories, technical histories, and electrical and engineering periodicals were checked for pertinent information. Research was also conducted at the California State Archives, Sacramento, where Articles of Incorporation were found to contain information on corporate connections of various early power companies.

A second trip was made to the study area in December of 1987, during which there was a brief investigation of the resources at Rush and Lee Vining creeks. A preliminary study of the power plants and substation was conducted, and some photographs were taken of the major buildings. A visit was also made to the Assessor's and Recorder's offices at the Inyo County Court House, as well as the Eastern California Museum in Independence.

Despite the thoroughness employed in preparing this report, there remains a potential for future study in the early photographs and newspaper articles available in local repositories. It is evident that Southern California Edison Company possesses very few early photographs of the Rush Creek and Lee Vining Creek power plants. However, it was brought to researchers' attention during this study that certain former California Electric Power Company employees at Bishop Creek may have obtained old photographs discarded at the time of the merger with Southern California Edison Company. If these photographs could be located, they would be an invaluable source of information on the history of the power plants' development.

CHAPTER 2

MOTIVES, PLANS, AND DEVELOPMENT: 1890s–1917

Built in the early twentieth century, the Rush Creek and Lee Vining Creek hydroelectric generating facilities located in the eastern Sierra Nevada Mountains are historically significant for several reasons (Map 2). First, the construction of these facilities was the result of events which took place in the early to mid–1900s with the struggle to capitalize and develop the hydraulic resources of the Mono Basin area. At the same time, the manner and means by which these facilities were constructed was in some ways unique, and in other ways representative of the kinds of construction techniques used in large engineering projects of the period. Additionally, the Rush Creek power plant and the Gem Lake dam were significant in engineering and design. Finally, the development and maintenance of these facilities and their connection with the Nevada–California Electric Corporation was important in terms of the broad patterns of California and Nevada history during the first half of the century, particularly the association with early mining activity in Nevada, and later with the developments in Imperial and Coachella valleys and the struggle over water rights with the City of Los Angeles.

By the turn of the century, a number of parties had recognized the tremendous potential which lay in the waters of Rush and Lee Vining creeks, and began to make plans for the area's development. The motives of these parties were varied: some wanted the water for irrigation, others for mining or hydroelectric generating purposes. In a short time, two individuals with plans for the area's development surfaced as leaders. These two men would go a long way toward ensuring the hydroelectric development of both Rush and Lee Vining creeks, although neither would actually be on hand to see the completion of the power plants.

James Stuart Cain

One of the first men to seriously develop plans to capitalize on the water resources of the Mono Basin area was one of Mono County's wealthiest citizens, James Stuart Cain. Born in Rockburn, Quebec Province, Canada, in 1854, Cain arrived in Carson City, Nevada, in 1875 to work in a lumbermill. When he heard tales of the gold in Bodie, Cain left Carson City and moved to the boom town, where he worked for the Porter Lumber Company. In a short time, Cain saved enough money to buy, together with partner Thomas Holt, the Bodie Railroad and Lumberyard, which ran lumber barges across Mono Lake. In 1880 Cain, together with another partner, Joe Maguire, obtained a six–month lease on a small portion of the Bodie Standard Mine, and within three months the two men struck the legendary Fortuna vein, which paid out $90,000 and made them both wealthy men. Cain soon began investing in a wide variety of Mono County businesses—from banking to mining to power development (Cain 1956:75–78).

Cain's interest in the development of hydroelectric generating plants and the transmission of electricity over long distances began when he became a stockholder of the Standard Consolidated Mining Company. Cain was one of the few supporters of mine superintendent Thomas H. Legett, who had the idea to construct a power

plant at Green Creek, seven miles above Bridgeport, and to transmit electricity 13 miles to the Standard Mill in Bodie (Cain 1961:21–22; Johnson and Johnson 1967:91–92). The completion of the Green Creek power plant in December 1892, and the transmission of electricity to Bodie in October 1893, proved to be a first in terms of long–distance transmission of electrical energy (Johnson and Johnson 1967:91; Potter 1934–1941:153). Cain "counted it one of the biggest thrills in his life" to be on hand when the power generated at Green Creek first reached the mill in Bodie (Cain 1956:82).

Undoubtedly sparked by the success of the Green Creek power plant, Cain began investigating other sites suitable for hydroelectric development in Mono County. He located a desirable spot on the Walker River and suggested to Standard Consolidated Mining Company the construction of a second power plant at this site. Cain's suggestion was eventually rejected because the Westinghouse Company, makers of the plant's electrical machinery, did not believe that it was possible to transmit electricity the distance from Walker River to Bodie (Potter 1934–1941:154).

Undaunted, Cain continued to investigate, and located two other sites suitable for hydroelectric development: the Lee Vining Creek site at the head of Silvester Meadows, and the Rush Creek site, 23 miles away at Silver Lake. In May and June of 1903, Cain and partner R. T. Pierce posted notices of appropriation near the outlets of Agnew and Gem lakes, claiming 50,000 miner's inches of the waters of Rush Creek (California. Superior Court 1915a:7). In September of 1906, Cain hired an engineer, Thomas R. Hanna, to survey Rush Creek and locate a site for a dam on Gem Lake (California–Nevada Canal, Water and Power Company 1907:Drawing #407–1). At the same time that Cain made plans and surveys of the Rush Creek and the Lee Vining Creek areas, he also attempted to purchase the surrounding ranch land in order to control the valuable water rights for any future development (Cain 1956:85).

Cain soon learned that he was not the first person to realize the potential of the Rush and Lee Vining creeks' water resources. As early as 1902, a study was made of the area by a group of Mono County residents. Plans were made to dam the waters of Rush Creek to form two storage lakes, then constructing flumes and ditches leading from the reservoirs to their properties for irrigation purposes (California. Superior Court 1915a:3; Hogan 1916:408). Although the group immediately began constructing irrigation ditches, they did not formally incorporate as the California–Nevada Canal, Water and Power Company until October 9, 1906. By this time Cain was also interested in development of Rush Creek's waters, and within a month of incorporation, Cain and his new partner, W. H. Metson, took control of the Nevada–California Canal, Water and Power Company (Potter 1934–1941:161).

Rather than abandon the Canal Company's plan to construct irrigation reservoirs at Rush Creek, Cain decided to expand development. In February 1907, California–Nevada Canal, Water and Power Company, under Cain's control, submitted an application to the U.S. Department of the Interior in Washington, D.C., for rights–of–way over public land to construct five irrigation reservoirs and numerous ditches and flumes in the Rush and Lee Vining creeks area. The five reservoir sites were at Gem, Agnew, Saddlebags (later referred to as "Saddlebag"), Rhinedollar, and Tioga lakes. After a period of investigation, the Interior Department approved the Canal Company's request, with one stipulation: upon proper agreement, the company would permit the use of impounded water for power generation, provided that after such use the water be returned to the streams to be

used for irrigation purposes (Hogan 1916:408; Potter 1934–1941:161). This stipulation no doubt pleased Cain, who recognized from the start the hydroelectric potential of the Rush and Lee Vining creeks sites.

Delos Allen Chappell

About the same time that the Canal Company's application was approved, plans for development of the water resources of Rush and Lee Vining creeks came to the attention of another wealthy and powerful individual concerned with hydroelectric development in Inyo and Mono counties—Delos Allen Chappell. Born on a farm near Williamson, Wayne County, New York, in 1846, Chappell "early developed those qualities which later brought him to the forefront of western enterprises and development" (Nevada–California Electric Corporation Bulletin 1916:n.p.). Chappell planned to become a scientist, and attended the University of Michigan in Ann Arbor. His plans were cut short at his father's death, when he quit school and went to work in Chicago as an engineer and water works constructor. Eventually he moved to Colorado, where he became interested in development of coal mines. By 1888, Chappell controlled the Victor Coal Company, one of Colorado's largest coal producers, and was associated with several of Colorado's leading banking institutions (Nevada–California Electric Corporation Bulletin 1916:n.p.; Potter 1934–1941:52).

About 1906, Chappell sold out his various Colorado holdings and moved to California, where he became interested in the hydroelectric developments of the eastern Sierra Nevada Mountains. In the fall of 1907, Chappell became president of the Nevada–California Power Company, which had already constructed powerhouses at Bishop Creek in Inyo County, supplying electrical power to the mining communities of southwestern Nevada. Not long after becoming president, Chappell realized that there existed, some 80 miles to the north of his company's Bishop Creek plants, the Rush and Lee Vining creeks sites, which were under the development of Cain and the Nevada–California Canal, Water and Power Company. Chappell perceived these developments as a threat to the Nevada–California Power Company, and as a later company president explained, "The existence of this hydro development in the hands of outside parties and in close proximity to our Nevada market, constituted a serious menance to the future of our Company" (West 1917:11). With no time to waste, Chappell made plans to obtain control of the Rush and Lee Vining creeks sites.

Pacific Power Company

Before Chappell had time to wrest the Rush and Lee Vining creeks sites from the "hands of outside parties," the outside parties—namely Cain and associates—had located and made plans to develop additional hydroelectric generating sites in Mono County. Cain and associates found another suitable site northeast of Mono Lake on Mill Creek, began buying up land and water rights, and made plans to construct a plant which would transmit electricity for the first time to the residents of Bodie and to mines at Aurora and Wonder, Nevada (Johnson and Johnson 1967:92; Potter 1934–1941:154).

In April 1910, construction work began on the Mill Creek site, which would eventually include a dam at Lundy Lake, 12,000 feet of flowline, 4,200 feet of penstock, and a powerhouse (Bodie Miner 1910:n.p.; Potter 1934–1941:154). A month

later, two companies incorporated which would develop and operate the new power plant: Hydro-Electric Company, which was in charge of the plant's construction until late December, and Pacific Power Company, which took over the plant and began operations on January 1, 1911 (Bridgeport Chronicle-Union 1910:n.p.; Fowler 1923:766; California. Incorporation Records 1910a, 1910b). In exchange for a large block of stock, Pacific Power Company became the beneficiary not only of Cain's holdings at Mill Creek, but also of certain properties and water rights he had acquired at Rush and Lee Vining creeks (Cain 1956:85).

Unfortunately for the recently incorporated Pacific Power Company, a disaster struck its new power plant on March 9, 1911: an avalanche destroyed the power plant and seven people were killed. The Pacific Power Company quickly chose a new powerhouse site, and by December a newly constructed plant was in operation at Mill Creek (Fowler 1923:797; Johnson and Johnson 1967:95-97; Potter 1934-1941:155-161).

As might be expected, Chappell and the Nevada-California Power Company found the construction of a power plant at Mill Creek every bit as menacing as the threat of developments at Rush and Lee Vining creeks. With the financial resources of the Nevada-California Power Company tied up with developments on Bishop Creek, Chappell tried to acquire the Pacific Power Company's holdings at Mill, Rush, and Lee Vining creeks. He personally began buying shares in both Pacific Power Company and Hydro-Electric Company, and instructed members of his company's Board of Directors and its officers to do the same (West 1917:11). By the end of 1911, Chappell held a substantial interest in both of these companies, and he had also seen to it that the Nevada-California Power Company took over another possible threat—the Silver Lake Power and Irrigation Company, organized in 1907 by Ernst Augerman to develop hydroelectric plants in the Owens River Gorge (Potter 1934-1941:82-84; California. Incorporation Records 1907).

Chappell's plan for Pacific Power Company was eventually to line up, by means of a transmission line, its Mill Creek plant and proposed plants at Rush and Lee Vining creeks, with those of the Nevada-California Power Company at Bishop Creek and proposed plants of the Silver Lake Power and Irrigation Company in the Owens River Gorge. Chappell hoped that the power generated at these plants would one day be transmitted not only northeastward into Nevada, but southward over the Nevada-California Power Company's new 238-mile Tower line to San Bernardino.

After 1911, Pacific Power Company was controlled by both Cain and Chappell. In 1913, a 56,000-volt transmission line was built from the company's Mill Creek plant to Nevada-California Power Company's Bishop Creek Plant 5 Control Station, fulfilling one part of Chappell's plan. The line was built by the Silver Lake Power and Irrigation Company, which sought to provide power for its developments underway in the Owens River Gorge, in spite of the fact that it was embroiled in a serious legal battle over water rights with the City of Los Angeles. The unusual connection between Pacific Power Company, Nevada-California Power Company, and Silver Lake Power and Irrigation Company was commented on in this quotation from the *Inyo Register*:

> The new power transmission lines from Nevada-California Power Company's plant 5, northly into Mono are primarily for the purpose of using power in connection with the development of the SILVER LAKE POWER COMPANY in running compressors, air drills, electric cars, and hoists.

> The work heretofore being done expensively by hand, now the Company's right have judicially determined, it is its purpose to do the work mechanically, and on a more economical basis in the construction.
>
> The line will also be extended to a connection with the Pacific Power plant in order to tie the two systems together.
>
> It is evident that extensive improvement at the Crooked Creek site and the erection of an important plant in the river canyon are included in the accepted program. Whatever evil or good might result from Los Angeles proposal reservoiring of Long Valley is practically removed from possibilities by the SILVER LAKE COMPANY'S being sustained in its contentions by Judge Murphy's recent decision. The Pacific Power Company is related to the Nevada–California Power Company by reason of having some of the same men as large stockholders [Inyo Register 1913a:1].

Although the developments of Silver Lake Power and Irrigation Company were eventually abandoned because of the struggle with Los Angeles, the transmission line from Mill Creek to Bishop Creek was completed and put into operation on December 18, 1913 (Chalfant 1933:376; Inyo Register 1913b:5; Potter 1934–1941:98, 187). By 1914, the transmission line had been taken over by Pacific Power Company, which entered a contract with Southern Sierras Power Company, a subsidiary of Nevada–California Power Company, to exchange and interchange electrical energy from the Mill Creek and Bishop Creek plants (Nevada–California Power Company 1914:n.p., 1915:12–13; Potter 1934–1941:111).

After 1914, despite Cain and Chappell's guidance, Pacific Power Company began to fail. The company defaulted on the interest of its first mortgage, $800,000 of which was outstanding (Fowler 1923:766). What followed was a series of events which eventually resulted in reorganization of the company and a division of its holdings.

From January to June, 1915, many stocks and bonds of Pacific Power Company were acquired by Central California Electric Corporation (Fowler 1923:766). Incorporated on January 22, 1915, with Chappell as president, Central California Electric Corporation was intended as a holding company for Pacific Power Company, concentrating its efforts on financing and promoting irrigation, water and power companies located in Mono County (Fowler 1923:766; Potter 1934–1941:164).

In August 1915, foreclosure proceedings were instituted against Pacific Power Company in both Nevada and California. It was Cain and Chappell who stepped in, as representatives of the bondholders, and purchased the company's properties. The amounts paid by Cain and Chappell were credited to Pacific Power Company's bonds and unpaid coupons, and in October 1915 the two men turned over the company's property and business to Pacific Power Corporation and Cain Irrigation Company (Chatfield 1917:34; Fowler 1923:766).

Pacific Power Corporation became successor to the power generating and transmission system of Pacific Power Company. Pacific Power had been incorporated back in November 1914 when Pacific Power Company first appeared to be failing (California. Incorporation Records 1914). In May 1915 this corporation entered an agreement with the old California–Nevada Canal, Water and Power Company for use of the waters of the five lakes at Rush and Lee Vining creeks covered by permits issued earlier by the U.S. Department of the Interior. Pacific

Power Corporation could use the water for power-generating purposes if, as provided in the government's stipulation, the waters were returned to the streams for use in irrgation (Potter 1934–1941:161–162). With the control of the Mill Creek plant and the opportunity to develop more sources of hydroelectric power, Pacific Power Corporation seemed on a good financial and economic footing.

The extensive real estate holdings and water rights of Pacific Power Company were acquired by Cain Irrigation Company, which had been incorporated in March 1915 by Cain and his old partner Metson (California. Incorporation Records 1915). Cain Irrigation also took control of other lands and water rights in Mono County, owned or controlled by Cain and Metson (Potter 1934–1941:163). In May 1915, Cain Irrigation Company began leasing certain waters and water rights on Mill, Rush, and Lee Vining creeks to Pacific Power Corporation for the purpose of hydroelectric development (Potter 1934–1941:252).

Soon after its incorporation, Cain Irrigation Company found itself embroiled in a legal battle with Wallace P. McPherson, who once worked for Cain and claimed to have acquired certain water rights on Rush and Lee Vining creeks. In April and September, 1915, two judgements were handed down by the Mono County Superior Court to the effect that McPherson had no known water rights on either creek (California. Superior Court 1915a:n.p., 1915b:n.p.; Hogan 1916:407–409). With this battle behind them, the directors of Cain Irrigation focused their efforts on acquiring additional land and water rights in Mono County.

Central California Electric Corporation, founded by Chappell in early 1915, would eventually secure title to all outstanding capital stocks and bonds of both Pacific Power Corporation and Cain Irrigation Company. Despite this take-over, the two companies continued to act and operate independently and to maintain separate titles to their lands, waters, and water rights. In May 1917, after a series of legal agreements were negotiated, Central California Electric Corporation, along with its subsidiary companies, Pacific Power Corporation and Cain Irrigation Company, was acquired by Nevada-California Electric Corporation. The latter had been incorporated in December 1914 as a holding company for Nevada-California Power Company (of which Chappell was president), Southern Sierras Power Company, Interstate Telegraph Company, Bishop Light and Power Company, Corona Gas and Electric Light Company, Hillside Water Company, and Sierras Construction Company (Fowler 1923:766–767; Potter 1934–1941:164–165).

It was under the control of Nevada-California Electric Corporation that Pacific Power Corporation, and later Nevada-California Power and Southern Sierras Power companies, would develop the hydroelectric sites at Rush and Lee Vining creeks visualized by Cain and Chappell. As it happened, neither Cain nor Chappell would play a significant role in the construction of the power plants at Rush Creek and Lee Vining Creek. Chappell died on February 9, 1916, after slipping on an icy sidewalk and suffering a compound fracture (Nevada-California Electric Corporation Bulletin 1916:n.p.). Cain, who was in his sixties, lived many more years, concentrating his energies on two mining projects in Mono County—neither of which proved successful (Cain 1956:87).

CHAPTER 3

RUSH CREEK DEVELOPMENT: THREE STAGES, 1915–1917

In May 1915, after reaching an agreement with California–Nevada Canal, Water and Power Company for use of the waters of Rush and Lee Vining creeks for power generating purposes, Pacific Power Corporation made plans for construction of the Rush Creek plant. This complex, with its associated dams at Gem and Agnew lakes, flowlines, penstock, and transmission lines, was to connect northward with the Mill Creek plant and Nevada markets, and southward with the Bishop Creek plants and southern California markets. The corporation soon found, however, that development of this plant would not be easy or inexpensive. As a result of the City of Los Angeles' plan to build a dam at Silver Lake, Pacific Power Corporation was forced to change the design of the Rush Creek powerhouse—a change which meant greater expense and loss of power (Sierras Service Bulletin 1933:6). Transportation of materials for construction of the plant also turned out to be costly; tramways had to be built and barges used to carry men and supplies to the remote construction sites.

Despite these difficulties, the Rush Creek power plant and the Gem Lake dam would be significant in terms of their design and engineering. The Rush Creek plant had the fourth highest head (1,810 feet) and the tenth largest average horsepower for individual turbines (8,000) among California hydroelectric plants in 1919 (see tables 1 and 2). Even in 1929, the Rush Creek plant still ranked ninth on the list of California's highest–head hydroelectric plants (see Table 3). Similarly, the multiple–arch dam at Gem Lake was listed as the fourth oldest, major multiple–arch dam in California, according to the International Commission on Large Dams Register for 1909 to 1926 (see Table 4). The completion of the Rush Creek power generating facilities marked an important step in the development of hydroelectric systems in the State of California.

Construction of the Rush Creek power plant by Pacific Power Corporation took place in three stages. The first stage, from May to September 1915, consisted of initial clearing and construction work, which was shut down in a few months because of a dispute with the City of Los Angeles. The second stage, from May to December 1916, saw construction of the No. 1 flowline, outlet, and powerhouse installed with one 5,000–kva generating unit, as well as near completion of the Agnew and Gem lakes dams. In the final stage, from May to December 1917, the dams were completed, the No. 2 flowline from Gem Lake to the powerhouse was constructed, and a second 5,000–kva generating unit was installed in the powerhouse. More than two years after work began, the Rush Creek power plant was completed and put in operation on December 11, 1917 (Fowler 1923:801).

Stage One: Transportation and Initial Construction

On May 19, 1915, Pacific Power Corporation began construction of the Rush Creek power plant. Work began with establishment of a transportation system to construction sites and initial preparation for construction. From the closest Southern Pacific Railroad Station some 60 miles away at Benton, the corporation had 75–horsepower gasoline caterpillar tractors haul supplies to the upper end of

TABLE 1

CALIFORNIA'S HIGHEST HEAD HYDROELECTRIC PLANTS—1919

(Downing et al. n.d.:594-601;
Federal Power Commission 1941:14-21;
U.S. Department of Energy 1982:41-54)

Plant	Head (ft.)	Owner Company	Date of Construction	Watershed
Big Creek #1	2,131	Southern Cal. Edison	1913	Big Creek/San Joaquin River
Mill Creek #3	1,905	Southern Cal. Edison	1903-1904	Mill Creek
Big Creek #2	1,858	Southern Cal. Edison	1913	Big Creek/San Joaquin River
Rush Creek	1,810	Nevada-Cal. Electric	1916	Rush Creek
Tule River	1,532	San Joaquin Light & Power	1913	Tule River
De Sabla	1,531	Pacific Gas & Electric	Pre-1909	Big Butte Creek
Stanislaus	1,498	Pacific Gas & Electric	1908	Stanislaus River
Electra	1,466	Pacific Gas & Electric	1905	Mokelumne River
Wishon	1,410	Pacific Gas & Electric	1910	Willow Creek/San Joaquin River
Drum	1,375	Pacific Gas & Electric	1913	Bear River

TABLE 2

LARGEST AVERAGE HORSEPOWER FOR INDIVIDUAL IMPULSE WATER WHEELS, CALIFORNIA HYDROELECTRIC PLANTS—1919

(Downing et al. n.d.:594-601;
Federal Power Commission 1941:14-21;
U.S. Department of Energy 1982:41-54)

Plant	Horsepower	Owner Company	Date of Construction
Big Creek #2	22,200	Southern Cal. Edison	1913
Big Creek #1	22,000	Southern Cal. Edison	1913
Wise	18,700	Pacific Gas & Electric	Pre-1919
Copco #1	18,600	Cal.-Oregon Power Company	1918
Big Bend	18,500	Pacific Gas & Electric	1908 and 1914
Halsey	18,000	Pacific Gas & Electric	1916
Drum	17,000	Pacific Gas & Electric	1913
San Francis-quito #1	16,000	L.A. Dept. of Water & Power	1917
Stanislaus	14,000	Pacific Gas & Electric	1908
Rush Creek	8,000	Nevada-Cal. Electric	1916

TABLE 3

CALIFORNIA'S HIGHEST HEAD HYDROELECTRIC PLANTS—1929

(Downing et al. n.d.:594-601;
Federal Power Commission 1941:14-21;
U.S. Department of Energy 1982:41-54)

Plant	Head (ft.)	Owner Company	Date of Construction	Watershed
Bucks Creek	2,561	Pacific Gas & Electric	1928	Bucks Creek/North Fork Feather River
Big Creek #2A	2,418	Southern Cal. Edison	1928	Big Creek/San Joaquin River
Balch	2,336	Pacific Gas & Electric	1927	Kings River
Big Creek #1	2,131	Southern Cal. Edison	1913	Big Creek/ San Joaquin River
Eldorado	1,910	Pacific Gas & Electric	1924	American River
Mill Creek #3	1,905	Southern Cal. Edison	1903-1904	Mill Creek
Spring Gap	1,865	Pacific Gas & Electric	1921	Stanislaus River
Big Creek #2	1,858	Southern Cal. Edison	1913	Big Creek/ San Joaquin River
Rush Creek	1,810	Nevada-Cal. Electric	1916	Rush Creek
San Gorgonio #1	1,773	Nevada-Cal. Electric	1923	San Gorgonio River

TABLE 4

INTERNATIONAL COMMISSION ON LARGE DAMS REGISTER OF MAJOR CALIFORNIA MULTI-ARCH DAMS—1909-1926

(Mermel 1963:16-42)

Name of Dam	Height (ft)	Length of Crest (ft)	Capacity (acre ft)	Date of Construction
Hume Lake	64	650	1,410	1909
Bear Valley	92	360	72,167	1912
Los Verjels	60	310	1,830	1915
Gem Lake	112	688	17,604	1916
San Dieguito	51	650	1,131	1918
Murray	114	864	6,085	1918
Lake Hodges	136	616	22,550	1918
Lake Eleanor	70	1,260	27,600	1918
Webber Creek	94	350	1,275	1924
Little Rock	164	578	4,300	1924
Green Valley	68	260	250	1925
Florence	154	3,156	64,574	1926
Big Dalton	170	490	1,194	1929

Silver Lake, and from there a two-section tramway system was constructed to Agnew and Gem lakes (Engineering News 1916:1159). The tramway rails, lifts, and cars were purchased from a defunct mine at Bodie (David White, personal communication). The first section of tramway, 4,800 feet long, ran from Silver Lake up to Agnew Lake, with a rise in elevation of 1,250 feet. At Agnew Lake, materials brought up by tram were transferred onto barges and floated across the lake to the start of a second tramway. This tramway section was 1,600 feet long, with a climb of 560 feet from Agnew to Gem Lake (Edwards n.d.:21).

During this first stage of development, Pacific Power Corporation cleared and prepared reservoir sites, began construction of the No. 1 flowline, and poured the foundation of the new powerhouse. To accomplish these tasks, a sawmill was established near the site of Gem Lake dam to cut timber for forms, camp buildings, and tramways. At a dump and slide area about a half mile away from the Gem Lake site, the corporation employed a crew to crush and separate rock to be used in dam construction (Engineering News 1916:1159; Journal of Electricity, Power and Gas 1916:481).

Four months after this initial stage of construction work began, it ceased. On September 17, 1915, the *Owens Valley Herald* reported the following:

> A controversy over rights on Rush Creek between the City of Los Angeles and the Pacific Power Company [Corporation], has resulted in the closing down of construction work on the part of the power company. A large portion of the crew that has been employed for the past few months in the building of dams and power house foundations has already been laid off. Whether or not the legal entanglement will be straightened out in time to resume work this fall is uncertain. It is understood that a conference is now being held in San Francisco in the hope of adjusting matters [Owens Valley Herald 1915:n.p.].

For years the City of Los Angeles had been involved in a series of disputes with Mono County residents and various power companies over the city's authority to control valuable water rights in Owens River Valley in conjunction with the Los Angeles aqueduct. At issue in the controversy between Los Angeles and Pacific Power Corporation was the city's desire to build a dam at Silver Lake which would increase the water level of Silver Lake and, in effect, flood the powerhouse under construction at Rush Creek. Pacific Power Corporation tried desperately to get Los Angeles to resolve this matter. When discussions broke down, Pacific Power decided the best thing to do was to change plans for the Rush Creek plant and prepare for the worst possible scenario—the rise in water level at Silver Lake.

Pacific Power Corporation soon changed the design of its powerhouse from one to two stories. In this new plan, the generating unit would be raised to a height above the proposed level of Silver Lake. The floor of the powerhouse generator room went from 7,226.80 feet to an elevation of 7,245 feet. This change meant a decrease in the distance the water would fall before reaching the powerhouse and, therefore, a loss of valuable power (Pacific Power Corporation 1915:Drawing #411-42,Sh. 2; Fowler 1923:805; Sierras Service Bulletin 1933:6).

It was not until the 1930s that the dispute between the City of Los Angeles and Pacific Power Corporation over a dam at Silver Lake was finally resolved. In 1933, the city was granted a Silver Lake reservoir easement, allowing the surface of

the lake to be raised to an elevation of 7,238 feet, or 11.18 feet below the floor of the Rush Creek powerhouse generator room (Los Angeles, City of 1933:34).

Stage Two: Dams and Powerhouse

In spite of the difficulties encountered during the 1915 season, Pacific Power Corporation entered the second stage of its Rush Creek power plant construction with plans to accomplish major work. The largest part of the project's construction work was completed during this period, including most of the work on the Agnew and Gem dams and the powerhouse building.

Before construction of the dams, Gem and Agnew lakes consisted of several small, natural lakes located at high elevations above the Rush Creek powerhouse site at Silver Lake. Gem Lake was originally three small lakes at about the same elevation (about 8,982 feet), making it possible for a single reservoir to be formed with the construction of a dam at the lowest lake's outlet. The watershed above Gem Lake extended for 22.12 square miles, mostly at elevations exceeding 10,000 feet. Located below Gem Lake at an elevation of 8,465 feet, Agnew was another small lake, easily dammed, which would provide an additional 1.65 square miles of watershed area (Engineering News 1916:1158; Fowler 1923:802–3).

At both Gem and Agnew lakes, Pacific Power Corporation decided to build multiple–arch dams engineered and designed by Lars Jorgensen of San Francisco. The dam at Gem Lake was described in the December 21, 1916, issue of *Engineering News*:

> Gem Lake dam is approximately 700 ft. along the crest, has 16 arches, each with a 40–ft. span, and a fractional arch at each end. Its highest arch is 112 ft. above the foundation and 84 ft. above ground surface. The maximum thickness of concrete at the base of the arch is 3.6 ft., and at the crest is 1 ft. Buttresses are 5 ft. long in plan on top and tapered [Engineering News 1916:1157].

Jorgensen's design for the Gem Lake dam also called for a coating of concrete to be applied with a cement gun to the upstream face. The dam would create a reservoir at Gem Lake with a 17,000–acre–foot storage capacity and a surface elevation of 9,050 feet (Engineering News 1916:1157).

The dam at Agnew Lake was to be a smaller version of the one at Gem Lake. This dam measured only 180 feet along the crest, with seven arches and a maximum height of 30 feet. The arches were two feet in thickness at the base and one foot at the top. The upstream face of Agnew Lake dam would also be coated with a layer of concrete. The Agnew Lake reservoir would have a storage capacity of 400 acre–feet, and the surface would be about 550 feet below that of Gem Lake reservoir (Engineering News 1916:1158).

During the second stage of construction in 1916, Pacific Power Corporation hired Duncanson–Harrelson Company of San Francisco as contractors, and put their man, F. O. Dolson, in charge of dam construction (Chatfield 1917:35; Engineering News 1916:1159; Journal of Electricity, Power and Gas 1916:481). During this stage, Gem Lake dam's concrete was completely poured except for a cavity developed by excavation at the bottom of one of the arches near the intake pipe, and the dam was

partially covered with concrete coating. At the same time, Agnew Lake dam's concrete was completed, and the dam was coated to a height of 12 feet with a layer of concrete (Chatfield 1917:35; Waugh 1918:34).

It was also during the second stage that the Rush Creek No. 1 flowline and the powerhouse with one 5,000-kva generating unit were completed. The No. 1 flowline consisted of a 30-inch diameter steel pipe, measuring 4,836 feet long, which connected Agnew Lake with the powerhouse. The plan was to operate the unit installed in the powerhouse off the Agnew Lake head (1,249 feet) using the No. 1 flowline, and later, when a second generating unit was installed during the third stage, to connect a 48-inch diameter steel pipe from Gem Lake to a point 592 feet below the Agnew intake, known as Agnew Junction, where a second flowline would be built to the powerhouse. A crossover and valves were to be installed at Agnew Junction so that both units would eventually be able to operate on either head, or independently on the Agnew or Gem lake heads (Chatfield 1917:34-35).

The powerhouse building, completed on July 15, 1916, was of mission style, constructed of reinforced concrete with a corrugated iron roof supported on steel trusses. The first floor of the building was used temporarily for storage. The second story consisted of the generator room, measuring 59 feet 9 inches long, 42 feet 6 inches wide, and 19 feet 6 inches high. The generator was a 5,000 kva, General Electric ATB form A machine operated by a single overhung impulse wheel (Fowler 1923:805-807).

Stage Three: Second Flowline and Generating Unit

The final stage of the Rush Creek power plant construction began in early May, 1917, and ended on December 10, 1917. Work begun in earlier stages was completed. At Gem Lake dam, the final concrete was poured and concrete coating applied by mid-June. The Gem Lake reservoir was filled to the spillway on June 28, 1917. Application of the remainder of the concrete coating at Agnew Lake was also completed in June (Waugh 1918:34).

The No. 2 flowline was completely constructed during this period. First, a tramway was built to carry sections of pipe and supplies to the trench where the flowline was to be installed. With the tram in place, 211 sections or 4,296 feet of 48-inch diameter steel pipe were moved to the trench, installed, and covered with backfill. The construction of the remaining portion of the flowline was delayed when the Kellogg factory, the pipe producers, fell behind in deliveries. By November, the final 4,280 feet of 30 and 28-inch diameter steel pipe was delivered, moved into place, installed, and backfilled (Waugh 1918:34-35).

It was also during this third stage that a second generating unit was installed inside the powerhouse. Concrete was poured as a foundation, and by November the 5,000-kva unit, manufactured by Allis-Chalmers, was in place. On December 11, 1917, this second unit was on line, and the Rush Creek development was essentially completed (Fowler 1923:807; Waugh 1918:34).

The completed Rush Creek plant, begun in 1915 by Pacific Power Corporation, was by 1917 under the control of the Nevada-California Power Company, a subsidiary of the Nevada-California Electric Corporation, which took over the Central California Electric Corporation and its underlying subsidiaries (including Pacific Power Corporation) in May 1917. The Rush Creek plant proved to be just

the boost the Nevada–California Electric Corporation needed to successfully survive 1917. That year, the corporation's Bishop Creek hydroelectric plants had decreased their output, while demand for electricity in Southern California increased. The corporation badly needed the additional electricity generated at Rush Creek to serve the growing southern California market. With Rush Creek, the corporation increased its generating capacity by 22,330,950 kilowatts (Potter 1934–1941: 187–188; Nevada–California Electric Corporation Bulletin 1918:5).

CHAPTER 4

A NEW MARKET, IMPROVEMENTAND CONSTRUCTION: 1917–1924

In the years following 1917, Nevada–California Electric Corporation, now in control of Pacific Power Corporation, began consolidating and reorganizing its holdings to better serve a rapidly growing southern California market via the long–distance Tower Transmission Line. In 1918, Nevada–California Electric organized its holdings into three main subsidiaries: Nevada–California Power Company, in charge of Nevada business; Southern Sierras Power Company, in charge of southern California business (except Imperial Valley); and Holton Power Company, in charge of Imperial Valley business (Potter 1934–1941:197). The corporation planned to switch the focus of its operation gradually away from Nevada–California Power Company's unprofitable market in the Nevada mining districts to the new agricultural developments in Coachella and Imperial valleys (Figure 1).

This change by Nevada–California Electric Corporation from a Nevada to a southern California market affected the development of the power–generating facilities at Rush and Lee Vining creeks. From 1917 to 1922, the holdings of Pacific Power Corporation, including the Rush Creek plant and valuable land and water rights leased from Cain Irrigation Company at Rush, Lee Vining, and Mill creeks, were controlled by Nevada–California Power Company (Potter 1934–1941:252). In 1922, Nevada–California Power Company formally obtained the properties and titles of Pacific Power Corporation, which was then legally dissolved (Potter 1934–1941:238). Throughout this period, Nevada–California Power Company made numerous improvements to the Rush Creek plant, and began work on the Lee Vining Creek development.

As Nevada–California Electric Corporation's focus switched to the southern California market, plans were made for Southern Sierras Power Company to carry on improvements at the Rush Creek plant and to complete the hydroelectric plants planned for Lee Vining Creek. In 1923, Southern Sierras Power Company obtained control of the lands and water rights in Mono County that were leased previously by Cain Irrigation Company to Pacific Power Corporation, and which therefore came under control of Nevada–California Power Company (Potter 1934–1941:252). Southern Sierras Power Company was anxious to develop these new holdings, particularly the power plants planned for Lee Vining Creek, as it had recently acquired the business of Holton Power Company in the Imperial Valley and needed greater sources of power. By 1924, Southern Sierras Power had completed most of the Lee Vining Creek development and had greatly improved the Rush Creek plant.

Rush Creek and Nevada–California and Southern Sierras Power Companies

From 1917 to 1922, Nevada–California Power Company worked to improve hydroelectric generating facilities at Rush Creek. One of its first improvements was construction of a new 55–mile transmission tie–line connecting Rush Creek with the Bishop Creek Powerhouse No. 5 Control Station and, from there, to the southern

THE NEVADA-CALIFORNIA ELECTRIC CORPORATION

Diagram Showing

Growth of the Nevada and California Loads.

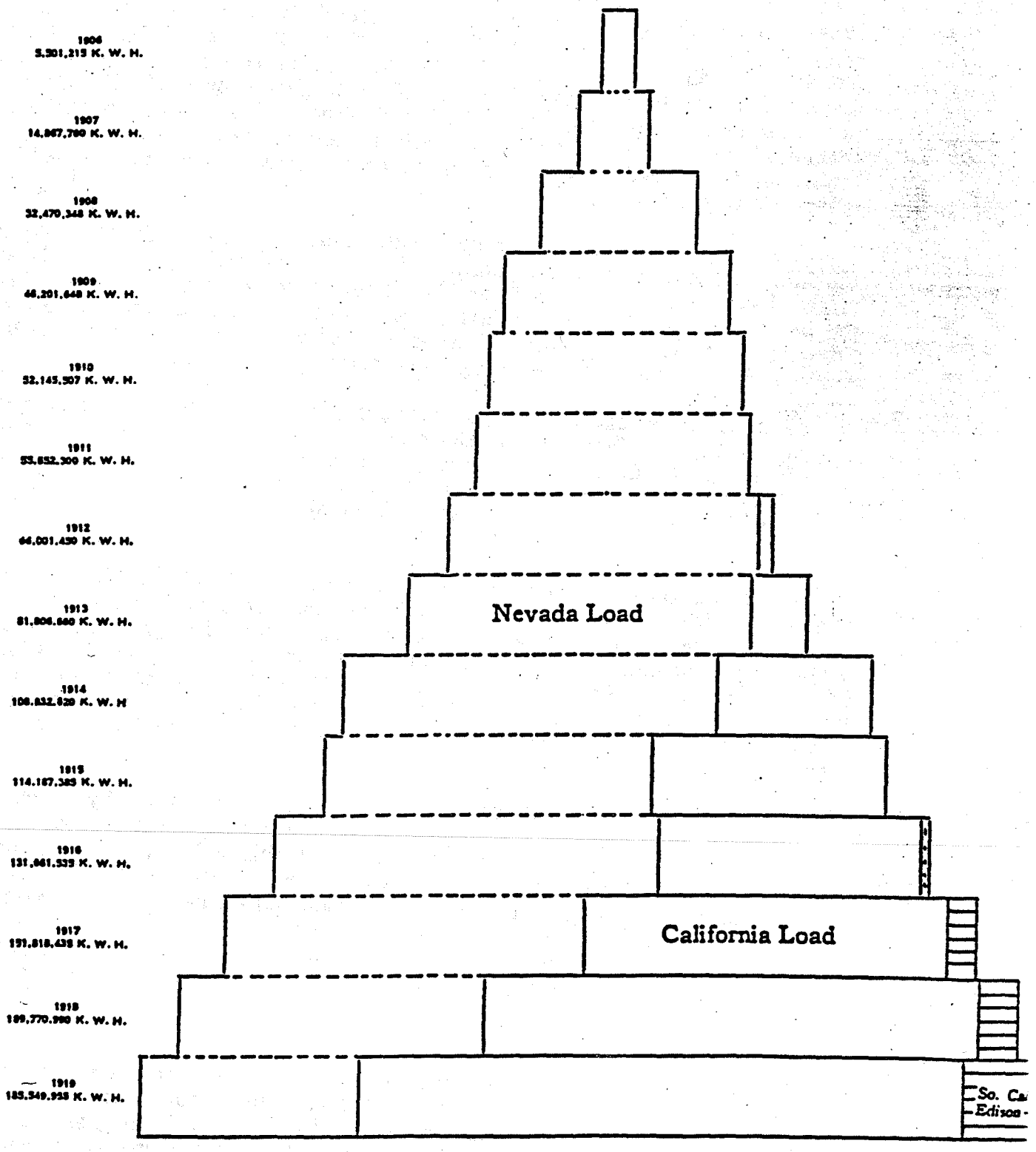


Figure 1

(Nevada-California Electric Corporation Bulletin 1920)

California market. This would replace the line built in 1913 by Silver Lake Power and Irrigation Company from the Mill Creek plant to Bishop Creek, and later extended through the Rush Creek plant. Insufficiently insulated, the old line was considered inadequate for transmission of the Rush Creek plant's output (Potter 1934–1941:204; Halpenny 1918:45). Plans called for the new line to operate at 88,000 volts and for the installation at Rush Creek of a 3,000–kva, three–phase transformer which would connect the tie–line with the rest of the old Pacific Power Corporation's system operating at 55,000 volts (Halpenny 1919:19). Construction work began on this new northern division tie–line in 1918. At first the work was completed by contract laborers, but when they all fell ill with "flu," company employees were used to finish the line's construction by the end of 1918 (Poole 1919:15; Waugh 1919:25).

Another project undertaken by Nevada–California Power Company to improve the Rush Creek plant was the addition of a third reservoir in 1918. This addition meant that a dam would be built at Rush Creek Meadows, one and a half miles above the head of Gem Lake at the foot of Mt. Lyell, at an elevation of 9,500 feet. Company engineer R. G. Manifold, after a great deal of study, created a plan for a single–arch concrete dam. His design is described in the following quote:

> Rush Creek Meadows dam is a single concrete arch, curved on a radius of 165 feet, 400 feet long on the crest, and 30 feet high. The upstream face is vertical; the downstream face rises in six steps 5 feet high by 1.2 feet broad. The dam is 5.4 feet thick at the crest and 11.4 feet thick at the lower part of the base [Fowler 1923:804].

Construction of the dam turned out to be a difficult process. Initially, the company decided to furnish the materials necessary to complete the dam, but hire outside laborers to do the actual construction work. Disagreements soon arose between the company and the contractors over delivery and handling of materials (Waugh 1919:24). As with construction of earlier dams at Rush Creek, transportation of supplies to the construction site also proved problematic. Chief company engineer, C. O. Poole, would later describe these difficulties in his yearly report for 1919:

> . . . the haul over 56 miles of rough, hilly, sandy road by truck or tractor, then hoisting the material 4,600 feet up the mountain side on an electrically operated tram, transferred at this point to pack mules, carried a further distance of a little over a mile up the mountain, unloaded onto a boat in the lake and transported a mile and a half by this means, then unloaded again and put on mule–back for the second time and carried a further distance of two miles to the point where the material was to be used, was, to say the least, a disheartening task . . . [Poole 1919:14].

As this statement suggests, transportation was both costly and the cause of numerous delays. A final problem was the procurement of sand and gravel needed in the dam's construction. This issue was solved by washing, sorting, and crushing the sand and gravel found at pits in the meadow above the dam—an expensive and time–consuming process (Waugh 1919:24).

By September 1918, the Rush Creek Meadows dam was virtually complete. The structure contained 1,261 cubic yards of concrete and had a storage capacity of 1,081 acre-feet. The company planned to raise the height of the dam in a few years to increase the reservoir's storage capacity to 5,500 acre-feet (Waugh 1919:23).

It was also in 1918 that Nevada-California Power Company excavated a drainage trench through bedrock between the original Upper and Lower Gem lakes, adding about 1,500 acre-feet to the storage capacity. Work on this trench began in April 1918, when two truck loads of contract laborers left Bishop for Gem Lake. The men worked through inclement weather and difficult conditions, draining portions of Gem Lake and using temporary dams and cutting out about eight feet of bedrock. The work was not finished until the following spring (Fowler 1923:803; Waugh 1919:23).

From 1918 to 1922 Nevada-California Power Company made few improvements to the Rush Creek plant other than some preparatory work on the project that would eventually raise Rush Creek Meadows dam. It was at the end of this period that Southern Sierras Power Company took over the work of Nevada-California Power Company at Rush Creek and began making its own improvements to the power plant.

In late fall 1922, Southern Sierras Power Company made preparations to gunite the downstream side of Gem Lake dam, which had deteriorated because of freezing weather (Dolson 1925:11). On October 3, 1922, before supplies could be taken to the dam site, a fire broke out at the Agnew Lake tramway hoist house, destroying the hoist equipment and resulting in a delay in the gunite application. A two and one-fourth ton motor (in use at the Lee Vining Creek development) was brought over to Agnew Lake by a "loyal and energetic crew" (Rhudy 1923:23). Without delay, a new hoist house was constructed and the new motor installed. During the period the hoist house was being rebuilt, work continued slowly, with transportation provided by pack mules, on the guniting of the dam (Rhudy 1923:22-23).

In 1923 and 1924, Southern Sierras Power Company was primarily occupied with developments at Lee Vining Creek, but still continued work at Rush Creek. By November 1924 the Gem Lake dam had been completely gunited (Dolson 1925:13). That same year, most of the work to raise Rush Creek Meadows dam from 27.3 feet to 42.3 feet was completed. In 1925, the dam was completely raised, resulting in a storage capacity of 6,000 acre-feet (Dolson 1925:12; Findlay 1925:25-26; Sierras Service Bulletin 1923b:2). Southern Sierras Power Company also made plans to construct two additional plants at Rush Creek, although neither plant was ever completed (Journal of Electricity 1924a:98).

Lee Vining Creek Developments

By 1917, Nevada-California Power Company had developed plans to build hydroelectric generating plants at Lee Vining Creek in the high Sierra Nevada Mountains below Mt. Conness. The plans called for construction of three power plants: Lee Vining No. 1, the uppermost plant, to operate under a 1,700-foot head with a single 10,000-kva generator; Lee Vining No. 2, the middle plant, to operate on a 600-foot head (never constructed); and Lee Vining No. 3, the lowest and smallest plant, to operate on a 300-foot head. Additionally, the company planned to enlarge, deepen, and dam three small, natural lakes—Saddlebag (elevation 10,050 feet), Rhinedollar (elevation 19,500), and Tioga (elevation 9,650)—to use as storage

reservoirs (Benson 1925:288). From the reservoirs, a tunnel some 1,800 feet in length was planned through solid rock to the penstock of Lee Vining No. 1 power plant. From 1917 to 1922, Nevada–California Power Company proceeded slowly to develop its plans, completing preliminary work on Rhinedollar and Tioga reservoirs and the No. 1 powerhouse, and constructing the Saddlebag Lake dam.

After 1922, control of the Lee Vining Creek development was acquired by Southern Sierras Power Company. Needing additional sources of power for its growing southern California market, Southern Sierras pushed hard for completion of the Lee Vining plants. Lee Vining No. 3, begun in March 1923, was completed in just 292 days—the shortest construction period of any of the company's plants. Under construction for several years, the Lee Vining No. 1 plant was finally completed in September 1924, thanks to the efforts of Southern Sierras Power Company's chief engineer, Charles Oscar Poole, whose name the plant would eventually acquire. At the close of 1924, the future seemed very bright for Southern Sierras Power Company, with its Rush and Lee Vining creeks power plants and seemingly ever–growing southern California market.

Initial Development Under Nevada–California Power Company

In 1917 Nevada–California Power Company began work on its Lee Vining Creek hydroelectric project. The initial phase of this development, from 1917 to 1922, consisted of installing a transmission line from the company's Mill Creek plant to the construction sites; development of a transportation route; establishment of construction camps; conducting preliminary work on Tioga and Rhinedollar reservoirs, tunnel, and powerhouse; and completion of Saddlebag Lake dam. This initial development was no easy task for Nevada–California Power Company, given the location of the site and the difficulty of the work contemplated. The company had a hard time hiring and keeping men on the job, and went to considerable trouble to make living and working conditions as pleasant as possible. Despite these efforts, completion of the Lee Vining Creek development would not be under the auspices of Nevada–California Power Company but under another Nevada–California Electric Corporation subsidiary—Southern Sierras Power Company, which took over construction activities in 1922.

In June 1917, Nevada–California Power Company began work on a transmission line which would carry the power needed to operate equipment such as motors, hoists, pumps, and compressors, from the Mill Creek plant to the Lee Vining construction sites. From Mill Creek, a 55,000–volt line was built in 1917 to Sylvester's Meadow, a large meadow below Tioga Road in the upper end of Lee Vining Canyon, where a construction camp and mill were to be established. A 6,000–volt line with a telephone circuit then continued on to the site of Rhinedollar dam, and from there the telephone circuit extended on to the Saddlebag site (Waugh 1918:36). In 1919, a 55,000–volt transformer bank was installed on Lee Vining Creek and the 6,000–volt line was extended from Rhinedollar to the Saddlebag site (Waugh 1920:19).

Work on a suitable transportation route to the Lee Vining Creek development began at almost the same time as construction of the transmission line. Nevada–California Power Company planned to use both roads and tramways to carry necessary supplies to the various construction sites. In 1917, a road was constructed from the mill at Sylvester's Meadow up to the dam site at Saddlebag Lake (Waugh 1918:36). In 1919, the tramway which ran from Agnew Lake to Gem Lake at Rush

Creek was disassembled and carried to Lee Vining Creek, where it was to be reassembled for use in penstock construction at Lee Vining No. 1 powerhouse (Waugh 1920:20). In 1920, work began on a road from the Southern Pacific Railroad station at Benton to Lee Vining Creek, and another road from Sylvester's Meadow to the Lee Vining No. 1 powerhouse site. Roadwork for the latter involved reconstruction of an old road, construction of a new road, and completion of a connection bridge between the two sections (Waugh 1921:16).

A construction camp and sawmill for the Lee Vining Creek development was established at Sylvester's Meadow in July 1917. Later that year, a second camp was set up at Rhinedollar Lake. Each of these camps consisted of two bunkhouses, a cook house, and a blacksmith shop. At Saddlebag Lake, an office building was also erected in 1917 for the monitoring of construction activities (Waugh 1918:36). By 1920, Headquarters Camp at Sylvester's Meadow consisted of eight large buildings, including a warehouse, machine shop, office, commissary, cook house, bunkhouse, and two garages. There were also an oil house, laundry, hospital, and eight small cottages (Waugh 1921:16). This same year, other camps were operating at Rhinedollar and Saddlebag lakes, and a second sawmill cut 354,000 board feet of lumber at Saddlebag.

Construction work itself proceeded slowly during this initial phase of the Lee Vining Creek development. In 1917, a temporary wooden dam and 500 feet of flume were set up at Rhinedollar Lake, and test pits were sunk to determine the feasibility of a dam at the south side of the lake. During this same period, the excavation of Rhinedollar and Saddlebag reservoirs was partially completed, and some blasting work on the tunnel took place (Waugh 1918:36).

After a year of no construction activity at Lee Vining Creek, Nevada–California Power Company started up work again in 1919, excavating portions of Saddlebag, Rhinedollar, and Tioga lakes. At Saddlebag Lake, 5,198 cubic yards of material were excavated from the site, and plans were made to remove enough earth and rock from the lakebed to provide additional storage of some 2,000 acre–feet. From Rhinedollar Lake, over 1,971 cubic yards of rock and earth were removed. At Tioga Lake, excavation began on a cut which was to reach 20 feet below the lake's surface and provide additional storage capacity without immediate dam building (Waugh 1920:19).

In 1920, the site for the Lee Vining No. 1 powerhouse and penstock was cleared, and more work was completed on the Rhinedollar dam site. At the powerhouse site, brush and trees were removed and 1,455 cubic feet of rock and earth excavated. At the same time, the first 500 feet of penstock line was excavated through solid rock, the route of the tramway aligning the penstock was graded, and the first 300 feet of track laid. In August, the Rhinedollar dam site was cleared down to bedrock and 272.5 cubic yards of concrete poured (Waugh 1921:16).

The majority of work taking place at the Lee Vining Creek development during 1920 and 1921 occurred at the Saddlebag dam site near the summit of Tioga Pass. Saddlebag Lake was the shallow overflow of one of the feeders of Lee Vining Creek leading out of an alpine basin. Its original name came from its shape—roughly that of a pair of saddlebags (Sierras Service Bulletin 1921:1). The dam constructed at this lake was to be 640 feet long and 42 feet high, impounding 11,000 acre–feet of water.

In 1920, work on Saddlebag dam consisted of more excavation and initial construction. Nevada–California Power Company construction engineer E. J. Waugh, in his annual report for 1920, described the construction work that took place at Saddlebag dam:

> The excavation, including the toe trench, totaling about 2,000 yards, was completed in July. Air drills started in the quarry June 19th, the derricks were working July 1st, and the electric hoist operating the dump cars within a week thereafter. The timber facing kept pace with the rock fill. Heavy hewed timbers were set clear across the dam on 6–foot centers and concreted three feet deep into solid rock at the bottom. These are anchored with rods and rails into the loose rock as the fill is brought up, and serve to carry the board facing, which consist of one layer of heavy caulked plank, a layer of sail cloth with a thick coating of tar, and a second layer of caulked plank. This facing was carried ahead as fast as the rock filling would permit [Waugh 1921:16].

In 1921, a small group of six men and one cook went in to finish the work at Saddlebag dam. The reservoir was excavated to its planned 11.3 feet below the original lake level. Rock fill, which in 1921 involved handling 6,784 cubic yards of rock, was completed. The timber facing was added, and the dam filled to capacity by August 1921 (Waugh 1922:20).

Throughout this initial stage of development, Nevada–California Power Company experienced some difficulty hiring qualified laborers and keeping them on the job. Part of the problem was that the company wanted the men to work a nine–hour day when most other construction projects nationwide were working an eight–hour day. In September 1920 the company changed its policy and instituted an eight–hour day, which helped to improve labor relations (Greenwald 1921:23).

To further improve relations, the Nevada–California Power Company constructed small welfare halls in each camp, which had a company store at one end and a recreation area—complete with a phonograph—at the other. Dances were held in these halls, guests were invited from the neighboring communities, and a camp orchestra was provided. Of these dances, transportation and commissary superintendent W. H. Greenwald wrote, "While the floors [of the halls] were rather rough, the lumber having been furnished from our own sawmills on the job, yet everybody always had a good time" (Greenwald 1921:23).

Second Phase of Development Under Southern Sierras Power Company

After 1922, when Southern Sierras Power Company took charge of the Lee Vining Creek hydroelectric development, the pace of construction activity quickened considerably. The second phase of development, from 1922 to 1924, saw the grading and laying of penstock, tunnel drilling, construction of Rhinedollar dam, and completion of the Lee Vining No. 1 and No. 3 powerhouses and their associated buildings, penstocks, and flowlines. By the end of 1924, Southern Sierras Power Company had virtually completed the Lee Vining Creek hydroelectric development.

During 1922, work was completed on the grading of the No. 1 powerhouse and penstock sites, installing a tramway line, drilling a tunnel through granite and

porphyry, and building a portion of Rhinedollar dam. The grading work consisted of removing 5,600 cubic yards of material from the powerhouse and penstock sites, the latter of which rose 1,640 feet in a distance of less than 4,000 feet. Equally steep, the tramway line along the penstock was difficult to grade and had to be installed by means of a hoist. The tunnel connecting Saddlebag, Tioga, and Rhinedollar lakes with the penstock for Lee Vining No. 1 powerhouse was drilled using double shifts working from both ends. When completed on August 16, 1922, the tunnel measured 1,834 feet long. At Rhinedollar dam, rock fill was covered with a concrete slab face to a height of four feet above the old lake level (Waugh 1923:20).

The following year, 1923, work continued on the Lee Vining No. 1 powerhouse and, at the same time, hasty preparations were made for construction of Lee Vining No. 3 powerhouse ahead of schedule. At the site of Lee Vining No. 1 powerhouse, excavation work began on the tailrace, which had to be carried 425 feet downstream to conserve head and to return the water to its natural channel (Poole 1924:9; Rhudy 1924:18). Also during this year, the trench for the Lee Vining No. 1 penstock was completed and five of the 45 sections of 28-inch diameter steel pipe penstock were laid (Rhudy 1924:9). In general, preparations were made during 1923 to enable completion of the No. 1 plant by the end of 1924.

In spring of 1923, Southern Sierras Power Company came to realize that its system would have difficulty carrying the rapidly increasing load, and decided to rush construction of the Lee Vining No. 3 plant (Poole 1924:9). On March 18, 1923, surveys were begun, and within a few weeks plans were drawn up situating the plant just off the California state highway leading into Yosemite Valley (Rhudy 1924:8). The plans called for construction of a concrete intake dam below Rangers Camp on Lee Vining Creek, connected to 3,300 feet of 48-inch diameter wood-stave flowline, which in turn connected to 2,000 feet of 48-inch diameter steel penstock pressure pipe, eventually reaching a concrete powerhouse where a 2,500-kva Westinghouse generator coupled to a 3,700-horsepower Worthington hydraulic turbine was to be installed. In the area near the powerhouse, three concrete residence cottages were also to be built.

By April 1923, Southern Sierras Power Company had crews at work clearing timber and debris from the site of the intake for the Lee Vining No. 3 plant (Rhudy 1924:18). A short time later, a new construction site, "Rainbow Camp," was established as the headquarters for Lee Vining No. 3 construction, providing accommodations for 60 men (Poole 1924:9). By June, crews were at work constructing the powerhouse. Work continued on several fronts at once until the plant was completed—292 days after construction began—in December 1923 (Rhudy 1924:19).

The new Lee Vining No. 3 plant operated under a 374-foot head and, in its completed form, was described by construction engineer C. H. Rhudy as follows:

> The intake structure is of reinforced concrete. The walls on each side of the spillway are of cantilever design and curved on a radius of 250 feet with convex side upstream. This type of wall effects a large saving in concrete over the types used at many points where the main wall is straight and supported from behind with buttresses. The spillway is an ogee section with 30 foot spilling area arranged for flash boards.
>
> The intake chamber is 16 feet wide and screened with 1/4x3 inch grids made up in sections about one foot wide. The water is admitted to the pipe line through two square 42 inch Coffin gates connected to a Wye

section, rectangular at large end and tapering to round. This type of inlet pipe appears to be an improvement over the regular funnel design, especially for shallow intakes, in that the air is not taken into the line so freely through vortices which frequently occur at the funnel inlets.

The flow line extends along a steep side hill of earth, loose rock and large boulders, and parallels the lower end of the Tioga Road at about 50 feet below it for a distance of approximately 5/8 of a mile. On account of a road crossing immediately below the intake dam, the first 66 feet of the line is of 48 inch diameter 3/16 inch steel pipe. The flow pipe is 48 inch inside diameter 3244.8 feet long, and built of redwood staves and 1/2 inch round bands. With the intake full the lower end of the wood stave line is under a head of 106 feet.

At the lower end of the wood stave line, the pressure pipe begins and consists of:

1205.06 ft. of 3/16x48 in. I. D. steel pipe.
198.21 ft. of 1/4 x48 in. I. D. steel pipe.
143.89 ft. of 1/4 x42 in. I. D. steel pipe.
373.94 ft. of 5/16x42 in. I. D. steel pipe.
99.80 ft. of 3/8 x42 in. I. D. steel pipe.
2020.90 ft. total slope length.

Both the wood stave and the steel pipe are back-filled with earth from 9 to 12 inches in depth over the top. The steel line is anchored with three concrete piers. Three 8 inch air valves, without shut off gates, were installed on the wood pipe, and two on the steel section.

The powerhouse is of reinforced concrete and Spanish tile roof. The operating room is partitioned off from the main floor, making a very satisfactory arrangement both for comfort and convenience to the operators, and in the saving of the large quantity of fuel that would be required to warm the whole building through the long winters in that locality [Rhudy 1924:18-19].

Rhudy goes on to state that the three reinforced concrete cottages, also built for the plant operators, were "equally as well, if not better, appointed for domestic comfort and convenience than the average city residence" (Rhudy 1924:19).

As planned, during the next year of 1924, Southern Sierras Power Company was primarily concerned with construction of its Lee Vining No. 1 plant, but at the same time, the company managed to raise the height of Rhinedollar dam, construct a new transmission line, install an outdoor switching station at Lee Vining No. 3, and move a large transformer to the Lee Vining No. 3 powerhouse. At Rhinedollar Lake, the dam was raised another four feet, making the dam eight feet high. By raising the dam, Rhinedollar reservoir inundated most of an old road around the lake. Southern Sierras Power was forced to build 5,345 feet of 16-foot-wide highway, at a cost $15,000, to replace the old road at a higher elevation. The road was built 27-1/2 feet higher than the original lake level, allowing the dam to be raised in the future. The company planned eventually to raise the dam to a height of 20 feet (Sierras Service Bulletin 1924:1-2; Waugh 1925:21).

In 1924, Southern Sierras Power Company built a new 21-mile, 140,000-volt transmission line from Lee Vining No. 1 to Lee Vining No. 3, and on to the Rush Creek plant, replacing the line built in 1917 by Nevada-California Power Company

from Mill Creek. The new line was necessary for connection of the Lee Vining No. 1 plant. The old 55,000-volt line was taken down and partially salvaged (Halpenny 1925:19).

Also in 1924, at Lee Vining No. 3, a transformer bus structure, large three-phase transformer, and special outdoor switching station (providing for current from Lee Vining No. 1 and Mill Creek plants) were installed. Southern Sierras Power Company intended to change the transformers at Lee Vining No. 3 to a suitable voltage to allow the plant to tie in directly with the 100,000-volt line to Rush Creek, the 140,000-volt line from Lee Vining No. 1, and the 55,000-volt line from Mill Creek. A switching structure was installed at Lee Vining No. 3 to allow for this change in voltage. A large three-phase transformer was brought in from the Rush Creek plant to provide for stepping up the voltage of the current from Lee Vining No. 3 and Mill Creek (Dolson 1925:11; Halpenny 1925:19).

The major accomplishment of Southern Sierras Power's 1924 season was the completion of the Lee Vining No. 1 power plant. Work on this plant had been ongoing for a number of years. In 1924, three camps were set up to finish the plant, with some 130 company employees and a large number of men working on contract for Davis, Heller, Pearce Company of Stockton in charge of the powerhouse and cottage construction (Sierras Service Bulletin 1924:1; Waugh 1925:22).

The main difficulty encountered in this final season of construction work at the Lee Vining No. 1 plant was transportation. Despite the earlier work completed by the Nevada-California Power Company on roads leading from Benton to Lee Vining Creek, the exceptionally dry weather in 1923-1924 left roads of desert sands and volcanic dust virtually impossible to maintain (Benson 1925:288; Waugh 1925:21). As Southern Sierras Power Company employee Robert Benson explained, the road from Benton was

> . . . reduced to a 56-mile stretch of pulverized crater-dust which serves only to conceal the deep ruts of the wheel tracks. In the effort to hold the road up under the heavy traffic, every practicable method of desert road making was tried, and all failed after serving a temporary need. Sawdust and chips from the old Mono sawmill were hauled into the six-mile stretch beneath the Mono craters, but to no avail. Sage brush was strewn deep in the wheel tracks, but after the passage of a couple of trucks the brush was chewed to bits and was ineffective. Grading only made the road worse by filling the wheel-tracks deeper with sand.
>
> As a result, trucks came into Leevining Creek some with frames broken under the weight of heavy machinery jolting over the ruts; some with cylinders scored by volcanic emery inhaled through the carburetors. Those of us who appreciate the battle involved in every trip into Leevining "take off our hats" to the truck drivers who literally buck their way across the ridges, sand and desert wastes of the Benton road [Benson 1925:288].

Although the problems Benson describes were quite overwhelming, the company managed to haul 2,207 tons of freight over the road with very few accidents (Waugh 1925:21).

Completed in September and on line by October, the Lee Vining No. 1 plant appeared "pigmy-like," according to one observer, when seen from the Tioga road at

the bottom of a steep gorge below the penstock (Sierras Service Bulletin 1924:1). The plant's steel flowline seemed to run perpendicular to the powerhouse, consisting of 2,537.41 feet of 48–inch diameter pipe, 1,834 feet of which were installed in the tunnel from Rhinedollar Lake. The plant had one penstock measuring 3,740.89 feet long and tapering from 44 to 28–inch diameter steel pipe. The powerhouse itself was built of concrete and measured 38 feet by 68 feet, with a projection out the back for an air shaft measuring three feet by three feet ten inches. Inside the building, operating under a 1,531–foot head, was a 12,500–kva generator driven by a 14,000–horsepower single overhung impulse wheel, one of the largest ever equipped with a deflector of the sleeve type for controlling speed (Benson 1925:188; Journal of Electricity 1924b:302). The powerhouse and the reinforced concrete, three–apartment cottage, machine shop, and garage associated with it were built into cuts in the side of the mountain so that the overhang might help deflect any possible damage caused by snowslides (Sierras Service Bulletin 1924:1; Waugh 1925:21–22).

At the end of 1924, Southern Sierras Power Company had completed most of the work on the Lee Vining Creek development originally conceived by Nevada–California Power Company back in 1917, and had made a number of improvements to the Rush Creek plant. Lee Vining No. 1 and No. 3 were now operational, generating the additional electricity the company needed to supply its southern California market. Although 1924 was a drought year in the State of California, Southern Sierras Power Company was able to meet its consumer demands despite the water shortage—thanks in part to the Rush Creek and Lee Vining Creek plants.

CHAPTER 5

REFINEMENTS, CONTROVERSY, AND THE LOST MARKET: 1925–1943

By 1925, due in part to the successful operation of its Rush and Lee Vining creeks plants, Southern Sierras Power Company was able to continue to meet the needs of the southern California market. Over the next decade, the company worked hard to further refine the hydroelectric systems it had established at Rush and Lee Vining creeks. At the Rush Creek plant, Rush Creek Meadows dam was completed and numerous cottages and employee buildings were constructed, improving the plant's living environment. At Lee Vining Creek, the name of the No. 1 plant was changed to the "Poole Plant," and improvements were made in the various dams. The successful operation and future growth of Southern Sierras Power Company's Rush and Lee Vining creeks plants seemed assured.

However, two situations occurred in the 1930s which effectively limited future development of the Rush and Lee Vining creeks plants under Southern Sierras Power Company. The first involved an ongoing controversy between the City of Los Angeles and Southern Sierras Power Company over water rights in Inyo and Mono counties. The controversy has begun years earlier—initially concerning other Mono County power companies and their plans to develop a plant in the Owens River Gorge. Southern Sierras Power Company became involved in the conflict in the 1920s, and it was not until 1933 that the dispute was finally resolved. As a result of this resolution, Southern Sierras Power Company's Lee Vining No. 3 plant would eventually cease to function as a power generating plant, and the future growth of the Rush Creek and Poole plants would be under some limitations.

The other situation which affected future developments at Rush and Lee Vining creeks was Southern Sierras Power Company's loss of Imperial and Coachella valleys' electric utility business. In 1936, the Imperial Irrigation District secured a low-interest Federal Rural Electrification Administration loan and entered the electric utility service in direct competition with Southern Sierras Power Company. Over the next seven years, Southern Sierras Power Company, then Nevada-California Electric Corporation (which took direct control of Southern Sierras Power Company in 1937), and finally California Electric Power Company (which took over Nevada-California Electric Corporation's holdings in 1941) tried first to compete—and later to cooperate—with the the new district's management. When such efforts failed, California Electric Power Company sold its Imperial and Coachella valleys service area to the Imperial Irrigation District in 1943.

System Refinements

By the end of 1924, major construction activity at the Rush and Lee Vining creeks plants was completed, and Southern Sierras Power Company began refining its plants. After Rush Creek Meadows dam was completed in 1925, Southern Sierras Power Company concentrated its efforts on general improvement and expansion of power plant surroundings at Rush Creek. In 1927, the company constructed two new operators' cottages slightly southeast of the powerhouse (Sierras Service Bulletin 1928:3; Southern Sierras Power Company 1930:Drawing #411-66a). The following

year, the company built two more cottages in the same vicinity, as well as a fully equipped recreation hall and clubhouse complete with four bedrooms, kitchen, and living room (Sierras Service Bulletin 1929:4; Nevada-California Electric Corporation 1936:Drawing #411-107; Southern Sierras Power Company 1927:Drawing #411-64).

In the 1930s, as the controversy with Los Angeles intensified, Southern Sierras Power Company realized the need to streamline its plant operation at Rush Creek. In 1934, the company installed equipment to convert the plant into a one-man operation (Halpenny 1935:1). The emphasis after 1934 was continued consolidation and scaling down of the Rush Creek facility.

At Lee Vining Creek in the 1920s, Southern Sierras Power Company found time to celebrate its past accomplishments while continuing to work and plan for improvements. In 1925, after the death of Chief Engineer Charles Oscar Poole who had worked extensively on the designs of the Lee Vining No. 1 plant, Southern Sierras Power Company's Board of Directors adopted a resolution renaming the No. 1 plant in Poole's honor (Sierras Service Bulletin 1925a:3, 1925b:2). A ceremony was held in October, 1925, when the directors placed a bronze plaque at the plant, commemorating Poole's 20-year association with what was then the Nevada-California Electric Corporation and its subsidiary, Southern Sierras Power Company (Sierras Service Bulletin 1926:2). The Poole Plant, "The sign manual of an indomitable conqueror of the obstacles and reluctances of mass, distance and altitude," was seen as one of the greatest accomplishments of the Southern Sierras Power Company to date (Sierras Service Bulletin 1925:2).

While Southern Sierras Power Company was proud of its accomplishments, it was still working hard to improve the Lee Vining development. In 1925, a spillway was added to Saddlebag dam, and the dam was raised another three feet (Dolson 1926:11; Waugh 1926:16). Improvements continued in 1927 when Rhinedollar dam was raised an additional six feet (Sierras Service Bulletin 1928:2). In October 1929, Tioga dam was finally completed. The March 1929 edition of the *Sierras Service Bulletin* described the newly completed Tioga dam as follows:

> The dam is 231 feet long and 25 feet high, of rock fill timber face type of construction, and provides storage of 1386 acre feet, an increase of 1020 acre feet over the former capacity of the reservoir. An auxiliary dam was also erected, a single arch reinforced concrete structure 52 feet long and 20 feet high [Sierras Service Bulletin 1929:4].

With completion of Tioga dam, the production of the Poole Plant increased by approximately 1,289,280 kilowatt-hours.

In the late 1930s, Southern Sierras Power Company (and later, other power companies) made few improvements to the Lee Vining Creek plants. The fate of Lee Vining Creek developments, like that of the Rush Creek plant, was determined largely by circumstances surrounding the controversy between Los Angeles and Southern Sierras Power Company.

Los Angeles Controversy

The dispute between the City of Los Angeles and Southern Sierras Power Company involving the Rush and Lee Vining creeks power plants had its roots in an

earlier conflict between the city and other power companies over a different power plant location. The entire problem began in the first decade of the twentieth century, when Los Angeles' Municipal Water System's chief engineer, William Mulholland, began investigating the Owens River as a possible source for a 250-mile-long aqueduct to Los Angeles. As could be expected, local Mono County farmers and power companies were not pleased with Mulholland's ambitious plans for "their water." Nevertheless, in 1906, the U.S. Congress, with complete support of President Theodore Roosevelt, passed a bill "authorizing the purchase by the city of Los Angeles of certain government lands in Owens Valley as need as rights-of-way for the Aqueduct and as storage reservoirs" (Kinsey 1928:11). Seven years later, at a cost of $24,600,000, the Los Angeles Aqueduct was completed, stretching 233-1/4 miles with 60 miles of open canals, 97 miles of concrete conduits, 43 miles of tunnels, and 12 miles of siphons (Chalfant 1933:374). In less than ten years the City of Los Angeles had become the most influential force in the struggle to develop the hydraulic resources of Mono County.

From the start, two Mono County power companies objected strongly to Los Angeles' presence in Mono County and to the city's desire to control the power sources of the region. Controlled by Oakland banker Edson F. Adams, the Owens River Water and Power Company (incorporated in 1903 to develop power sites on Owens River) and the Mono Power Company (incorporated in 1906 to build plants on the sites) secured valuable land and water rights in the Owens River Valley. In 1912, an open conflict erupted between the Mono Power Company and the City of Los Angeles after the company sued to condemn three power plant sites on Owens River (Potter 1934-1941:209).

Seven years later, Mono Power Company's suit was still pending, and Adams began looking for a way to rid himself of what were now costly and controversial holdings in the Owens River Valley. Adams tried first to market his holdings to Los Angeles. He entered an agreement with Fred Eaton, a former Los Angeles mayor, who for a commission of $50,000 was supposed to put through a sale of Adams' holdings to Los Angeles. Eaton was unable to complete the deal as planned and Adams was left holding the power sites (Chalfant 1933:376; Potter 1934-1941:209).

Rejected by Los Angeles, Adams decided to try to interest a Mono County power company in the purchase of his Owens River holdings——none other than Southern Sierras Power Company. In need of more sources of power for its southern California market, Southern Sierras Power Company acquired in December 1919 a 60-day option to buy Adams' holdings. On February 4, 1920, Southern Sierras Power Company took up the option and purchased Adams' Owens River holdings (Chalfant 1933:376-7; Potter 1934-1941:209).

When the City of Los Angeles got wind of the pending take-over of Adams' holdings by Southern Sierras Power Company, it tried desperately to prevent the sale to a company which had the resources to actually develop the power sites. Instead of making efforts to purchase Adams' holdings directly, the City of Los Angeles tried to sue to condemn the holdings of Mono County Power Company before the sale to Southern Sierras Power Company could take place. The city dispatched a special messenger to Bridgeport, the Mono County seat, to file the suit, but before the messenger could reach the courthouse, Southern Sierras Power Company, fully aware of Los Angeles' plan, recorded its deed of sale, thereby becoming legal owner of the disputed properties. Foiled in its attempt to prevent the sale, Los Angeles brought suit against Southern Sierras Power Company. This

time the suit was to be heard in the U.S. Federal Court in Oakland (Chalfant 1933:376–7; Potter 1934–1941:210).

Over the next five years, as Los Angeles worked to take control of the holdings it had once rejected, Southern Sierras Power Company began developing power plants in the Owens River Gorge. The first plant, Adams Auxiliary Plant, was completed in February 1921, augmenting the company's generating capacity by 3,750 horsepower (Nevada–California Electric Corporation Bulletin 1922:5). Three years later a second plant, the Adams Main Plant, was completed immediately below the first, operating under a 235–foot head with a capacity of 7,500 horsepower and (Dolson 1925:11). The development of these two plants by Southern Sierras Power Company effectively increased the value of the properties that the City of Los Angeles was now trying desperately to obtain.

While Southern Sierras Power Company's construction crews were busy building the Owens River Gorge plants, the company's attorneys were occupied by the legal battle with the City of Los Angeles. In 1921, the lawsuit in U.S. Federal Court came to trial, resulting in a judgement in favor of the City of Los Angeles and a price of $525,000 set for the purchase of Southern Sierras Power Company's Owens River holdings (Chalfant 1933:378). Southern Sierras Power Company immediately took the case to the U.S. Circuit Court of Appeals, which in 1922 set the former verdict aside, denying Los Angeles' right to condemn. According to the higher court's decision, "the laws of California do not permit any municipality, however large and powerful, to divert to its own use hydro–electric power, resources or developments dedicated to, and in the active service of other municipalities, although such service may be rendered by privately owned utilities" (Potter 1934–41:239). In 1923, the City of Los Angeles tried to take the case a step further—to the U.S. Supreme Court—but the Court refused to hear it, supporting the lower court's decision. The City of Los Angeles would have to find a way other than condemnation to take over the Owens River holdings (Chalfant 1933:378; Sierras Service Bulletin 1923a:2).

After the Supreme Court ruling, Los Angeles made no attempt to take control of the Owens River properties until 1930, when the city decided to try to obtain a large selection of Mono County lands and water rights, including not only the Owens River holdings but portions of the Rush and Lee Vining creeks developments. The plan was to build, among other things, a conduit from Lee Vining Creek to Silver Lake, and a dam at Silver Lake just below the Rush Creek plant. In order to complete the developments, Los Angeles needed to obtain certain lands and water rights at Rush and Lee Vining creeks. To finance these developments, the City of Los Angeles held an election in which the voters approved a $38,800,000 bond issue for improvements and new purchases, including $7,000,000 for the purchase of lands and water rights in Mono Basin (Chalfant 1933:379; Sierras Service Bulletin 1930:1).

Despite approval of the bond issue and the decision of the Supreme Court, the City of Los Angeles still refused to purchase the Mono Basin properties directly, and again brought a condemnation suit against Southern Sierras Power Company. In an interesting countermove, Southern Sierras Power Company organized the California Municipal Water Supply Company to compete directly with Los Angeles by conveying Mono Basin waters to southern California cities outside of Los Angeles (Chalfant 1933:379). This final move proved to be just what Los Angeles needed to be brought into action. In October 1933, the City of Los Angeles finally signed a contract to purchase from Southern Sierras Power Company and other associated companies certain Owens River, Fish Slough, Hillside, Mill Creek, Lee Vining Creek,

Rush Creek, Parker Creek, and Walker Creek lands and water rights in Inyo and Mono counties, as well as the two Owens River Gorge plants for $6,740,000 (City of Los Angeles 1933).

The sale of these properties in Mono Basin to the City of Los Angeles was to have a significant impact on Southern Sierras Power Company's Rush and Lee Vining developments. At Rush Creek, Southern Sierras Power Company sold to Los Angeles all of its water rights except those at or above the Rush Creek powerhouse which were used in generating electricity at the plant. The city agreed to allow the power company to store water in its reservoirs from one season to the next, provided the amount did not exceed five percent of the total reservoirs' capacities. With no rights to waters below the Rush Creek powerhouse, Southern Sierras Power Company would have to limit any additions to the Rush Creek facility to the area above the powerhouse (Los Angeles, City of 1933:31).

The impact of the Los Angeles sale was more profound where Lee Vining Creek developments were concerned. The City of Los Angeles purchased all of Southern Sierras Power Company's water rights at or above the Lee Vining No. 1 power plant, except those waters used for hydroelectric power generation at the No. 1 plant. No exception was made for the Lee Vining No. 3 plant located below the No. 1 plant. The city agreed to permit the storage of waters in reservoirs from one season to the next with the same five percent limit as at Rush Creek. Southern Sierras Power Company was to be allowed continued use of the waters of Lee Vining Creek to generate power at the Lee Vining No. 3 plant for the following three years, or until the city began diversion of water from the creek (Los Angeles, City of 1933:20–22).

As it turned out, the Lee Vining No. 3 plant continued to operate using the waters of Lee Vining Creek until 1940—seven years longer than agreed (Wills 1940:Letter). During the seven years, plans were made to convert the powerhouse to a substation and to use its hydroelectric generating equipment at another powerhouse. The decision of Southern Sierras Power Company to sell Lee Vining Creek water rights to Los Angeles proved to be a fateful one for its No. 3 powerhouse.

Loss of Imperial and Coachella Valleys Markets

The loss of the Imperial and Coachella valleys markets by Southern Sierras Power Company was a regrettable turn of events. The first sign of trouble began in 1935 when the Imperial Irrigation District, since 1906 the supplier of water to Imperial Valley farmers, decided to enter the utility business. Southern Sierras Power Company, which had been operating in the valley for years, could not help but see this move as a serious threat to its market. By 1936, the Imperial Irrigation District had secured a one-percent interest rate Federal Rural Electrification loan, built a 7,500-kilowatt diesel plant in Brawley, and was providing electric service to a few customers. Throughout 1936, Southern Sierras Power Company fought aggressively to keep its Imperial Valley customers from switching to the district's service—it seemed with some success (Myers 1983:133–134).

In 1937, either due to problems in Imperial Valley or for other reasons, Southern Sierras Power Company came under direct ownership of Nevada-California Electric Corporation—of which it had long been a subsidiary—and the latter corporation proceeded to take up the fight against the Imperial Irrigation District.

The conflict between the district and the power company intensified throughout the year, despite repeated offers from the company to submit the matter to mediation. With additional loans from the federal government, the Imperial Irrigation District began work on a 9,600-kilowatt hydroelectric generating plant on the All-American Canal, and on a 600-mile extension of rural lines in Imperial Valley. In spite of these developments, Nevada-California Electric Corporation continued to maintain a sizable share of the Imperial Valley market throughout 1937 (Myers 1983:134; Nevada-California Electric Corporation 1938:14-15).

From 1938 to 1941, Nevada-California Electric Corporation held its own against the Imperial Irrigation District. During this period, the district completed its line work and began concentrating efforts on the acquisition of new customers. The power company, meanwhile, seemed content with about 65% of connected meters in March 1940 as had been connected in November 1938. The two concerns seemed at a stalemate, with neither one side or the other taking total control of the market—yet neither side willing to abandon its claim to the Imperial Valley market (Myers 1983:136-137).

By 1941, Nevada-California Electric Corporation had become California Electric Power Company, and the new company took up the struggle against the Imperial Irrigation District. However, the controversy was about to come to an end. In 1943, California Electric Power Company gave up the fight and sold its Imperial and Coachella valleys system to the Imperial Irrigation District. As part of the agreement, the district agreed not to invade the California Electric Power Company's market outside the area sold (Myers 1983:137).

The loss of the Imperial and Coachella valleys market brought an end to a period in which the need for additional sources of power triggered new developments at Rush and Lee Vining creeks. California Electric Power Company would no longer be faced with the pressing needs which had driven Southern Sierras Power Company to begin construction of a new hydroelectric facility even before the former one was completed. At the same time, California Electric Power Company would no longer benefit from the ready, lucrative market that Imperial and Coachella valleys had once been for Southern Sierras Power Company.

1941 - Cal Elec Corp

CHAPTER 6

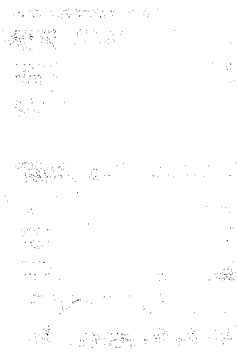
CONSOLIDATION AND MERGER: 1943–PRESENT

In the years following 1943, the power plants at Rush and Lee Vining creeks continued to operate and to see improvement, but their history was largely overshadowed by events taking place in the corporate world of California Electric Power Company. In the 1940s and 1950s, California Electric Power Company, or "Calectric" as company employees called it, gradually sold off bits and pieces of the old Nevada–California Electric Corporation system in an effort to consolidate its holdings and concentrate on servicing its customers. In 1964, Calectric merged into Southern California Edison Company, which further streamlined the old Nevada–California Electric Corporation system. Throughout this period, Rush and Lee Vining creeks power plants continued to be a vital part of both companies' systems, and numerous improvements were made to the plants, increasing their overall efficiency.

The sale of the Imperial and Coachella valleys service area in 1943 was the first of a series of sales by California Electric Power Company over the next two decades that signalled the break–up of the old system. In April 1948, Calectric sold off its Yuma utility service to the Arizona Edison Company, which in turn sold it to the Arizona Public Service a year later (Myers 1983:137). In 1954, Calectric sold its Interstate Telegraphy Company subsidiary to the newly incorporated California Interstate Telephone Company, which began independent operations in March of that year (Anonymous 1964:n.p.). Two years later, Calectric abandoned the Imperial Valley ice plants, retained after the sale of the power system to the Imperial Irrigation District. Finally, in 1960, Calectric sold its northwestern Baja California service territory to the Mexican government's *Commision Federal de' Electricidad* (Myers 1983:137).

In the years after World War II, even though a sizable portion of its service area had been sold, Calectric was struggling to find ways to meet consumer demands due to the rapidly growing California population. The company felt that there were no streams capable of supporting hydroelectric development within its production area (Electrical West 1962:n.p.). Thus, Calectric was forced to enter contracts with other utility companies for the purchase of additional power at great expense. In the 1950s, to help improve its service, the company launched a steam–plant building program in southern California. In addition to steam plants, Calectric constructed new transmission lines which ran to Crowley Lake (1951), the Hot Creek Hatchery (1952–53), and Mammoth Mountain Resort area (1957) (Anonymous [1961]:46).

By the 1960s, Calectric had gone through considerable changes from its old Nevada–California Electric Corporation days. As of 1962, the company was operating 8,129 miles of transmission and distribution lines, 262 substations, and serviced an area of approximately 52,203 square miles. The company had divided this system into 13 separate districts, and had operating revenues of $36,298,977 and assets of $175 million (Electrical West 1962). When Southern California Edison Company and Calectric came together in 1964, the merger was one of the largest, most complex ever to take place (Myers 1983:207).



Under Southern California Edison Company, the old Nevada–California Electric Corporation was further dismantled, as the company consolidated its holdings and broadened its service area. In 1969, Southern California Edison Company sold the old Nevada service area to Sierra Pacific Power Company (Myers 1983:138). This sale meant that the area which once sparked the original developments at Rush and Lee Vining creeks was no longer a part of the power system. Regardless, the sale proved to be a wise decision by Southern California Edison Company, which was able in the 1970s and 1980s to increase its consumers while operating in a service area smaller than that of Calectric in the 1960s. By 1983, Southern California Edison Company was the third largest investor–owned utility in the United States, providing service to a population of more than nine million people in an area measuring 50,000 square miles and encompassing all or part of 14 central and southern California counties (Myers 1983:8).

Throughout the years that Calectric controlled the Rush and Lee Vining Creek plants, the company continued to operate and, in many cases, to improve the system. At Rush Creek, only minor repairs and changes were made to the plant, which continued to run efficiently, producing 10,000 kilowatts. At the Lee Vining Creek plants more significant changes took place. In 1943, the power generating equipment was finally removed from the Lee Vining No. 3 plant, which was then converted into a substation (Wills 1940:letter).

In 1952, 13 of the 17 steel impulse buckets of the Poole plant's impulse turbines were replaced in a little over a month's time at a cost of $30,000 (Edwards n.d.:30–32). In 1953, the intake chamber of Saddlebag dam was partially reconstructed and repaired (California Electric Power Company 1953:Drawing #363–11). In the 23 years that Calectric employees operated the Rush and Lee Vining creeks plants and substation, they worked hard to maintain efficiency and improved the overall system.

When Southern California Edison Company took control of the Rush and Lee Vining developments in 1964, the company continued efforts to make the plants more efficient. Numerous changes were made, particularly to the Rush Creek plant, developing additional plant capacity and energy. In 1983, Southern California Edison Company initiated a project to replace one of the two old turbines (Unit 1) at the Rush Creek plant with a new two–jet horizontal shaft impulse turbine of modern design (Maurel 1983:2). This project was approved, and plans were made to complete the work by 1986 (SCE 1983). In 1984, 12 feet of the outlet pipe at Rush Creek Meadows Reservoir broke loose and was replaced (SCE 1985:n.p.). Southern California Edison Company continued to maintain the same high standards for the Rush and Lee Vining plants and substation as had Calectric before them.

I DID THIS.

Conclusion

As can been seen by this overview, the history of several hydroelectric generating plants located in the upper reaches of the eastern Sierra Nevada Mountains at Rush and Lee Vining creeks must be considered significant. The construction and engineering of the plants was representative of high–head hydroelectric projects in California. From the early struggle of James Stuart Cain and Delos Allen Chappell to capitalize and develop the hydraulic resources of the Mono–Basin area, developments at Rush and Lee Vining creeks have been at the forefront of local and regional history. Through the years, the plants' developments

have been connected with events in the mining districts of Nevada, with agricultural developments in Imperial and Coachella valleys, and with the City of Los Angeles' fight to provide water for its residents.