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Making the Desert Bloom
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The Story of St. George Water

Legend has it that Brigham Young was heard pronouncing words to the effect that if you could get the water under southern Utah to the surface, you could float a boat from St. George to Phoenix. History and legends aside, Brigham believed that water would come from somewhere, and that there would be enough of it to sustain a thriving, ever-growing city for decades to come. Even so, when the original 300 families entered the St. George valley in late fall of 1861, they had little more than the two small springs, East and West, to rely on. From the day those indomitable pioneers set foot in this valley, until the day they died, their lives were spent in search of, obtaining, and wisely using water.

We encourage you to take the time to read these true and inspirational accounts of the early pioneers as they faced the great challenge of finding water in the St. George valley.

East and West Springs

William Carter holds the distinction of being the first man to plow a ditch in the valley. The story goes that he used the same plow which had marked the first furrow in the valley of the Great Salt Lake. The encampment was made along the salt brush flat on the east edge of the valley where Dixie College now stands. The water Carter channeled emerged from the original East Spring which was measured at just over 0.6 cubic feet of water per second (cfs). That flow, as well as the 1.7 cfs flow from the West Spring, has remained consistent for 130 years. In a valley that has seen nothing but growth and change over the past century, those two springs have remained singularly constant.

Yet in spite of a trustworthy supply, the quality of water that ran through the valley was lacking. The water the pioneers were forced to drink had an awful taste. It sustained them biologically, but it was not refreshing, not enjoyable to drink. Those who periodically dipped what they needed from the Virgin River wryly called the rank water "Virgin Bloat."

Early in 1862, the proposed city was surveyed and lots were platted. Ditches were dug to conduct water from the two city springs to the lots. Numbers were drawn from a hat to determine the distribution of lots, and people prepared to take possession of their new property. On March 2, the camp was buzzing well before daylight. Families were already packed and prepared to move. A few had hoped to be able to boast that they were first to reach their homesite in the valley. Brigham Jarvis raced his team through the sage, across the crusty slopes, tipping over the wagon's spring seats and scattering some of his goods among the bushes. He finally pulled up alongside a creosote bush and said, "Get out Mother, we're home!" They were the first settlers on the actual site of St. George.

William Carter's young wife had been eager to get an early garden started. A few days earlier she had hiked to her assumed lot, and, with a grubbing hoe and shovel, had cleared a garden space. When the Carters took possession of their lot on March 2, Mrs. Carter discovered she had grubbed on the wrong side of the stake. She went down in history as having done the first road work in St. George.

Those settlers literally built a city out of nothing. In addition to clearing their lots and putting up temporary shelters of tents, willow sheds, dugouts and small houses, theirs was the paramount business of getting water to the land. It was the first necessity and it would take a cooperative effort. In the first four years after St. George was founded, \$26,611.59 was spent repairing and replacing dams and sections of the ditch which at that time watered 420 acres, making a tax of about \$63 per acre for water alone. The pioneers knew all along that water would be scarce, but they soon learned first hand that water in Utah's Dixie was not nearly as plentiful as they had grown accustomed to in northern Utah.

The City Charter of St. George placed the control and distribution of water in the hands of the city council. Yet, from a practical standpoint, it became the responsibility of the LDS bishops to allocate water to the lots. Lots south of Diagonal Street and 100 North were watered from the West and East City Springs, while other lots in the original survey were watered by springs seeping from the red ledges along the north edge of town.

The Drinking Hour



490W. 500N.

One twenty fourth of the water was reserved by the city for drinking and culinary purposes. Upon completion of the ditch system through the city, a "Drinking Hour" was established in which all irrigation diversions were taken out of the main ditch so that water would flow completely through the valley. During the specified hour (5 to 6 a.m. in summer and 6 to 7 a.m. in winter) members of each household dipped enough water from the ditch for their daily needs. They placed this culinary water in storage barrels from which they dipped during the day. None of the water was ever wasted.

Clair Terry, who lived part of his boyhood days in St. George, remembers dipping water during the "Drinking Hour." The family had two barrels under a cottonwood tree - one for settling and one for use. Most families kept the drinking barrel on the north side of the house where it would stay more cool.

Often the barrel was wrapped in burlap or with an old quilt, and the wrapping was soaked to help keep the water temperature down. If someone dipped a drink and didn't finish it, the remaining water was poured onto the packing. Drinking barrels were cleaned often to stop the growth of moss inside and prevent them from becoming a breeding place for mosquitoes. Drinking barrels were also a key gathering spot at public events. During church conferences and the county fair, two drinking cups were attached by a chain to the top of the barrel, and everyone drank from them - caring little, and knowing less about the germ theory of disease.

Though the water was much appreciated and never taken for granted, it did become a source of sadness. The early settlers may not have realized it at the time, but the condition of the water they drank caused the deaths of many children. The ditches ran through livestock corrals and the water became contaminated as it moved along. By today's standards that water would not have been remotely close to acceptable for human consumption. It was difficult for infant children to switch from the bacteria - free milk of their nursing mothers to the infested water dipped from the ditch. The result was a sorrowful mortality rate among St. George children.

Water quality was a continual concern through the end of the 1800s. Even at church it was an important topic of discussion. The matter came up in an LDS Priesthood meeting in August of 1892, in a discussion over whether water should be substituted for wine in sacrament meetings. President Daniel D. McArthur pointed out that livestock roaming the city streets made the water filthy, and as for him, "he preferred good wine for sacrament to bad water." David H Cannon reported that "one morning he walked down the ditch to run down by Prisbrey's and counted nine big cow droppings in the ditch. This the people have to drink." President Ivins said that the marshal might take up every cow that came out and the ditch would still be filthy, "for whenever a cow comes out to drink the first thing she does is to turn her head upstream, and when she is full she lets her droppings drop in the ditch, and there is no way to stop her" (from Karl Larson's *I Was Called to Dixie*).

Water turns were timed to the minute in early St. George. The schedule ran 24 hours a day and the meager supply, coupled with discrepancies in time pieces, caused constant disputes between neighbors. Nothing was so precious or coveted as water, and this simple commodity had a way of trickling into and drowning relationships among even the best of friends. The problem was partially alleviated with the installation of a town clock in the Tabernacle tower in 1872. But resentments and feeling of unfair treatment would always exist as long as water was scarce.

In January of 1863, Mayor Angus M. Cannon let bids to sink an artesian well on the public square. Archibald Sullivan won the contract and the well was "driven to quite a depth, but no water was secured."

Looking Toward Pine Valley Mountain

By the late 1860's the citizens of St. George began feeling a strong need for more water. By now they were aware of abundant springs that broke from the base of Pine Valley mountain, 18 miles to the north. They began to search for ways to transport the water to town and even started a canal project. But a lack of technology and blasting powder soon halted the effort.

Meanwhile, they made do with their meager supply from the local springs. A city committee on Water Works and Water Rights was formed and city council meetings were dominated by the always ominous topic: Water.

Construction of the courthouse, tabernacle and temple occupied the time and attention of citizens for many years, but by 1890 the need for water development became supreme. If the city was expected to grow at all it would take water, much more than was presently available.

Anthony W. Ivins was elected mayor in 1890, and he moved quickly to find a way to bring water from the Cottonwood Spring at the base of Pine Valley Mountain. On September 6 of that year a committee recommended that water be diverted from the spring's stream at Richard Prince's ranch three miles down from its source. This would require a canal about two miles long and a tunnel 150 feet long, at a cost of \$2,000. Prince's water rights were bought for \$200 and a contract was let on November 22 to John E. Pace and Thomas P. Cottom for digging the tunnel, to be completed by February 1, 1891, for \$722.

The plan was to divert water into the wash flowing to the cotton factory in Washington. The water would be ample to supply a continuous flow for factory power, then be used by the grist mill, and later taken by canal to the St. George Valley to water everything south of the temple. The diversion was made, but the two miles of canal ran through a gypsum formation and would not carry water. The precious commodity, along with the developers' dreams, sank into the gypsum beds.

The Cottonwood Canal



Remains of the original Cottonwood Canal can still be seen near the road to Cottonwood Spring.

In 1896, Edward M. Brown was elected mayor. His councilmen included Brigham Jarvis, George T. Cottom, C.F. Foster, Samuel Miles, Jr. and John G. McQuarrie. Councilman Jarvis was very familiar with the springs at the base of Pine Valley Mountain. He believed a canal could be built to bring the water directly to St. George. Such a feat had been dreamed by many of St. Georges's leaders since the first days of settlement, but the reality of distance some 18 miles, and the rocky, steep terrain had awoken them from the dream each time. Yet this time, Jarvis was determined to spark the dream to life. Jarvis and a select committee set out to study a route for the canal. I. C. Macfarlane surveyed the route and work began soon thereafter.

City administrators assured the citizens that the good water from Cottonwood spring would arrive within two years. A Crew of townsmen went to work with high aspirations. They built a ditch that wound more than 15 miles down the rocky twisted slopes toward St. George. The canal hugged steep ridges, circled rocky knolls, and sprawled down the lava flats, mile after mile, to the city. Meager wages, paid in the form of water "scrip" (to be redeemed later), were promised to the men who dripped sweat and shed blood along every inch of the canal. But their pay came

mostly in the satisfaction of building a life line from the mountain to the town. And instead of two years, the project took more than seven.

A drive up the dirt road today reveals the remaining evidence of that incredible project. Visible remnants of the canal offer an idea of the amount of rock and earth that had to be moved, reminders of the strength exerted and pain suffered to complete the job.

In June of 1903, the canal was declared finished. Total cost of the project was put at \$14,010, with about \$4,000 provided as cash and supplies by the city, and approximately \$10,000 in labor which would be paid later with water "scrip."

Yet even upon completion the canal remained a continual challenge as cave-ins and washouts required the constant attention of workers. In wintertime during particularly cold stretches, men like William Brooks were hired to ride the ditch horseback and in places where it had frozen over, drag a log through it to keep the water flowing.

The canal reached the city at the Red Hill north of town where it settled in a pond before being diverted down the municipal ditches. The Cottonwood water was pure and delightful at its source, but once it had run the distance of the canal, it was not so palatable, and after rainstorms it arrived in town as a thick brown mixture.

City council minutes are also replete with complaints of sheep and cattle fouling the canal along its route to St. George. Stockmen were supposed to keep their animals away from the stream, but that was like trying to keep kids out of the candy jars at Judd's Store on Tabernacle Street.

1907: Time for a Pipe System

During the summer of 1907, a bond election was held in the city on whether or not to incur bonded indebtedness in the amount of \$10,500 to establish a water pipe system for the city. The election drew 94 voters, 89 of whom voted for the proposition, with just five opposing it. As a result, by 1909 the City of St. George had a head house at the upper end of Main Street and a wood-pipe system carrying water to many parts of town. A settling pond was constructed near the head house to allow silt to settle before water was conducted through the system. The settling system was fairly successful, although turn-of-the century residents always spoke of their taps after rain storms.



The "Hernia Dam," as it became known, was the key component in a reservoir that never was.

The paramount challenge remaining now was to figure a way to store large amounts of Cottonwood water so that it would be consistently available regardless of weather or condition of the canal. In a city council meeting during February of 1911, it was resolved that the city should take immediate steps to file on a reservoir site and secure it to commence construction at the earliest possible date. The site would be near Black Knolls, a few miles north of the head house on the Red Hill, and the estimated cost of building the dam came in at \$15,000. The project began sometime thereafter and continued for more than 20 years.

The dam, built with giant lava boulders is a monument to the work ethic and good intentions of the time, but the reservoir would not hold water and never served its intended purpose.

The First Water Meters

By 1912, most all of St. George's homes were served with piped water. During that year water meters began to be installed with the initial rate of 15 cents per 1,000 gallons. A "water rate collector" was assigned to read meters and collect fees at the end of each quarter. All of this brought an end to the need for a "Drinking Hour" in Utah's Dixie, and the ordinance requiring all diversions to be removed from ditches for one hour each morning was officially repealed on September 21, 1912. As far as water was concerned, this marked the end of the pioneer era in St. George.

1920: Time For Pipeline



Late in the 1920's the city began to replace its wood pipe system with a cast-iron system for distributing water to the various parts of the city. Citizens had recently approved a bond election to "extend and improve the present waterworks system and secure an additional water supply for the city." Voters agreed to the \$72,000 package by a vote of 115 to 29.

From the time the Cottonwood Canal began delivering water to St. George in 1903, until the early 1920's water had ran through the open ditch fully exposed to the elements. Sheep, cattle and wildlife constantly watered in and tromped across the canal. By 1920, the idea of piping the Cotton wood water had moved to near the top of the city's priority list. In October of 1920, the city council passed a resolution to hold a special bond election on whether or not the citizens would be willing to incur a bonded indebtedness of \$72,000 to "extend and improve the present waterworks system and secure an additional water supply for the city."

In spite of what was at the time an incredibly large amount of money, the next month citizens voted in favor of the proposal by a margin of 115 to 29. The next year \$45,000, in bonds was issued and construction commenced on four miles of eight inch cement pipeline beginning at the head house at the north end of St. George and extending north to the reservoir site at Black Knolls. The cement pipeline was built by and ingenious process sometimes referred to as the "bladder method" using inflatable tubes around which the cement was poured. Once the cement cured, the tubes were deflated, removed and used again. Remnants of the old cement pipeline built by this method can still be seen from the road as you drive along Sky line Drive on the Red Hill north of the city.

City Water Ordinance May 29, 1909

The annual rates for the supply of water from the St. George City Waterworks, to be paid semiannually in advance are hereby fixed and established as follows:

Baker	\$6.00
Barber Shop	\$6.00
Baths, public, first tub	\$6.00
• each additional tub	\$3.00
Bath tub in private house, each	\$1.00
Butcher Shop	\$6.00
Dancing Hall	\$6.00
Drug Store	\$6.00
Steam Boiler	\$10.00
Hose connections for gardens, lawns, per square yard	\$0.02
Hose connections for washing private vehicles, each vehicle	\$1.00
Hotel or boarding house; single tap	\$10.00
• each additional tap	\$0.50
• each bath tub	\$1.50
House or private residence; one tap	\$6.00
• each additional tap	\$0.50
• each water closet	\$1.50
Laundry	\$15.00
Livery Stable; for each stall or feeding place	\$0.75
Offices: banks, attorney, dentist, etc. each tap	\$6.00
Pool or Billiard room	\$6.00
Soda water fountain; for season	\$6.00
Store or shop	\$6.00
Corrals, each animal up to five	\$0.50
• each animal over five	\$0.35
Fire plugs or attachments for extinguishing fires	\$3.00
School or public building	\$10.00

Wood Pipe Replaced by Cast-Iron



Late in the 1920's the city began to replace the wood pipe system with a cast-iron system for distributing water from the head house to the various parts of the city. The project extended over seven or eight years and was financed with waterworks revenues. Pipe for the project originally came from plants as far away as Birmingham, Alabama. But with the advent of the Pacific States Cast Iron Pipe Company in Provo, Utah, St. George was able to obtain iron pipe at much reduced prices. In fact, according to city records, the first carload of pipe produced by the Provo Company was delivered to St. George.

In 1930, a gentleman by the name of J.S. Backett petitioned the city for the rights to drill wells in the St. George Valley. His intent was to discover a new water source beneath the city and share in any profits derived from the venture. The city council gave him the go-ahead, but after months of drilling and digging he gave up.

1936: Pipeline From Cottonwood

As the depression years of the 1930's rolled around, city leaders began looking to the federal government for help to convert the Cottonwood Canal entirely to pipe. In the city council meeting of June 19, 1931, William O. Bentley, representing the chamber of commerce, urged the city to take whatever measures necessary to pipe the stream, citing the health hazards and the water loss from seepage and evaporation. That same summer, Dr. Wilford Reichmann warned city leaders that a program of chlorination should begin immediately to reduce the health hazard of the municipal water supply.

The country's economy sank deeper into depression. President Roosevelt and congress countered by creating unique public works programs designed to put people to work and benefit cities and counties across America. In the summer of 1933, the City of St. George decided to test the program out itself by petitioning the National Public Works Administration (PWA) for help under provisions of the National Industrial Recovery Act. In order to get federal subsidization, the city had to obtain preference rights to lease all the Cottonwood water rights owned by private individuals. This took a great deal of effort and maneuvering by city leaders since local citizens owned considerable rights in the stream as a result of their labor on the original ditch and the ill-fated reservoir. With water rights finally in hand, the city entered into a contract with the PWA in 1935 to borrow from the Reconstruction Finance Corporation \$102,000 and receive a PWA grant for \$30,000, all of which would be used to complete the Cottonwood pipeline to its source at the foot of Pine Valley Mountain.

Work on the pipeline began in 1936, during the administration of Mayor Albert E. Miller. In the upper reaches of the line, where the slopes were steep and rough, steel pipe was used. In the lower areas where the terrain was more even, cement pipe was used. To complete the project it was necessary to use an additional \$13,000 from current waterworks funds, bringing the total cost of the project to nearly \$150,000.

The pipeline, in much the same manner as the original ditch, cost more in sweat and blood than it did in dollars.

Other, less-remembered contributors to the project were the teams of horses that dragged the pipe and carried the supplies. If it hadn't been for these unsung heroes, the pipeline could have never been built. Interestingly enough, even now in the 1990s, the city water department has to call on a pack horse once in a while to help carry materials to rebuild or overhaul springs at the base of Pine Valley Mountain.

At the completion of the pipeline project in midsummer of 1937, an official city celebration was held. The pipeline represented the culmination of a dream held by every previous administration since the pioneers entered the valley. The finished product was a source of pride for the entire community. St. George citizens could now boast that their water supply, which emanated from cold caverns on Pine Valley Mountain, did not see the light of day until it rushed forth from their taps in the valley. The health risk was now alleviated, and now that seepage and evaporation were no longer an issue, nearly twice the water was arriving in the valley than was arriving

before. What's more, the water was cool enough to actually be refreshing. And, because the Cottonwood stream was such quality water, St. George now had one of the finest culinary water sources found in the west.

Soon after the Cottonwood piping project was finished, R.E. Hart, who was the state director of PWA projects, commented that if the City of Los Angeles had piped its water as far per capita as did St. George, the Los Angeles pipeline would have extended from one coast of the continent to the other.

For years thereafter, the St. George City waterworks system was sufficient to serve the needs of the residents. By 1942, city water revenues were approximately 20,000 annually. By then the original bonds on the first two piping projects had been completely retired.

The Search For Water



The original Cottonwood Spring on the south side of Pine Valley Mountain was St. George's chief source of water for decades and still contributes significantly to the city's supply.

After talking over the culinary water system in 1944, the utility commission wasted no time in securing and developing new water sources. Several springs along the base of Pine Valley Mountain, in addition to the original Cottonwood Spring, had been developed and funneled into the Cottonwood pipeline. But in 1945, a major move was made to purchase rights to water at Blake and Gubler Ranch, a few miles to the west of the original Pine Valley Springs. Late in 1945, a contract was let to build a pipeline from springs at Blake and Gubler, along the base of the mountain, to connect with the Cottonwood pipeline. this added significant volume to the city's water system.

Bill Baker's Water Era Begins



Early view of the water tank on Skyline Drive. Note the Sugar Loaf at upper left.

R.C. Lund served as the city's water superintendent in 1943 and 1944. In May of 1945, William E. Baker was named to the post. Bill Baker's tenure on the water side paralleled Ken Parkinson's on the power side. Like Parkinson, Baker approached his responsibilities with a hands-on attitude. He took it upon himself to search out and develop the best water sources available, and when he came up with an idea, he would get the go-ahead from the commission, then go to work with his crew to make it happen. Baker's history with the city is one of discovery, development and delivery of water from Mill Creek north of Washington, to the Gunlock drainage on the west side of the county.

At the same time the power side was scrambling to develop more kilowatts, the water side was looking for more water volume. Although growth in the 40s and 50s was nothing like today, it was very significant at the time. If not for quick and effective moves by the commission and by Baker and his crew, the water supply would have never kept up with demand.

In 1948, the city built a 1 million gallon water storage tank on the Red Hill at the head of Fifth East. The tank not only became a major component in the municipal water system, but also added to the community's social scene. The tank was constructed with a railing around the top, and its wide, flat concrete roof became a popular outdoor dance floor. For years after its completion, the water tank was a favorite fun spot for Dixie-ites.

Turning to Mill Creek, and Controversy

By the mid 1950s, the water supply was looking rather bleak in St. George. City leaders turned toward Mill Creek, above the city of Washington, for new sources. The city began to purchase water rights from farmers in the Washington area. Contention began to simmer as some Washington citizens envisioned the City of St. George taking over their water. Water has always been a point of confrontation in the west, and St. George's water history is no exception. In fact, the dispute with Washington could probably trace its roots all the way back to the turn of the century when differences of opinion surfaced as to how and where the original Cottonwood water should be diverted.

Suffice it to say here that the Mill Creek controversy in the 1950s was settled through not-always amiable negotiations both in and out of court.

Though ongoing splinters of the debate continue to this day, St. George succeeded in developing several productive springs in the system, and ultimately piped the water to a 2 million gallon tank built on the Red Hill at the north end of Main Street.

More Springs Under the Mountain



Water superintendents Bill Baker and Glen Gubler have overseen the development of numerous springs such as this one in Slide Canyon at the base of Pine Valley Mountain. The springs still supply a significant

The Mill Creek water was critical in keeping St. George ahead of its needs. But from that time to the present, there has been no time for the water department to sit back and admire its

accomplishments. Year-to-year Bill Baker and his crew continued to develop new springs and overhaul existing springs beneath Pine Valley Mountain. By the late 1940s, numerous springs were feeding the Cottonwood pipeline from various canyons along the base of the mountain. East Fork, Cottonwood, Sullivan, and West Fork Canyons were the sites of the original springs. On the Blake and Gubler side to the west, Baker and Quaking Aspen, Slide Canyon, and Carter Springs. Each of these projects was a major undertaking, requiring crews to camp onsite for days at a time. In many cases, pack animals had to be used to transport cement and other supplies to the spring sites. Baker did most of the engineering on the drawing boards of his own mind. In the end, as always, the city was the recipient of a job well done, at a minimal cost. In 1966, Glen Gubler joined Bill Baker's crew and became a serious student of the city's water system. He would eventually replace Baker as a water superintendent, but not before paying his dues on the crew, building and maintaining springs, installing pipeline, figuring out new and better ways to get more water to the city.

Water System Approved

In August of 1962, St. George City's water system received a morale boost as the state department of health conducted a sanitary engineering survey and "approved" the city system. Such approval was very significant at the time because it was necessary for F.H.A. loans to be approved in the city, and because, at the time several companies were looking at St. George as a site for expansion. Having the state's official seal of approval on the water system was a definite feather in the city's cap.

At the time of the state's "approval," the city's water system was supplied by 32 springs spread seven miles along the base of Pine Valley Mountain. The water moved by gravity flow along, for the most part, the route of the original Cottonwood Canal and pipeline to a mixing station on the Red Hill north of town. At that point the water was mixed with water from the Mill Creek springs near Washington. The Mill Creek flow was furnished by some 46 different springs that had been cleaned out down to bedrock and connected into the system.

The Pine Valley and Mill Creek sources remained adequate into the mid 1960's. But the need for additional water grew more ominous with each passing year. The city staff and the water and power board put their heads together to come up with the best answer. All eyes pointed toward the Santa Clara River, and, more specifically, the Gunlock drainage area.

Gunlock



Reed Mathis, Governor Calvin Rampton, and Rudger McArthur, sign Gunlock Reservoir contract.

For several years the federal government had been considering possible water developments in southern Utah under the name of "The Dixie Project." Part of what they studied was the possibility of building a dam on the Santa Clara River below Gunlock. Federal engineers had placed a price tag on the dam project at about \$9 million. When, for complex reasons, the federal government dropped that segment of the project, the City of St. George jumped right on it. The St. George Water and Power Board believed it was a good idea to build a dam on the Santa Clara River below Gunlock. If the federal government didn't want to do it, they would give it a go themselves.

They were given little chance for success by state water officials, but city leaders pushed forward by first petitioning for and receiving the green light from the state, from Fish and Game from the Forest Service, and from the Bureau of Land Management. Jay Bingham was retained by the city as project engineer for the Lower Gunlock Reservoir. Bingham became a driving force in moving the proposal along. He helped get permits cleared and the funds secured, and worked closely with Governor Calvin Rampton for state assistance. A major obstacle in the process was getting the blessing of, and funding from, the Bureau of Reclamation in Washington, D.C. Shirl Pitchforth of the water and power board traveled to Washington and met first with Senator Wallace Bennett. The senator put him in contact with the right people in the Bureau of Reclamation, who told him point blank the whole thing was impossible. But by the time Pitchforth got home, the Bureau of Reclamation had approved the project and put up \$300,000 toward it.

Construction on the Gunlock Reservoir began on January 8, 1970. The Reservoir was officially dedicated on Nov. 21, 1970. The City of St. George built the project, which is now administered by the Lower Gunlock Reservoir Corporation, for about \$1 million. Plans for the original Bureau of Reclamation project, which carried a \$9 million price tag, had called for a much larger reservoir, with a dam 12 feet higher than the one the city ultimately built.

The Gunlock Reservoir itself does not supply culinary water. After completion of the reservoir the city studied and made plans to build a treatment plant and pipe reservoir water to St. George, but the plans never materialized as studies showed the annual yield was too low for such a project. While the reservoir serves as irrigation storage for farmers downstream, and as an important recreation resource for the area, its benefit to users of St. George culinary water is less direct. It is believed that the reservoir helps keep deep sandstone aquifers downstream charged with water and the city owns six wells just a few hundred yards downstream from the dam.

In the end, it was the wells the water department drilled along the Gunlock drainage that benefitted the city most. Drilling actually began on some Wells long the Gunlock drainage in 1964-65. Soon after construction began on the dam more drilling occurred. With three plentiful wells producing more than 4 million gallons a day, a 14 mile pipeline, 18 inches in diameter, was installed. The pipeline connected the Gunlock water to a 1.7 million gallon storage tank - the green tank on the north point of the black ridge at Bluff and Sunset Boulevard.

Today, eight plentiful wells are pumping along the Santa Clara River Below Gunlock Dam, sending in excess of 7 million gallons of water a day to thirsty St. George residents.

Growth, Growth, and More Growth

The Gunlock project helped push St. George into the 1970s. But when it came to growth, the city hadn't seen anything yet. At the turn of the decade a company called Terracor began marketing St. George, and more specifically the country club community of Bloomington, all over the United States. This was the catalyst that finally put St. George on the map.

All through the 70s the city grew at a rapid pace. The community's water taps were fed by 7 million gallons of water a day from Gunlock, 1.5 million gallons a day from Millcreek, and about 5 million gallons a day from Pine Valley Mountain. In spite of it all, the city desperately needed more water. Glen Gubler took over the reins as superintendent of the water department in 1972. By 1974, the city had become adept at the science of drilling wells. Two new wells were put in along City Creek, northeast of St. George. Together these wells delivered about 2 million gallons a day.

A 2 million gallon storage tank, which the City Creek wells feed, was built in the industrial park north east of the city. Glen Gubler and his crew were staying one jump ahead in the water game.

Drought Turns Eyes Toward Snow Canyon



Each of these 3 million gallon, concrete tanks lies level with the landscape in Snow Canyon.

Then came the drought of 1977. A significant drought. A drought that nearly brought the city to its knees. That summer the city actually asked residents to volunteer to cut back on water use. Rudger McArthur, the water and power board, and Glen Gubler and his crew were on constant alert. "We never reached the point of having to ration," remembers Gubler. "But we came awful close."

The summer of 1977 caused water officials to do a lot of soul searching, but the most important thing it did was turn their sights toward Snow Canyon. There, several hundred feet below the ground, in aquifers between the Navaho and Kayenta rock formations, they hoped to find the answer to St. George's water problems.

Dr. Harry Goode of the University of Utah visited Snow Canyon with city water officials in the mid 1970s. Based on the geology he saw, he assured them there would be water if they were willing to drill for it. Bob Cardova of the U.S. Geological Survey was also positive about the prospect of finding an abundant source of water beneath the floor of the canyon.

Rudger McArthur, along with Glen Gubler and Scott Prisbrey, later canvassed the entire upper Snow Canyon area, and all agreed on a drilling spot up the Park's West Canyon. The water, according to geologists, would be stored in aquifers within the contact zone between the Navaho and Kayenta rock formations. They convinced the water and power board to appropriate \$10,000 to drill a well, and the firm of Creamer and Noble was hired to engineer the project. Sure enough, they hit water - a pure, sufficient flow - not very many feet from the spot where city officials had originally estimated it would be.

City leaders felt fortunate to be able to tap a water resource within the limits of a state park. At the time, circumstances being what they were, and through astute negotiations by the water and power board and water department staff, all the bureaucratic hurdles were jumped. In the city's favor was the fact that officials of Snow Canyon State Park badly needed a water supply for park

use. Part of the agreement with the State Parks Division was that the project would deliver water to the park.

The water development in Snow Canyon was achieved through a compact with the towns of Santa Clara and Ivins. All three municipalities participated in the project, and all three have benefitted from the water supply. Recently, Santa Clara has augmented its supply by installing its own well in Snow Canyon.

The Snow Canyon system now has five wells (not including the new Santa Clara well) which supply two giant underground storage tanks. Each of those tanks whose vast flat concrete tops lay level with the landscape in West Canyon, hold 3 million gallons. At a nominal investment of \$3 million, St. George gets 3 million gallons of water a day from Snow Canyon.

The Snow Canyon water, drawn from depths of 700 to 1,000 feet, is some of the finest culinary water found anywhere in the United States.

Wayne McArthur Takes the Helm



Wayne McArthur, water & power director.

In 1985, another era in St. George's water and power history ended with the retirement of Ruder McArthur as director. It was only by coincidence that another man with the surname McArthur, distantly related to Ruder, is a St. George native, having graduated from and served as student-body president of both Dixie High School and Dixie College. He earned a civil and environmental engineering degree at Utah State University and earned his MBA at BYU. At the time of his appointment as St. George utilities director, Wayne had already spent 10 years as an engineer and manager for Exxon Company USA in Memphis, Tennessee, Little Rock, Arkansas, Baton Rouge, Louisiana, and Houston, Texas.

Wayne McArthur took the helm as water and power director in March of 1985, at the height of the city's growth boom. In 1985 alone, permits for 1,718 building units were issued by the city. This significant rise came mostly as a result of an increase in power and water impact fees which

city leaders felt was long overdue. Developers who were planning projects hurried to beat the deadline before the fee hike took effect. By the time the decade was finished, the city had literally doubled in size—from just over 13,000 in 1980, to 28,500 in 1990.

Due to drought and incredible growth, the city was inching dangerously close to water shortages, and was also in the middle of a heated, expensive battle with the state Public Utilities Commission on where a new power line would run, and who would build it. Power use was nipping on the edge of supply.

Among considerable other projects, Wayne McArthur began immediately to get involved in two major undertakings, one in water, and one in power, which would greatly help stabilize the city utilities situation. On the power side, it was a new diesel plant on the Red Hill north of the city, and doubling the size of the Parkinson Substation. On the water side, it was the planning and negotiating of St. George's involvement in the Quail Creek Reservoir project.



During the 1980's, St. George's population doubled from 13,146 in 1980, to 28,502 in 1990.

Quail Creek Reservoir



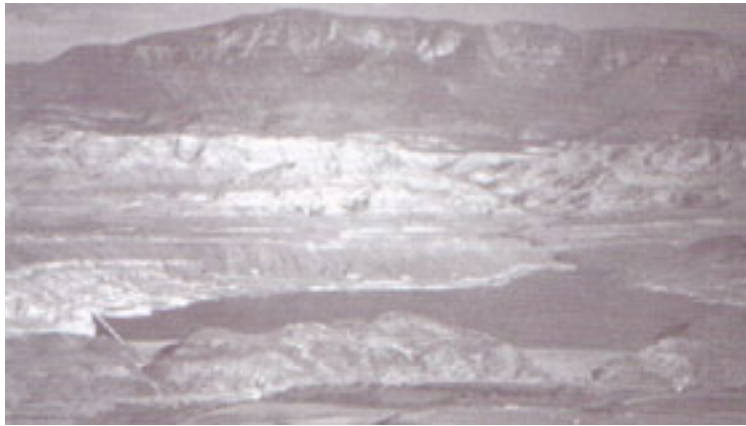
Quail Creek Water Treatment Plant, now a 20 MGD facility.

Anticipating the tremendous growth southern Utah would experience by the turn of the century, the Washington County Water Conservancy District conceptualized, designed, engineered and built the Quail Creek Reservoir project during the 1980s. The County Conservancy District was an outgrowth of the Dixie Project which was abandoned in the 1960's. The Quail Creek project was the district's first to move from planning board to reality. With an affirmative vote of 89 percent, the residents of Washington County approved funding the project at a cost of \$20 million. Planning for Quail Creek began in 1982. The project would ultimately include a diversion dam upstream on the Virgin River, an underground pipeline feeding the reservoir from the diversion site, hydro-electric plants on the pipeline, and a storage reservoir of over 40,000 acre feet. By the spring of 1986, the reservoir was half full and the facility was in full use by 1987.

The City of St. George viewed Quail Creek as a \$20 million water project with no customers. It was obvious that the city should be a prime user of Quail Creek water. The question was how much water, and what the cost would be. Part of Wayne McArthur's initiation was involvement in negotiations between the city and the County Water Conservancy District. The city didn't feel it should have to pay for water from the project, since its citizens had already been taxed to build it. In the end, the City of St. George contracted to lease 10,000 acre feet of water from Quail Creek on a 50 year agreement, with an option to buy. Such a commitment required the city to begin planning a water treatment plant, something new for a community which had for more than a century obtained its water from pure underground sources.

These negotiations occurred during the summer of 1985 at a time when St. George was suffering possibly its worst water shortage ever. McArthur was anxious to get ahead of the ball game. The Quail Creek water would virtually double the city's water resources. At the time, the city wasn't even using 10,000 acre feet. but utility leaders felt it was time to move from a history of multiple wells and springs to a more "sure," "manageable," "firm," water supply. As McArthur characterized it: you can "see" what's there when you're dealing with surface water. The city as since then exercised its options and purchased its share of Quail Creek water.

In-house Engineer



Quail Lake as it appeared in the spring of 1991.
Photo by Murdock Aero Photo.

About the time the city was diving into plans to build its first water treatment plant, a significant move was made to hire the water and power department's first in-house engineer. Phillip Solomon, a civil engineering graduate of the University of Utah, joined the department in November of 1985. Originally from Salt Lake City, he moved his family to St. George after working as a civil structural engineer with Bechtel National in San Francisco.

Among other projects, Solomon got his feet wet in the department by helping engineer the water treatment plant at Quail Creek. Design of the treatment plant began in 1986.

Originally the water outlet in the dike had been placed at the bottom of the reservoir. In order for the concept to work, multiple-level outlets would have to be built. It took 45 days to go back and cut the new outlets into the dike

As plans continued, the city made an important decision to feed the treatment plant with a split stream, part coming from the reservoir, and part coming through a bypass line directly from the Virgin River. This was done to reduce the hardness of the water going through the plant, since the hardness of the water coming directly out of the reservoir would have required a much more expensive plant to treat. But a side benefit of the plan came a few years later when, on New Year's Day of 1989, the Quail Lake Dike collapsed, rendering the reservoir useless for several months. In spite of the flood, the city treatment plant, which began operation in July of 1989, was still able to process water from the bypass line and keep the city supplied with water.

The ensuing flood from the Quail Lake dike failure was one of the worst disasters in southern Utah history, causing more than \$12 million in damage, yet, miraculously, no lives were lost.

The city's culinary water treatment plant was officially dedicated on December 1, 1989. The city bonded in the amount of \$15 million at an interest rate of 5.5 percent to build it. Of the total,

approximately \$9 million went to build the plant, and \$6 million built the 14-mile, 36-inch pipeline which delivers the treated water to the city. The 36-inch line is twice the size of the city's next largest pipeline, an 18-inch line running from Gunlock.

The Quail Creek treatment plant, managed by Superintendent David Friess, had the potential of delivering 10 million gallons of water a day to St. George. Presently, the source supplies water to sections of the city south of 700 South, delivering from 8 to 9 million gallons a day.

Moving to a surface water source was a significant step for St. George. For the first time the city had to gain state treatment certification.

During this period, a 2.5 million gallon storage tank was built at Bloomington Hills to complement an existing 1.3 million gallon tank. These, combined with a 1 million gallon tank at Bloomington Country Club, as well as the other existing tanks, put the city's culinary water storage capacity at 26 million gallons.