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THE MARLETTE LAKE WATER SYSTEM

A Report on the Feasibility and Desirability of Its Retention

LEGISLATIVE COMMISSION
OF THE
LEGISLATIVE COUNSEL BUREAU

FEBRUARY 1969

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Legislative Commission

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Senator Carl F. Dodge
Senator James I. Gibson
Senator Archie Pozzi, Jr.
Assemblyman Melvin D. Close, Jr.
Assemblyman Zelvin D. Lowman
Assemblyman James E. Wood
Senator Marvin L. White

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Report to the Legislative Commission from the Subcommittee for Study of the Marlette Lake Water System

PART I

Subcommittee's Findings and Recommendations

A. Introduction.

Your subcommittee was directed to make a complete study of the present and future needs of and demands upon the Marlette Lake water system in accordance with the directions of Senate Concurrent Resolution No. 21 (1967). This we have done. We apologize for the length of our report occasioned by the many complex facets of the study but believe that for a minimal understanding of the water system and its problems the legislator who has not had the opportunity to inspect it or become acquainted with its operation will find the contents both instructive and interesting. Often the written word in technical studies is inadequate to describe the subject. Such is the case here, and the report is illustrated liberally with photographs and maps to assist the reader.

Our subcommittee was given invaluable assistance and advice from many of its members appointed because of their expert knowledge of and experience concerning the water system. At the outset the subcommittee chairman assigned specific tasks to individual members for investigation. Six meetings of the subcommittee were held during the period August 1967 to November 1968, and several inspections of the system were made by the whole subcommittee and member groups. Testimony was taken from several individuals, and published works were consulted both by the staff and subcommittee members.

B. Problems of Divided Ownership.

Carson Water Company and the State of Nevada each own and operate water supply and distribution systems serving parts of the same area. Each relies on the Marlette Lake water system as a source. This situation is not conducive to the development of the water resources of the Carson City-Eagle Valley area. Carson Water Company has not engaged in a well-drilling program only because of the availability of state water sold at the high price of 16 cents per 1,000 gallons. Carson Water Company is reluctant to enter into long-term contracts with the state guaranteeing any more than a minimum water use during peak demand periods. The state continues to demand the 16-cent price because of its large investment in the purchase and subsequent expenditures on the system and legislative direction to use revenue excesses over costs for debt service. Continuing required improvement expenditures have lowered the anticipated reduction of debt. Insistence by the state on the high rate has serious implications for both Carson City and the state.

Roy L. Torvinen, Esq., assemblyman and subcommittee member,

speaking for the subcommittee on November 11, 1968, describes the state's dilemma:

> To start with, to date, June 30, 1967, not now, this system has cost the State of Nevada, not including the purchase price, not including salaries, $36,700. In addition, we have spent almost $400,000 retiring the bonds. To improve the water resources system to its potential, here are just a few items that the State Planning Board suggested last year during the session when they made their report: Enlarging Hobart, $324,000; independent connecting pipeline, $306,000; connecting Red House and the tunnel, $182,000; tunnel rehabilitation, $62,000; another pipe to Marlette tunnel, $161,000; lower reservoir, $200,000. This is up to the 1985 potential. We have over $1,000,000 right there. You people who say the state should retain and own the water resource system are looking at a future expenditure, conservatively, of one-half million dollars, according to the State Planning Board, or $1,000,000 above what is already invested. If we continue to do this and sell water to the Carson Water Company only when they need it we are going to realize only about 5 or 10 percent interest on our investment--the actual invested capital. It is impossible of recovery based on these facts. It is economically not feasible for the state to pay for the improvement of the water resources development area, the production of the water, and sell it occasionally at wholesale. It is my feeling, strongly, that all of the land with the exception of a few acres, the easements for the pipelines and possibly portions of Hobart could be retained by the state. All of the water resources and waters themselves, the collection areas, can be sold or leased on a royalty basis to either the Carson City Water Company, Carson City-Ormsby County or a district to be formed. A district or municipal water system in Eagle Valley is the best thing if it can come to pass. Production facilities of the water could be sold and somebody else be responsible for spending this half million to million to produce the water. * * * I would recommend that we look towards the distribution of the water and saddling of the responsibility of improving the collection system on someone else who can amortize the cost against sales of water in the Eagle Valley area, where it should be paid, and not by taxpayers of all the state. This committee should suggest that as soon as possible an engineer or evaluation firm be employed to give us an evaluation of the * * * economic value of the system, the water source and the distribution system, with a view of ultimately either negotiating on an informed basis with Carson City-Ormsby County or a district that is formed or the Carson Water Company.

C. Required Improvements to the System; Costs.

In order to make full use of the water resources of the Marlette-Hobart area which supplies the Marlette Lake water system, a number of improvements are required.

1. Pipeline from tunnel to Red House.

An 8-inch line was installed in part during the summer of 1967 as a temporary device at the expense of Carson Water Company. The Reid report describes this project as the most urgent of the required developments. Mr. Walter G. Reid recommends a pipe 18 inches in diameter to carry as much as 6,000,000 gallons per day in order that Marlette Lake could furnish the major portion of the water during the dry years and complement the flows from other areas. His cost estimate for this work on August 19, 1968, is $140,000. His estimate of cost of extending the 10-inch pipe to the east portal of the tunnel is $83,900.

2. Tunnel.

In his original report to the Legislative Commission, Reid estimated the cost of reopening the tunnel to be $40,000. In August 1968, because of the work done on the tunnel in the interval, he was unable to make an intelligent estimate without considerably more investigation.

3. Pipeline: Marlette Lake to tunnel.

Mr. Reid advocates bringing water from Marlette Lake to the west portal of the tunnel by a 14-inch-diameter pipe 25,200 feet in length. In August 1968 he estimated the cost to be $250,000.

4. Hobart Creek Reservoir dam.

To construct a dam at the sight of the dam, enlarged to create a reservoir with a capacity of 838,000,000 gallons, Reid's recent estimate of cost is $330,000.

5. Pipeline to Carson City.

When the demand from the state and Carson City exceeds 3,000,000 gallons per day, it will be necessary to install an additional line to the state reservoir from the tanks. Reid's estimated cost for this work is $83,800.

6. Replacement of tanks.

The tanks are wooden. Because of high fire hazard, they should be replaced with either concrete or steel tanks. No estimate of cost is made.

D. Subcommittee's Recommendations.

1. In order to eliminate most of the disadvantages of the present method of operation of the water system and to minimize others, the subcommittee recommends that the legislature initiate action to convey responsibility for operation and development of the Marlette Lake water system to Carson City, Ormsby County or a general improvement district formed for the purpose. It is proposed that the state retain ownership of all the land and full control of the use of the area, including recreational and fisheries uses of the lakes.

The recommended sale would also include the state's water distribution facilities in Carson City and Ormsby County. Such a sale would result in the state's purchasing all needed water from the city, county or district. Legislation to effect this recommendation should:

(a) Appropriate to the Department of Administration sufficient moneys for a professional appraisal and evaluation of the economic value of the water system, the water source and the distribution system.

(b) Authorize the Department of Administration to sell (or perhaps lease for a term of years) the water system, source and distribution system at not less than the appraised value, recognizing the historic needs of Virginia City, Gold Hill and Silver City. Broad guidelines should be given the department for negotiation of the recommended sale.

(c) Provide administrative direction for multiple use of the land for recreation and fisheries purposes. It is suggested that the responsibility for land use and management be assigned to the State Department of Conservation and Natural Resources, its Divisions of State Parks and Forestry having a direct interest in the land. Use of the lakes for the fisheries programs of the Fish and Game Commission should be retained by that commission.

Fig. 1. Lakeview Hill House, 1968.

(d) Direct the establishment at the house at Lakeview Hill (Fig. 1) and a sufficient amount of land surrounding it by the Nevada State Parks System of a picnic area and a visitors' center interpretive of the historic Marlette water system.

2. If the first recommendation is not possible, then your subcommittee recommends that the state remain in the wholesale water business, developing its water supply but selling to a public utility--Carson City, Ormsby County or a general improvement district--all of its water facilities below the tanks. To assist the Department of Administration in fixing the rate for the sale of wholesale water the legislature should recognize that the land originally was purchased for other than water system purposes--namely, parks and outdoor recreation purposes--and should, by appropriate legislative act, amend existing statutes to assist the department in future contract negotiations. Debt service required for the land purchase should perhaps realistically be funded from the state's general fund and not from revenue excesses over operating costs. Acceptance of

this recommendation would of course lead to a high priority development of Hobart Reservoir and expenditure of state funds to meet long-term wholesale water contract obligations.

3. It is also recommended that the subcommittee be continued for the next biennium to advise the next legislature concerning the system.

E. Acknowledgment.

Your subcommittee gratefully acknowledges the cooperation and assistance of all persons, both public and private, who assisted it in its investigations. They include officers and representatives of the Carson Water Company, Virginia City Water Company, Carson City, Ormsby County, Storey County, Carson Chapter of the Nevada Society of Professional Engineers, United States Bureau of Reclamation, and many of the state's departments and agencies.

All photographs used in the report (except as hereinafter credited) were taken for the subcommittee by Mr. William A. Rollins, conservation agent, Nevada Fish and Game Commission. The aerial photograph was made available by Mr. Robert S. Leighton, Sierra Pacific Power Company, having been taken on May 31, 1968, by Millard-Spink Associates, Inc. of Nevada. The subcommittee thanks the University of Nevada for giving its permission to reproduce several early photographs of the system from its publication, Geology and Mining Series No. 45 (1947).

The subcommittee's special thanks are given to its member Walter G. Reid who, at no expense, updated his earlier report on the water system and provided the subcommittee with expert, technical information. Russell W. McDonald, Esq., Legislative Counsel, assisted the subcommittee in its labors.

F. Suggested Legislation.

Suggested legislation to effect the recommendations of the subcommittee follows.

SUMMARY--Provides for administration of Marlette Lake water system. (BDR 27-1271)

AN ACT relating to the Marlette Lake water system; providing separately for the administration of land and for the administration, sale or lease of the water supply system; making an appropriation; and providing other matters properly relating thereto.

THE PEOPLE OF THE STATE OF NEVADA, REPRESENTED IN SENATE AND ASSEMBLY, DO ENACT AS FOLLOWS:

Section 1. NRS 331.160 is hereby amended to read as follows:

PART II

History of the Water System[1]

Located at an elevation of about 6,200 feet Virginia City and Gold Hill are on the eastern side of the Virginia range. Winter storms cover the upper portions of its mountains with snow but the surface runoff, confined to the winter and spring months, is slight. Available water from the mountain interior is limited, being mostly solid rock. In the early days of the Comstock, natural springs afforded a sufficient supply for the relatively few persons inhabiting the two mining camps. As the population increased the spring flow became inadequate and various methods were devised to collect and distribute water. The Gold Hill News of March 2, 1865, in an article entitled "Where We Get Our Water," describes the sources and methods of the then supply:

> When the existence of silver mines in Nevada first became known, the item of water was considered of vast importance, for at that time, in Storey County particularly, there was hardly a drop of the article to be had, and the Ophir Company gave for the privilege of a small spring in the canyon west of their claim 100 feet of ground (the Mexican Mine) which has yielded to the possessors an immense fortune. First was organized a company styled the Virginia Water Company, and subsequently another called the Gold Hill Company, each affording a limited supply of water to the different towns. But on the 12th of May, 1862, the Virginia and Gold Hill Water Company was first incorporated, being a consolidation and enlargement of each of those companies. From that date both Virginia and Gold Hill have been bountifully supplied with water, and to know the source of that most necessary flood will perhaps prove not uninteresting.
>
> There being no single source from whence an adequate supply could be obtained, the company have secured the water from several points: First, from the Santa Rita Tunnel, situated in Spanish Ravine north of Virginia; second, from a tunnel piercing the western side of the hill in 7-Mile Canyon about two miles northwest of Virginia; third, from the Old Ironsides Tunnel (now styled the Virginia Tunnel) directly west of the city; fourth, from the Yolo Tunnel in Gold Hill; and finally, from several prominent mining companies in this district. The streams of water mentioned are conveyed through ditches for a distance of over 10 miles, and supply various large reservoirs, which in turn connect with pipes conveying the water to any required place.
>
> Virginia City is supplied from four huge reservoirs, substantially constructed and having a capacity of above 200,000 gallons, and keeping constantly full 21 fire cisterns besides furnishing all the water for drinking, culinary and other uses that may be required--the average cost to each family supplied being $1 per week exclusive of the cost of laying the necessary pipes, of which there is at

this time several miles in length. Gold Hill and the mills in the canyon below are supplied from four reservoirs of a smaller capacity, yet amply large enough to furnish the demand. Like Virginia, Gold Hill is dependent upon the company for water; and so is (sic) also 45 mills and hoisting works. In fact, so used have the people of Storey County become to the liberal supply of God's vineyard to them that they hardly ask where comes this article so necessary to prosperity and health.

The present winter has been one of unparalleled severity in this country, and at times it has been an utter impossibility to the company to keep the pipes and ditches from freezing, although a large force of laborers have been constantly employed and every means known to ingenuity used to keep the reservoirs full; and now it is hoped the severity of the season has passed and failure of the accustomed supply need not be apprehended. The company has struggled through all kinds of ill luck in past years but are now in affluent circumstances.

As Dan DeQuille related, "Virginia City and Gold Hill were frequently placed upon a short allowance of water, and it was seen that a great water famine must soon prevail in both towns, in case the tunnels that had been run into the mountains were depended upon for a supply. The Virginia and Gold Hill Water Company then determined to bring a supply of pure water from the streams and lakes of the Sierra Nevada Mountains--from the regions of eternal snow."[2] The decision was made by the company in August 1871.

The Sierra Nevada range bordering the eastern side of Lake Tahoe is higher than the Virginia range by 1,000 to 1,500 feet. From Virginia City to the Lake Tahoe mountains the distance exceeds 30 miles. Between the Virginia range and the Sierras lie Eagle and Washoe Valleys, approximately 1,200 to 1,500 feet below Virginia City. The Virginia range is connected to the Sierra Nevadas by a mountain spur called the Washoe Mountains. The Lakeview saddle is approximately 150 feet above Washoe Lake and 500 feet above Eagle Valley. The Lakeview saddle and the Washoe Mountains determined the location of the proposed aqueduct.

The plan was bold, its accomplishment remarkable. Two problems were involved. First, a diversion dam was to be constructed on Hobart Creek together with long lines of box flumes. Second, a pressure pipe across the Washoe depression was an unprecedented undertaking as the static head (difference in elevation) was much greater than had ever been used in a waterpipe. This problem was solved by the use of iron plates bent to a cylindrical shape and riveted to form a pipe. (Fig. 2.)

The design of the pressure pipe was done by Hermann Schussler, a San Francisco engineer, who had had experience with riveted pipelines of the Cherokee Hydraulic Mining Company across a branch of the Feather River. Surveys were made in the spring of 1872, and manufacturing of the pipe was ordered from Risdon Iron Works in San Francisco. It took nearly a year to manufacture the pipe from

English wrought iron. Risdon Iron Works were furnished with a diagram of the line on which it was to be laid and each section was made to fit a certain location. Twelve inches in diameter, varying in thickness depending on the water pressure encountered, the pipe was made up in 26-foot lengths. (Fig. 3.) It weighed a total of 700 tons and stretched for 7 miles when installed. There were 1,524 joints in the pipe as laid, and one million rivets and 35 tons of caulking lead were used. After fabrication in San Francisco the pipe was shipped by railroad to Lakeview, distributed to its preassigned locations and installed in a trench 4 feet deep, dug for the purpose. The first joint was laid on June 11, 1873. The last section was in place on July 25, 1873--just 6 weeks after ground had been broken for the project.

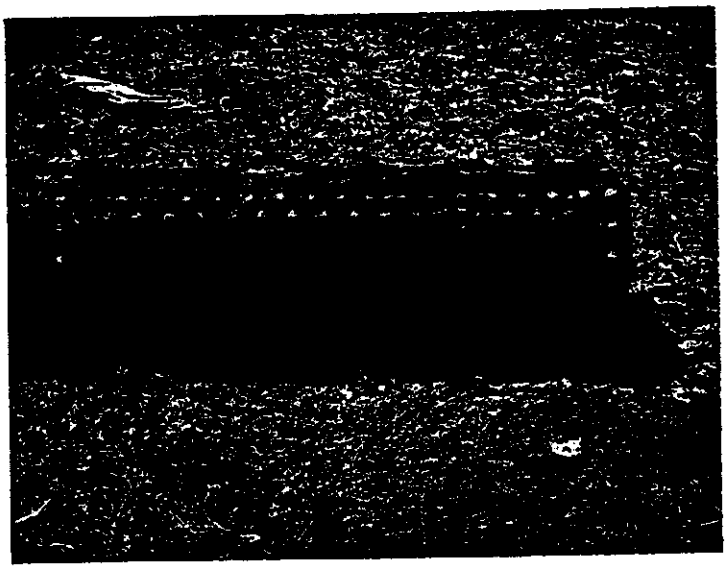

Fig. 2. Section of original riveted pipe, 1968.

Construction of the other portions of the aqueduct was carried on at the same time that the pipe was being manufactured and installed. A diversion dam was built on Hobart Creek and a wooden flume 18 inches deep and 20 inches wide, 4.62 miles in length, was built along the mountainside to a tank where the water entered the pressure pipe. From the outlet of the pressure pipe a flume 4.04 miles long lead to a saddle where Five-Mile Reservoir was subsequently constructed. This flume was 16 inches by 18 inches in section. From the reservoir site the flume ran 5.66 miles to Gold Hill and Virginia City. Water reached Gold Hill and Virginia City on the night of August 1, 1873. DeQuille describes the rejoicing: "Cannons were fired, bands of music paraded the streets, and rockets were sent up all over the city. Many persons went out and filled bottles with this first water from the Sierras * * *."[3] The system, over 21 miles in length, was capable of delivering 2,200,000 gallons in 24 hours.

Fig. 3. Sections of original riveted pipe, 1968.

The demand for more water on the

Comstock increased. Hobart Creek could not produce a sufficient supply, stream flow falling to about 700,000 gallons each day during the summer months. Plans for a second pipe were made, and that pipe was laid in 1875 on ground close to the first pipe. The pipe was lapwelded iron, screw-jointed, with a 10-inch internal diameter. Since there were no rivet heads in it to produce friction, it delivered the same amount of water (2,200,000 gallons each 24 hours) as the larger first pipe. A second flume, 4.72 miles long, was constructed from Hobart Creek parallel to the first flume and a second tank was erected as the pressure pipe inlet. An additional flume 3.98 miles long was also built from the outlet end of the two pipes to Five-Mile Reservoir created by an earth dam with a capacity of 5,000,000 gallons.[4] (Fig. 4.) Another flume from Five-Mile Reservoir was constructed, 7.31 miles long, leading to Gold Hill and Virginia City. (Fig. 5.)

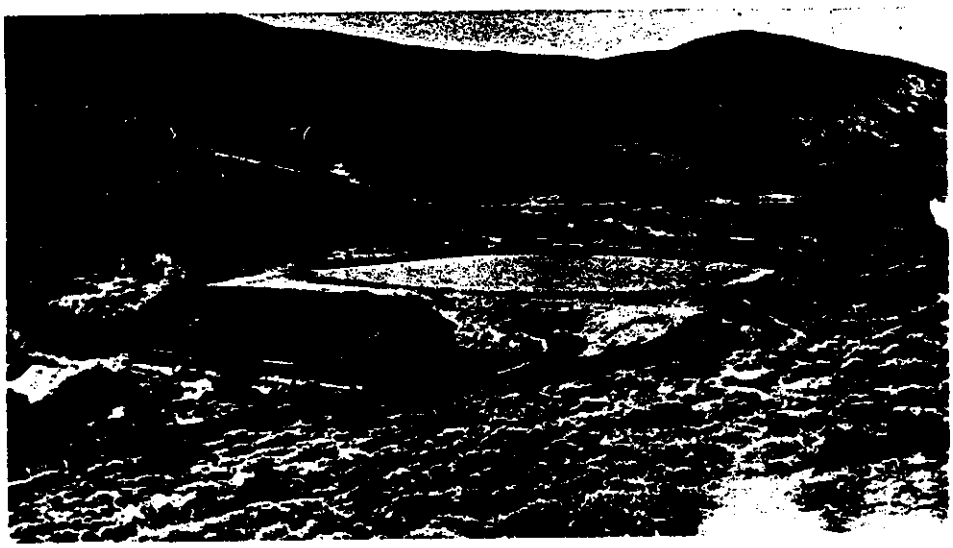

Fig. 4. Five-Mile Reservoir and ice house, c. 1877.

Meanwhile, up in the Sierras Duane L. Bliss and H. M. Yerington were conducting their lumbering enterprises. In the summer of 1873, they placed a dirt fill and stone dam across the head of Marlette Basin, creating a small lake or reservoir at an elevation of 8,000 feet above sea level. Originally named Goodwin Lake, it was renamed Marlette Lake, honoring Seneca Hunt Marlette, first Surveyor General of the State of Nevada.[5] The water collected in Marlette Lake, to be used for fluming purposes, was conveyed in a 6-mile V-flume south to Spooner Summit, then down the Clear Creek main flume to their lumberyard south of Carson City. The Hobart Creek supply was insufficient, despite the two flumes and pressure pipes, to supply the increasing Comstock demands. In 1876 the Virginia and Gold Hill Water Company received the consent of Bliss and Yerington to draw water from Marlette Lake. The dam was raised to a height of 37 feet. It was about 213 feet long, 16 feet wide at the crest, with battered sides. The exterior walls were made of dry rubble masonry with roughly coarsed stones. (Fig. 6.) The lake formed by these improvements was about 1 3/4 miles long by three-fourths of a mile wide, containing about 2,000-million gallons of water.

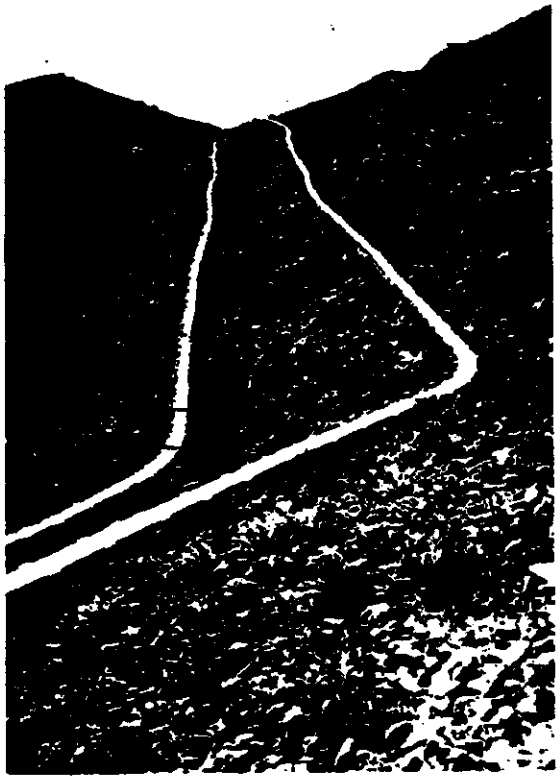

Fig. 5. Flumes in the Virginia Range: Five-Mile Reservoir to Virginia City, c. 1877.

A covered box flume was built from Marlette Lake 14 inches by 30 inches in section north along the mountainside 4.38 miles to the west portal of a tunnel driven through the granite ridge dividing the Lake Tahoe drainage from the Hobart Creek drainage. (Fig. 7.) Also a flume, 8.25 miles long, was constructed along the mountainside to the north of the tunnel, for the purpose of collecting waters from the many creeks on the west side of the mountains. (Figs. 8, 9, 10, 11.) This flume joined the west portal of the tunnel, combining its flow with the Marlette Lake water.

The tunnel was 3,994 feet in length, connection between the headings being made May 13, 1877. Lined with timber over one-half the length, the tunnel was 7 feet high, 4 1/2 feet wide at the top, and 6 1/2 feet wide at the floor.[6]

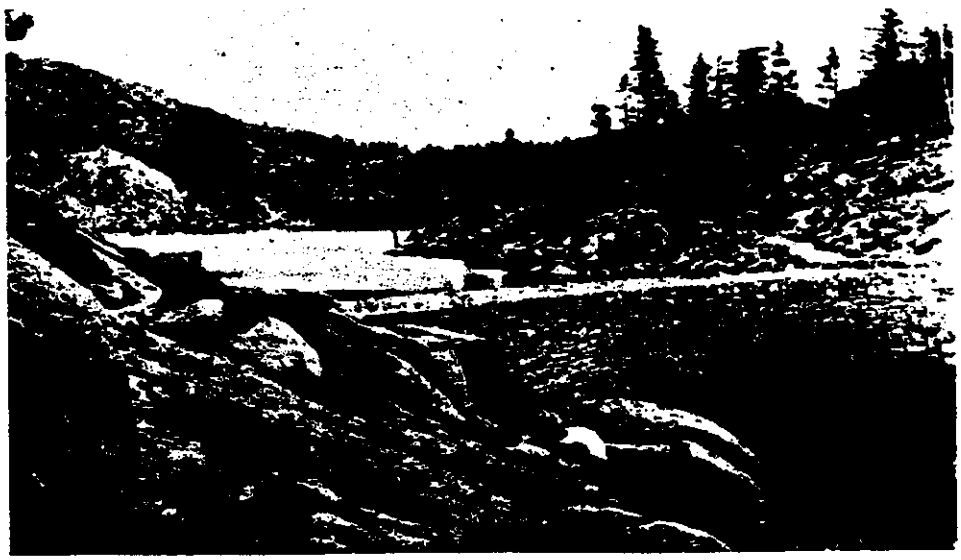

Fig. 6. Dam at Marlette, c. 1877.

Fig. 10. Remains of north flume, 1968.

Fig. 11. Remains of north flume, 1968.

From the east portal of the tunnel a flume 2.77 miles long led to Hobart Creek (Fig. 12). A storage reservoir, designated Hobart Reservoir, was built a short distance above the diversion dam of the flumes by constructing a rubble masonry and earth dam. This reservoir had a capacity of 35,000,000 gallons, and served to regulate the discharge of the stream (Fig. 13).

In 1887, a third pressure pipe was installed in substantially the same location as the first two pipes. When completed, the water supply system included three reservoirs, over 21 miles of pressure pipes across the Washoe depression, approximately 46 miles of covered box flume and the tunnel. The total investment was in excess of $3,500,000.

With the decline of the Comstock the fortunes of the water system suffered. In 1933 the company's name was changed from "Virginia and Gold Hill Water Company" to the "Virginia City Water Company." Due to the advanced age of the pipelines, failures became severe during 1956-1957; and the company having operated at a financial loss for many years, funds were not available to make necessary repairs and replacements. Curtiss-Wright Corporation loaned the water company money to replace the flume and pipeline from Virginia City to Five-Mile Reservoir. In 1957 Curtiss-Wright Corporation purchased from the Virginia City Water Company

all the water rights, storage facilities at Marlette Lake, Hobart Reservoir, flumes and pipelines, up to and including Five-Mile Reservoir. The physical production and transmission system was extended, augmented and expanded by Curtiss-Wright Corporation and subsequently sold to the Marlette Lake Company.

Fig. 12. Flume: Tunnel to Hobart Creek, c. 1877.

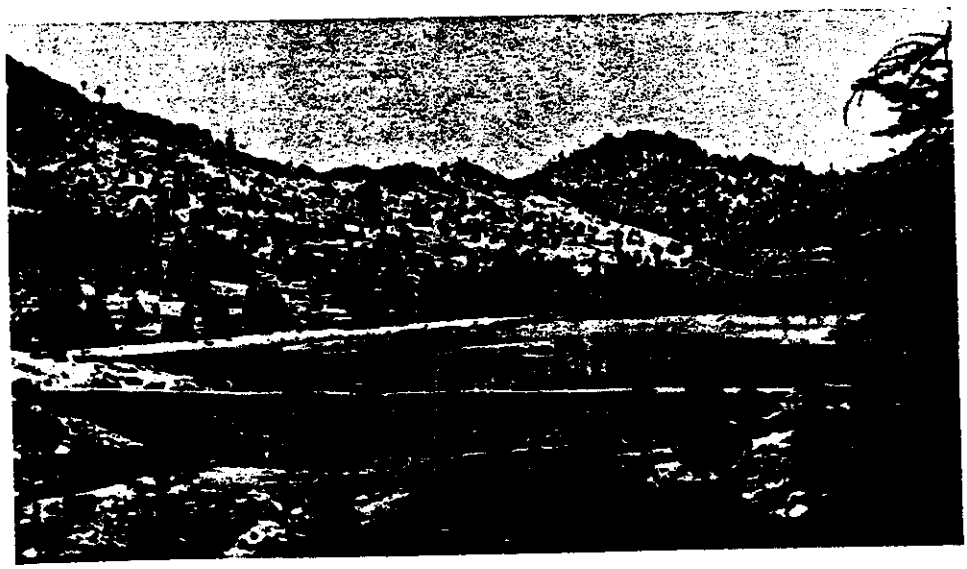

Fig. 13. Dam and reservoir at Hobart Creek, c. 1877.

PART III

Acquisition of the Water System by the State of Nevada

In 1963 Marlette Lake Company offered to sell to the State of Nevada for $1,650,000 of the state's general obligation bonds, bearing interest at 3 percent per annum, its water rights, approximately 5,377.91 acres of land, easements, pipelines, flumes and other fixtures and appurtenances used in connection with the collection, transmission and storage of water by the company in Washoe, Ormsby and Storey Counties. The 1963 legislature accepted the offer by enacting Chapter 462, Statutes of Nevada 1963, which, among other things, directed the state bond commission to issue the bonds. The constitutionality of the 1963 act was questioned by the state bond commission, which refused to issue the bonds, and the Marlette Lake Company then commenced an original proceedings in mandamus in the Supreme Court of Nevada to force the issuance of the bonds. In Marlette Lake Co. v. Sawyer, 79 Nev. 334, 383 P.2d 369 (1963), the supreme court granted the writ, holding that the Nevada Constitution permits the legislature to authorize the state to exceed the debt limitation by purchasing private water rights, watershed, and water collection, transmission, storage and distribution systems. Thereafter the bonds were issued and the state became the owner.

Anticipating possible acquisition of the water system, the 1963 legislature also enacted two additional acts. Chapter 463, Statutes of Nevada 1963 (now NRS 331.160 to 331.180, inclusive), gave statutory recognition to the system and placed its supervision and administration in the Department of Administration.[1] Chapter 465, Statutes of Nevada 1963, made a $20,000 appropriation to the Legislative Commission of the Legislative Counsel Bureau for the purposes of engaging the services of engineers and appraisers to make engineering studies and appraisals of the system. The Legislative Commission employed Mr. Walter G. Reid, Civil Engineer, of Virginia City to make the engineering investigation, analysis and report. (Mr. Reid is a member of the Legislative Commission's subcommittee which has prepared this report.) The Reid report was filed with the Legislative Commission in November 1964, and extracts from it are liberally quoted in this subcommittee report, particularly in Part IV.