STAR VALLEY RANCH ASSOCIATION

Water System Master Plan

November 1996

Jorgensen Engineering and Land Surveying, P.C.

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and
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November 15, 1996

Mr. Chuck Gibbons, Chairman
Star Valley Ranch Association
P.O. Box 159
Thayne, Wyoming 83127

Re: Water System Master Plan

Dear Chuck:

Jorgensen Engineering is pleased to present this Water System Master Plan to the Star Valley Ranch Association. The master plan will guide future improvements to the water system, and help to ensure a safe, adequate, and reliable water supply.

Many of the recommended improvements are linked to the amount of water used at Star Valley Ranch. The number of new supply wells, the need for replacement of undersized distribution pipes, the size of a third storage tank, and the timing of these improvements are all based on the conservative assumption that per capita water usage will not decrease. To the extent that SVRA can reduce per capita usage, some of these improvements might be deferred or eliminated. In order to guide decision making, it is very important that SVRA continue to meter water usage, and check per capita usage each year. Water conservation measures are discussed in Chapter 5.

We believe the most important capital projects next year are to get the Airstrip well operational, upgrade the zeroing boxes and pipeline creek crossings, install air relief valves, reset PRV pressures, and begin a hydrogeological study of future well sites. We should begin detailed design and preparation of plans and specifications by February, 1997, in order to construct these projects next summer. Other important actions which should be completed include executing the separation agreement with Leisure Valley, Inc., formation of an Improvement and Service District, and securing funding for the capital projects.

It has been a pleasure working with everyone at Star Valley Ranch Association. I particularly want to thank you and the Board of Directors, also Helen and Bobbi, and especially Bart Barge, Bob Carmine, and Roger Cox. I look forward to helping SVRA implement this plan.

Sincerely,

JORGENSEN ENGINEERING AND LAND SURVEYING, P.C.

Steve Wonacott

Steve Wonacott, P.E.
Project Manager

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EXECUTIVE SUMMARY

This section summarizes the Star Valley Ranch Water System Master Plan, for the reader who needs a brief overview of the existing conditions and recommended program.

INTRODUCTION, STUDY OBJECTIVES, AND SCOPE OF WORK

Star Valley Ranch (SVR), located in Lincoln County, Wyoming, consists of 2,032 platted homesites averaging approximately 1/2-acre in size, and associated recreational facilities including golf courses. Leisure Valley, Inc. (LVI) began development of SVR and construction of the culinary water system in about 1970. The homeowner's association, Star Valley Ranch Association (SVRA), currently owns the majority of the water system and is also responsible to operate and maintain the system. Approximately 470 homes have been built to date.

Over the years, the system has experienced problems with excessive leakage, low pressures, and occasional water shortages. SVRA recognized the need for and benefits of a Water System Master Plan, and in November 1995 retained Jorgensen Engineering and Land Surveying, P.C. to conduct the necessary studies and prepare the Master Plan.

One of the key objectives is a phased program which can be implemented as growth occurs, is affordable on an annual basis (pay as you go), and which addresses the most pressing needs first. The overall objective is to ensure a safe, adequate, reliable, and economical water supply.

The scope of work includes the following tasks:

Task	Description
1	Project Management
2	Define Service Area, Population, Water Usage
3	Inventory Existing Supply and System
4	Identify Future Needs
5	Develop and Evaluate Alternatives
6	Recommended Plan
7	Prepare Report

BACKGROUND DATA

Background data includes service area boundary, population projections, water usage records and projected demand, and water quality.

Service Area Boundary

The water service area boundary is defined to include the approved plats (2,032 residential lots), and the SVRA common facilities located within the plats (offices, clubhouse, pools, cook shack, pro shop, Silo restaurant and lounge, maintenance shop, and restrooms/showers, and miscellaneous other).

Population Projections

On August 18, 1996, SVRA conducted a population census at SVR, which yielded an estimated SVRA population of 1,541 people, or 3.3 persons per home. The summer population projected at build-out of SVRA, based on 2,032 homes, 3.3 persons per home, and an 80 percent occupancy factor is projected to be 5,364 people.

Since 1990, the annual rate of home building has been in the range of 7 to 9 percent per year. Based on this recent growth rate, buildout would occur between 15 and 25 years from now. At a 7 percent growth rate, the number of homes would double, to approximately 1,000 homes, by the year 2007.

Water Usage Records

Flow meters were installed during the spring of 1996 in each of the supply mains, and at major points of use. Meter locations were selected to account for all water entering, and the major points of use, within the SVRA system. All irrigation connections to the culinary system were closed or disconnected.

Records for the period August 12 through August 25, 1996, were studied. After accounting for other uses, and allowing for leakage, the homeowners used an average of 1,051,526 gpd. Based on 467 homes currently built, this works out to an average usage during this period of 2,252 gpd per home. Assuming all homes were occupied with 3.3 persons per home, this is equivalent to an average usage during this period of 682 gallons per capita per day (gpcd).

Because the SVRA population presumably fluctuated daily, but the number of homes built (467) was constant during the August 12 to 25 period of record, it is reasonable to project future water usage on a per home rather than a per person basis. Daily usage during this period ranged from 2,100 to 2,400 gpd per home. For planning purposes, 2,300 gpd per home is selected as a maximum day value.

Water Demand Projections

Based on past usage, maximum day water demand at buildout conditions is projected to be 4.1 mgd. This is the total amount of water that the water supply must be capable of providing on any given day during peak summer occupancy at buildout.

Water Quality

With more than 15 service connections and service to more than 25 year-round residents, the SVR water system is classified as a public, community water system and is regulated under the Safe Drinking Water Act (SDWA). The SDWA specifies maximum contaminant levels, monitoring frequency, and sampling locations for primary drinking water contaminants regulated under the SDWA. We have reviewed available laboratory analyses and reports for SVR water. All of the parameters appeared to be well within SDWA-specified maximum contaminant levels.

The only water quality concern of which we are aware is the potential for the Green Canyon and/or Prater Canyon spring sources to be under the direct influence of surface water, and thus not be true groundwater sources. Some limited particulate testing has been done, but the results were inconclusive.

EXISTING SUPPLY AND SYSTEM INVENTORY

Charles V. King of Salt Lake City was the engineer who designed the SVR water system. His involvement with the water system ended in the early 1990's. Reference is made to his drawings and reports in this section.

System Description

The water system consists of two developed spring sources, known as Prater Canyon spring and Green Canyon spring (also referred to as Stewart spring); a transmission pipeline, flow meters and storage tank associated with each spring; distribution piping (including a high pressure interconnect pipe between the two sources); and various pressure control and air relief valves. Two new supply wells were recently completed, but are not yet integrated operationally with the existing system. The water system is shown on Figure 1 (found in a pocket at the back of this report).

Because of the extreme topographical relief, the distribution system is divided into many pressure zones, and pressure reducing valves (PRV) are located throughout the system to maintain pressures within reasonable limits. The two new supply wells are connected directly to the distribution system.

Spring Development

The Prater Canyon spring was developed as a water source in about 1972. Although we are not sure how the spring area is sealed or protected against contamination, some concrete has been poured on the ground surface around the boxes.

The Green Canyon spring (also known as Stewart springs) was developed in about 1985. Records show a 40-mil PVC sheet laid over the spring area, and covered with 18 inches of earth fill.

Based on visual inspections of the two springs, it appears that the Prater Canyon spring may capture a higher-quality water, and would be less likely to come under the direct influence of surface water. The Green Canyon spring appears to have a greater potential to come under the direct influence of surface water.

Spring Flows

Flow meter records for the springs have been kept since October 1986. During the ten years of record, the Prater Canyon meter has indicated a flow generally in the range of 100 to 500 gpm. The Green Canyon meter has indicated a flow generally in the range of 150 to 1,200 gpm. Water production from the springs varies seasonally, and is highest during June through September, and lowest in February and March. Fortunately, the period of highest spring flow coincides with the period of greatest water demand. The flow from the springs also varies from year to year, depending on the antecedent precipitation conditions and the amount of groundwater recharge.

The average total spring production during August 1987 was 730 gpm and represents the lowest average August flow for the ten year period of record. This is equivalent to approximately 1.05 mgd.

Transmission Pipelines

Each of the two springs is connected to the water system via its own transmission pipeline. The Green Canyon pipeline was constructed in 1985 and consists of 7,200 feet of 6-inch PVC pipe. The Prater Canyon pipeline was constructed in 1970 and consists of 4,800 feet of 6-inch steel pipe. Both pipelines have sufficient capacity to carry the available spring flows.

The Prater pipeline is very shallow, and exposed in many places. It is reported that neither pipe is properly bedded. Instead, apparently the pipes were laid in the trench, which was then backfilled with whatever material came out of the trench. During repairs, large cobbles and rocks are often found in contact with the pipe, which can damage the pipe.

"Zeroing boxes" are located on each pipeline. The zeroing boxes serve to control pipeline pressures to an acceptable limit. These zeroing boxes are a source of air entrainment and potential contamination.

Storage Tanks

A storage tank is associated with each spring and transmission pipeline. Both tanks are reinforced concrete. The 400,000 gallon Green Canyon tank was built in 1985. The 175,000 gallon Prater Canyon tank was built in 1977. Both tanks appear to be in good physical condition. A leak test should be run to confirm that there are no major leaks from the tanks.

Distribution System and Appurtenances

The distribution system delivers water from the storage tanks and transmission pipelines to all points of use. The specifications prepared by Charles King which we reviewed required PVC pipe conforming to the American Water Works Association (AWWA) C-900 standard, Class 150 or 200, with push-on joints.

During construction, steel pipe was, unfortunately, often substituted for the specified PVC pipe. The steel pipe is very susceptible to corrosion and leakage. Over the years, some of this pipe was replaced as its shortcomings became obvious. According to our estimate, currently about 20 percent of the system or 33,000 feet consists of steel pipe.

The King specifications required concrete thrust blocks at fittings, proper pipe bedding and backfill, and a minimum cover of 54 to 60 inches. These requirements were often not followed during construction. Thrust blocks are rarely encountered during repair excavations. It is reported that the pipe is generally improperly bedded. During repairs, large cobbles and rocks are often found in contact with the pipe. It is reported that the depth of cover generally averages about 48 inches, and is sometimes as little as 36 inches.

All of these deviations from the engineer's specifications now contribute to the pipe cracking, leakage, failure, and freezing problems which are experienced at SVR.

Pressure Reducing Valves. The water system was designed with PRV's throughout the system. The King specifications required that they be installed in vaults, with bypass piping, valves, and pressure gauges or gauge connections. The vaults were required to be either sections of concrete pipe, corrugated pipe, or timber boxes.

Today, many of the PRV stations are unsatisfactory. Apparently, the engineer's design was not always followed. Many are unsanitary or unsafe, are missing bypass pipes, have missing or inoperable valves, and missing gauges. Most, if not all, of the PRV stations will need to be upgraded or replaced.

Gate Valves. Gate valves found in the system are reported to be generally satisfactory. There appear to be a sufficient number of valves at appropriate locations for maintenance operations.

Air Relief Valves. Air relief valves (ARV) automatically vent accumulated air. Today, a few air relief valves are installed, but more are required. They should be installed at all system

high points. This is particularly important since the water contains a considerable amount of entrained air.

Blow-Offs. Blow offs allow stagnant water and/or accumulated sediment to be periodically flushed from the system. Blow-offs have generally been installed at most dead-ends.

Services. It is reported that many of the early services to individual homes are galvanized pipe. Stop and waste valves were initially provided on services. Beginning in the 1980's, services were constructed of copper pipe, which is the practice today. Stop and waste valves are no longer used, as they are a potential cross-connection and source of contamination. The galvanized services are prone to corrosion and early failure. These will eventually need to be replaced.

Water Supply Wells

Two supply wells were completed within the last several years at SVR. One well, known as Airstrip Well #1, is owned by SVRA. The other, known as RV Park #1, is owned by LVI. The LVI well will be disconnected from the system once SVRA and LVI execute the separation agreement.

The Airstrip Well #1 total depth is 545 feet, with static water at 187 feet. The well was pump tested at 690 gpm for 37 hours with a drawdown of 14 feet. The current 50 hp pump delivers about 225 gpm into the distribution system.

The well pump is currently operated manually. That is, there is no control system provided which would operate the pump based on tank level, system pressure, or otherwise. Some type of automatic control system must be provided if this well is to be integrated with daily operation of the water system.

Distribution System Modeling

The entire existing water distribution system was modeled using the Waterworks Version 1.2 computer program by Synex Systems. The system model includes all piping, water main connections, transmission lines, storage tanks, and pressure reducing valves used in the current system.

The purpose of the modeling effort is not only to analyze and trouble shoot the existing system, but to predict and solve problems created by future development. Our approach was to first model a few simple modifications which could improve the existing system. Then different scenarios of increasing water demand based on 50 percent, 75 percent, and 100 percent build-out were run with the model.

Case 1: August 1996 Water Demand - Existing System - Current Conditions. The resulting pressures were all above 30 psi. Some nodes located at lower elevations within a pressure zones experienced excessive pressures, as high as 178 psi. This may be related to the

locations and settings of the PRVs. It was found that it was impossible for the PRV 12 (Vista East Dr.- Lower) to operate properly, presumably because of it's location just upstream from a connection to the 8-inch main from the Green Canyon tank. With PRV 12 open, water was allowed to be directed away from the higher Prater tank area to the lower Green Canyon tank area at a high flow rate. This may be one reason that the Prater side of the system is currently experiencing low pressure problems and water shortage during peak demand periods.

Case 2: August 1996 Water Demand - Existing System - Modified Conditions. Based on the results of Case 1, the model was modified slightly attempting to improve system performance. All valves within each pressure zone were opened to provide increased looping. Problem PRV12 was replaced with a closed gate valve effectively separating the Prater Canyon system from the Green Canyon tank. Most of the PRVs were set at lower pressures attempting to reduce excessive pressures at low points in each pressure zone.

Pressures in Plats 7 and 8 of the Prater Canyon system improved significantly. In addition, water from the Green Canyon spring source helped supply the Prater tank through the interconnect pipe. Opening all gate valves within pressure zones also helped improve pressures. Only one valve was required to remain closed and is located between Zones 1 and 2 . Setting the existing PRVs at lower pressure helped relieve points of excessive pressure.

Case 3: 50 Percent Build-Out Water Demand - Existing System - Modified Conditions. For this scenario the same system configuration and conditions as Case 2 were used with no further improvements. Water usage was set at peak hourly demand for a 50 percent build-out condition. Unlike the water demand for Case 1 and Case 2, where the current development of each plat varies widely, this case assumes that each plat is equally developed, with a home built on one half of the lots within Star Valley Ranch.

Pressure problems developed in the upper nodes of Plats 1 and 15, apparently caused by the high head loss in the 2, 3, and 4-inch water mains supplying theses areas. Plats 1, 2, 3, 15, 20 ,and 22 are all supplied by only one continuous water main that starts at the Prater tank as a 6-inch steel main and then goes to 4-inch PVC at the connection between Plat 15 and 1. High pipe friction is starting to become a problem as demand increases in these plats. Replacing the existing water mains with larger diameter PVC pipe and adding new mains for looping will increase pressure in these areas.

Case 4: 75 Percent Build-Out Water Demand - Existing System - Modified Conditions. For this scenario, we used the same system configuration and conditions as Case 2 and 3. Water usage was set at peak hourly demand for a 75 percent build-out condition. Again, each plat was assumed equally developed.

With this water demand, all of Plat 1, most of Plat 15, parts of Plats 3 and 20 experienced pressure problems. The upper end of Plat 8 showed some pressures lower than 35 psi, apparently caused by high pipe friction in the 4 and 2-inch mains in this area. The entire remaining ranch is starting to feel the effects of high head loss in the undersized water mains. Eight of the PRVs are now wide open.

Case 5: 100 Percent Build-Out Water Demand - Existing System - Modified Conditions. For this 100 percent build-out situation it is assumed that Star Valley Ranch is fully developed. The water usage is set at the peak hourly demand and the system is the same as in Cases 2, 3, and 4.

The high demand and increased pipe friction results in wide spread system failure with pressures falling dramatically over most of the development. All of Plats 1, 2, 3, and 15 experience severe pressure loss. In Plats 7 and 8 pressures drop to below 25 psi at the upper nodes. Plats 9, 10, 11, 12, 13, 14, 17, and 18 in the Green Canyon system are also experiencing pressures as low as 20 psi with even lower pressures likely at points of high elevation. The low lying Plats 4, 5, and 21 are maintaining pressure due to their elevation. Plats 20 and 22 are also maintaining pressure because of the combined effect of their low elevation and proximity to the Prater tank. Most of the problem areas would show adequate improvement with the replacement of some of the small diameter water mains with new larger diameter PVC mains at specific locations.

NEEDS AND ALTERNATIVES

This section identifies the planning period, design criteria, service extensions, and system needs and recommended improvements.

Planning Period

This report is based on a 20-year planning period, and that buildout will occur at the end of the 20-year planning period.

Design Criteria

All system upgrades as a minimum must comply with Wyoming DEQ Water Quality Rules and Regulations. New sources must be developed in accordance with the requirements of the Wyoming State Engineer's Office.

Service Extensions

No service extensions are planned or anticipated beyond the limits of the current SVR plats.

System Needs and Recommended Improvements

An increased water supply, and other system improvements, are necessary in order to continue to provide an adequate, reliable water supply to SVRA residents. Some improvements, such as replacing all steel pipe, should be made as soon as funds are available. Other improvements, such as additional water supply wells and larger distribution pipes, will not be

required until a certain number of homes are built on the ranch, and water demand reaches a certain level.

Water Supply Wells. Until automatic controls are installed at the Airstrip No.1 well, only the flow from the two springs can be considered as a firm, reliable source. The first priority is to fit the Airstrip No. 1 well with automatic controls tied to Green Canyon tank level. This should be done immediately. This would increase the reliable supply to 1.35 mgd. Based on August 1996 usage of approximately 2,300 gpd per home, approximately 600 homes could then be served even during a drought year.

When approximately 550 homes are built on the ranch, a larger pump (600 gpm) should be installed in the Airstrip No. 1 well. This would increase the firm water supply to 1.90 mgd, sufficient to serve 850 homes.

A new well should be constructed prior to reaching 850 homes. Ultimately, if per capita water usage is not reduced, four to six new wells may be required. A third storage tank located near Cedar Canyon will be needed at about 50 percent buildout. Consider the water system then as having three divisions: Prater Canyon, Green Canyon (served by wells located at the airstrip), and Cedar Canyon. We recommend that each division have its own storage tank and wells. Under this scenario, two wells and a tank would serve the Prater Canyon area, and so on for the Green Canyon area and Cedar canyon area, for a total of three tanks and six wells which may ultimately be included in the system. Each pair of wells should be controlled by its respective storage tank level, via a telemetry system.

Proposed well locations are shown on the water system map, Figure 1. Based on available data, we believe that it will be possible to develop wells capable of producing at least 300 gpm in one or more of these locations. The proposed well sites must be reviewed and the best site(s) confirmed by a hydrogeological study prior to drilling. This hydrogeologic study should be completed within the next year or two.

Based on historic homeowner usage, each new 300 gpm well would be capable of serving 180 to 200 additional homes. Flow meter records and the pace of home building should be monitored and the timing of the new wells adjusted to reflect changed conditions. For example, replacement of the steel pipe in the distribution system will eliminare leaks and thus reduce the average water consumption, thereby allowing construction of new wells to be deferred. Or the rate of growth could increase, requiring accelerated well construction.

SVRA should begin investigating the availability of sites or easements in the vicinity of the proposed well locations, and acquire the sites or easements in advance of the need for well construction. We understand lots 11 through 14 and 85, Plat 17, are owned by SVRA. These could be potential well sites, subject to further hydrogeologic investigation.

Springs. It does not appear that any improvements to the spring collection areas are warranted at this time. However, either spring has the potential to be come under the direct influence of surface water during parts of the year. We recommend that SVRA begin a regular particulate

testing program for each of the springs, and collect data for several years. This data will be useful in the near future to guide decision making. Also, SVRA should endeavor to reach an agreement with LVI with respect to the spring water rights. We recommend that these water rights, to the extent necessary, be transferred to SVRA in their entirety.

Transmission Pipelines. The transmission pipelines are a critical element of the SVRA water system. A break in either of these pipelines would curtail the flow of water from the respective spring. The Green Canyon pipeline is the more important of the two, because it generally carries three times the water carried by the Prater Canyon pipeline.

If the Prater spring is to remain in service as a source of culinary water, then the entire length of the 25-year old, steel pipeline should be replaced with a properly installed PVC pipe. This decision should be made in about five years, after the particulate data is collected. It would probably be less expensive to drill a new well and abandon the Prater spring as a source of drinking water. A new 300 gpm well would make up for the water typically supplied by Prater Canyon in the month of August.

The Green Canyon pipeline is only 10 years old, is constructed of corrosion-resistant PVC, and delivers three times the water of Prater pipeline during the critical month of August. We recommend that the Green Canyon spring and pipeline continue in service.

All three of the zeroing boxes (one on Prater pipeline and two on Green) should be replaced with boxes of improved design as soon as possible. The existing boxes are a source of air and contamination, and overflow from these boxes wastes water.

Storage Tanks. The existing storage tanks are in satisfactory condition and should remain serviceable for many years. However, a third additional storage tank will be needed in the future. Based on DEQ regulations which require storage equal to 25 percent of maximum daily demand, and assuming the ultimate maximum day usage falls in the range of 3 to 4 mgd, the capacity of the third tank would need to be in the range of 175,000 to 425,000 gallons. Total system storage capacity would then be in the range of 750,000 to 1 million gallons.

The new tank should be constructed when the maximum day demand exceeds about 2.3 mgd. This is projected to occur when approximately 1,000 homes are constructed, which, based on recent growth rates, will occur in eight to ten years.

The tank will serve the south end of the ranch, and will need to be located on the hill on the east side of the ranch, preferably near Cedar Canyon. It should be located at least as high as the elevation of Green Canyon tank, or EL 6500 feet. Several lots in Plat 17, and possibly Plat 13, meet this criteria. SVRA should begin to investigate the possibility of purchasing one of these lots for a future storage tank site.

Distribution System. The following system upgrade recommendations are based on the distribution system computer modeling effort and the age and material of the existing water mains.

Prior to the 1997 summer season, replace PRV 12 with a gate valve allowing the Prater system and Green Canyon system to be separated at this point. Set specific PRVs to lower pressures to reduce excessive pressures at low points.

Before 50 percent build-out, replace all steel water mains, or approximately 33,000 feet. This should be accomplished within the next seven years at an approximate rate of 5000 feet of steel pipe replaced per year. In addition to increasing pressures in problem areas this will do much to reduce leakage, possible contamination, and maintenance. The long term result will be less water needed and possibly fewer new wells and storage tanks required in the future.

Before 75 percent build-out, replace approximately 4,100 feet undersized pipe with 6 and 8-inch PVC pipe in Plats 1, 2, 3, 15, 20, and 22, in order to provide adequate pressures and increase reliability.

Before 100 percent build-out, replace approximately 17,300 feet of undersized pipe with 6 and 8-inch PVC pipe in Plats 6, 7, 8, 9, 11, 12, 14, 17, and 18.

Chlorination. After sufficient particulate data is accumulated, and assuming it is decided to retain the springs as a water source, we would recommend that chlorination equipment be installed to treat water from the springs, and provide a chlorine residual in the distribution system.

Power and Controls. The normal water supply to the Green and Prater Canyon tanks will be from the springs, and tank level will be controlled by float switches in each tank which open and close a level control valve, admitting water from the springs. A telemetry system will send tank level signals to the respective wellhouse, which will call for one or both well pumps to run if the tank level falls too low. Wells will serve as the source of supply to the proposed Cedar Canyon tank, which will be controlled in the same manner.

WATER SYSTEM PROGRAM

This section summarizes the recommended program including conservation measures, a financing plan, and budget.

Water Conservation Measures

Water conservation measures are a major component of the master plan. To the extent that SVRA can reduce per capita water consumption, the number of new water supply wells needed can be reduced, and/or their construction deferred.

Water meters coupled with usage-based billing are one of the most effective conservation measures. SVRA will continue to install water meters with all new services, and meters will be installed on existing services which are currently unmetered. Once all services are metered, SVRA can begin usage-based billing.

Excessive pressures result in increased water usage, both by consumers and through leaks. Prior to the 1997 summer season, SVRA should reset selected PRV's to lower pressures. Replacement of the steel water mains should result in significantly decreased leakage, which will have the effect of reducing per capita usage. Homeowners should be encouraged to water lawns during the cool evening and early morning hours.

Program Description

The SVRA water system master plan incorporates the recommended improvements presented in the previous section, "Needs and Alternatives," and as described in detail in Chapter 4. The improvements will be phased over a 20-year period. The timing of improvements such as additional wells, and upsizing of distribution pipes, is linked to the rate of home construction, and to the trend in per capita water usage. The master plan program, budget cost estimates, and implementation schedule are summarized in Table 14 found in Chapter 5.

Three Year Administrative Program

This section summarizes, for quick reference, the administrative actions SVRA will need to undertake during the next three years.

1. Execute the water system separation agreement with LVI.

2. Form an Improvement and Service District (ISD), for the purpose of funding water system capital projects.

3. Begin building a capital improvements fund for water system improvements by levying annual assessments in accordance with the ISD procedures.

4. Transfer the culinary water rights from LVI to SVRA, in accordance with the separation agreement. This will involve preparing and filing documents with the State Engineers Office.

5. Undertake a hydrogeologic study to investigate and determine the best locations for new water supply wells. A consultant specializing in this area should be retained by SVRA. We recommend Hinckley Consulting, located in Laramie, a well-regarded consultant with whom we often work.

6. Begin to identify and acquire sites for new wells, and the Cedar Canyon storage tank.

7. File applications (UW-5) with the State Engineers Office for new wells.

8. Maintain the water rights permits in good standing by requesting time extensions each year until the time is right for adjudication.

9. Begin detailed design and preparation of plans and specifications for construction of the first capital projects.

10. Review and update this master plan every few years, or as conditions warrant.

Permitting

A number of permits will be required to construct the various improvements. These include the Forest Service Special Use Permit, DEQ Permit to Construct, right-of-way and easement acquisition, water rights, archeological review, and Lincoln County building permit.

Water Utility Organization and Administration

SVRA should form an Improvement and Service District (ISD) for the purpose of funding water system improvement projects. The ISD is managed and controlled by a three member board, and has the authority to borrow money, receive grants, and levy special assessments against property, subject to a vote of the members.

The water utility budget should be set up as an enterprise fund, that is, a self-sustaining fund where revenues equal expenses, all utility-related revenues go into the fund (not into the general fund), and user fees are set each year at a level sufficient to generate the revenue needed to fund that year's budget.

Funding Options

A number of water utility funding options are available to SVRA following formation of the ISD. These include the annual assessments currently allowed by the DCCR's, special assessments as allowed under the ISD, grants and loans from the Wyoming Water Development Commission or Wyoming Farm Loan Board, commercial bank loans, or general obligation bonds. WWDC may fund development of new supplies, transmission pipelines, and storage tanks, but cannot fund distribution system improvements. Ultimately, when all services are metered, SVRA should fund the water utility at least in part with usage-based charges.

User Rates and Financing Plan

In the 1996 fiscal year, SVRA assessed $308.10 per lot as the annual assessment under the DCCR's. The total revenue generated was approximately $662,000. This revenue went into the general fund. A portion of this revenue went to fund the water utility budget. The 1996 water utility budget and expenses are presented below.

1996 SVRA Water Utility Budget and Expenses

Description	Budget	Actual YTD	Variance
Payroll	$63,869	$41,777	-$22,092
Payroll Taxes	12,737	7,757	-4,980
Benefits	3,600	3,300	-300
Culinary Maintenance	65,000	62,116	-2,284
Culinary Replacement	0	31,009	31,009
Totals	$145,206	$145,959	$753

Notes: YTD is through October 1996.

Hook-up fees are currently $1,200 per new connection. Through October 1996, hook-up fees have generated $44,550 in revenue. The balance of the water utility revenue came out of the general fund. In 1996, not including hook-up fees to new homes, each property owner paid $4.13 per month to fund the water utility. The 1996 water utility revenues are presented below.

1996 SVRA Water Utility Revenue

Description	Revenue
Hook-Up Fees	$44,550
General Fund	100,656
Total	$145,206

For 1997, the O&M budget should be increased 3 percent to account for inflation, which rounded up is $150,000.

Funding for the recommended capital projects program must raise a total of approximately $3.7 million over the next 17 years, or an average of approximately $225,000 per year. Initially, SVRA should plan on generating this revenue internally, by an annual assessment as allowed under the ISD. Later, when the first new well is needed, or another eligible project such as the storage tank or transmission pipeline replacement, SVRA can make application to WWDC or the Farm Loan Board for funding assistance.

A replacement fund should be established in the budget to allow for these unanticipated expenses related to repair and/or replacement of worn-out or obsolete system components, not included in the capital improvements program. For 1997, this fund should be established at $40,000.

A reserve fund should be established in the amount of $50,000, which should be accrued over the next five years at $10,000 per year. Charges against this fund should not be allowed except by special resolution of the ISD board.

We recommend that the hook-up fee be increased to $1500. For budgeting purposes, the estimated 1997 revenue from hook-up fees is based on 30 new connections x $1500 per hook-up. The recommended 1997 water utility budget is shown below.

Recommended SVRA 1997 Water Utility Budget

Description	Amount
Expenses	
Operation & Maintenance	$150,000
Capital Projects Fund	225,000
Replacement Fund	40,000
Reserve Fund	10,000
Total Expenses	$425,000
Revenue	
Hook-Up Fees	$45,000
Annual Assessments	380,000
Total Revenue	$425,000
Assessment Per Lot (Based on 2,032 lots)	
Per Year	$187.01
Per Month	15.58

The assessment needed to be assessed against each property is $380,000 / 2,032 lots = $187.01 per lot per year, or $15.58 per month. This monthly rate is comparable to what other Wyoming municipalities pay for water service.

Given that SVRA intends to apply to WWDC or the Farm Loan Board for funding assistance for future projects, it is important that SVRA water rates be set at a level comparable to other users in the state. This will improve the likelihood that the agencies will look favorably on funding a proposed project in the future.

Operating costs for the new wells will be the major component of future O&M cost increases. We estimate the power cost to pump one well full-time for an entire year will be approximately $15,000 per year. However, most years not all of the wells will need to be pumped year-round. The projected impact on user rates is presented below.

Projected SVRA Monthly Rates, Based on No. of Wells Pumped Year-Round

Year	No. of Wells	Annual O&M Cost	Monthly Bill
1997	0	$380,000	$15.58
2002	1	395,000	16.20
2007	2	410,000	16.82
2012	3	425,000	17.44
2017	4	$440,000	$18.06

Note: All costs presented in 1997 dollars.

The annual water utility budget should be reviewed yearly, and expenses and revenue requirements adjusted up or down as experience dictates.

CHAPTER 1

INTRODUCTION

Chapter 1 presents background information, study objectives, and scope of work.

BACKGROUND

The Star Valley Ranch (SVR) development is located in Lincoln County, Wyoming, east of the Town of Freedom. The development includes 2,032 platted homesites, 27 holes of golf, two swimming pools, tennis courts, an RV Park, two restaurants, a lounge, offices, clubhouse, pro shop, and maintenance shops. The developer, Leisure Valley, Inc. (LVI) began development of SVR in about 1970. Development of SVR and the water system which serves it continued in phases over the years, culminating in the present configuration. The lots generally average 0.5 acre up to 1 acre in size.

Today, LVI retains ownership of the RV Park, the LVI maintenance shops, and one or two other small facilities; the remainder of SVR having been acquired by the homeowners over the years. Ownership of the water system was transferred by the developer to Star Valley Ranch Association (SVRA), the local homeowner's group, via deed dated January 25, 1985. At that time, LVI retained a 50 percent ownership of certain water facilities which serve the RV Park. However, SVRA is in the process of acquiring ownership of the remainder of the water system from LVI, at which time LVI will be required to install its own independent water supply system, and then disconnect from the SVRA water system. This agreement is expected to be concluded in 1996. SVRA is now and will continue to be responsible for operation and maintenance of the SVR water system.

The water system was developed in phases, and generally kept pace with development of SVR. More than 25 construction permits have been issued by DEQ, the earliest dating back to 1970. The water system presently consists of two developed springs, known as Prater Canyon spring and Green Canyon spring (also referred to as Stewart spring), two transmission pipelines, two storage tanks, extensive distribution piping, and various flow meters, pressure control valves, and air relief valves. Two new supply wells were completed in recent years, but are not yet integrated operationally with the system.

Over the years, the system has experienced problems with excessive leakage, low pressures, and occasional water shortages. Parts of the water system are 25 years old. Presently, approximately 470 homes are built. SVRA recognized the need for and benefits of a Water System Master Plan, which will serve to guide needed improvements to the water system as additional homes are built and water usage increases. SVRA thus retained Jorgensen Engineering and Land Surveying, P.C., to conduct the necessary engineering studies and prepare the Water System Master Plan.

STUDY OBJECTIVES

The plan will inventory and evaluate the existing culinary system, project future water supply needs, evaluate and prioritize system improvement alternatives, and include cost estimates, a financial analysis, and an implementation schedule. The recommended plan will include a phased program which can be implemented as growth occurs, is affordable on an annual cost basis, and which addresses the most pressing needs first. The main objectives will be to ensure a safe, adequate, reliable, and economical water supply.

This report is also intended to satisfy the requirements of the Wyoming Water Development Commission for a Level II engineering report.

SCOPE OF WORK

The scope of work for the Water System Master Plan, as taken from the Agreement, is as follows:

Task	Description
1	Project Management
2	Define Service Area, Population, Water Usage
3	Inventory Existing Supply and System
4	Identify Future Needs
5	Develop and Evaluate Alternatives
6	Recommended Plan
7	Prepare Report

Task 1. Project Management. This task includes management of Engineer's internal work activities, budget, and schedule. Task provides for Engineer to maintain regular communications with Client and regulatory agencies. This task includes preparation of progress payment invoices, and preparation for and attendance at up to 3 project review meetings, including a scoping meeting if desired. This task provides for internal review and checking of Engineer's work, and maintenance of Engineer's files.

Client services: Appoint Client Project Manager. Review and pay invoices. Attend meetings. Provide input and direction to Engineer.

Task 2. Define Service Area, Population, Water Usage. In consultation with Client, Engineer will establish the existing and ultimate service area for the water system. Based on the service area, and the ultimate number of lots and facilities to be served within the service area, Engineer will estimate the population which must be served at buildout. Engineer will

estimate per capita water usage, based on available water usage (flow meter) data, and on published factors. Based on the population projections, and on estimated per-capita usage, Engineer will estimate existing and project future water demands including average day, maximum day, and peak hour demands. These estimates will be used to assess future needs of the water system.

Engineer will estimate fire demands which would be appropriate for various locations within the system. These estimates will be used in the water system modeling task, in conjunction with maximum day demands, to evaluate the capability of the system to deliver fire flows.

Prior to the 1996 summer season, Client will purchase and install totalizing flow meters at certain locations in the water system. These meters should be installed prior to May. Engineer will recommend meter locations to Client. Client will read these meters daily and record the daily usage throughout the summer of 1996. Client will provide the daily readings to Engineer. Client will also estimate the number of people present on the ranch on certain days which will be selected by Engineer. Engineer will review daily meter readings and the estimated daily populations prior to finalizing estimated per capita usage and water demands.

Client Services: Assist with identification of service area; estimate summer population; identify non-residential water users; purchase, install, and daily read the flow meters; provide flow meter data.

Task 3. Inventory Existing Supply and System. Engineer will inventory the existing water system and supply sources, and describe the existing conditions. Engineer will review available drawings and prepare a base map of the water system. Map will be prepared by electronically scanning an existing water system drawing. A maximum of two drawings will be scanned. Engineer will add additional features to the base map which may not be shown on the scanned map. Map will show service area boundary, roads, lots, topography, springs, wells, storage tanks, transmission and distribution pipes and sizes, PRV stations, major valves, creeks, ditches, golf courses, and major facilities. Client will identify land ownership of major parcels (not individual lots), and will provide copies of existing permits or easements for the water system.

Design data, sizes, and capacities will be compiled for the water system components. Historic water supply data for the springs will be compiled. Client will provide available drawings, maps, records, reports and water quality data for the water system. Client will provide approximate phasing sequence and dates of development, planting, and water system construction. Client will provide PRV settings. Engineer will meet with Client, tour the system, review maintenance and repair histories and requirements to identify problem areas, and discuss any special problems identified by Client. Engineer may recommend that Client begin a particulate testing program.

Engineer will conduct computerized hydraulic modeling of the water system. Modeling will be based on the water demands prepared under Task 2. The purpose of the modeling will be to evaluate the delivery capabilities of the system, and to identify improvements or pipe

replacements required to deliver the projected future demands, and to maintain adequate system pressures and flows. The capability to deliver fire flows of between 500 to 1,000 gpm will be evaluated.

Client Services: Provide available water system drawings, maps, records, reports, design criteria, permits, easements, land ownership, water quality data; provide PRV settings; provide the year of water system construction for each phase of the ranch; verbally provide system maintenance and repair histories and special problems or concerns.

Task 4. Identify Future Needs. Based on the results of Tasks 2 and 3, Engineer will identify future needs of the water system. Future needs may include development of additional water supply sources, additional storage capacity, transmission or distribution piping replacement or extensions, a control system to integrate the operation of the wells with the storage tank levels, chlorination facilities, or other needs. The most likely future water supply sources will be wells. Based on existing available information, Engineer will identify preferred well locations. Most likely these would be located near the existing well at the airstrip.

Task 5. Develop and Evaluate Alternatives. Engineer will identify and develop alternatives for meeting future needs. Engineer will prepare preliminary designs suitable for cost estimating. Alternatives will be evaluated based on capital cost, operating and maintenance cost, present worth, reliability, ease of operation, ease of integration with existing system, environmental concerns, regulatory compliance, constructability, and public acceptance. Alternatives will include water conservation measures. Engineer will identify permits or easements necessary in order to construct the improvements. Engineer will prepare a recommended phasing plan and estimate annual costs to implement the projects. Client will provide any existing geotechnical data or reports for the ranch for use in preparing preliminary designs.

Engineer will meet with Client to review the identified alternatives, Engineer's evaluation of alternatives, and the recommended phasing plan. Client will provide input regarding the acceptability of alternatives, Client's preferred alternatives, and the desired phasing plan.

Client Services: Provide available geotechnical data. Provide input and direction regarding preferred alternative(s) and project phasing.

Task 6. Recommended Plan. Engineer will summarize the preferred alternative identified in Task 5. Summary will include preliminary designs, capital cost estimates, and phasing. Engineer will identify implementation and financing alternatives for the preferred alternative. Implementation alternatives may include forming a special improvement district or water and sewer district, incorporating as a municipality, or maintaining the status quo as a homeowner's association. Financing alternatives for capital costs may include special assessments, annual fees, loans, or grants. Engineer will prepare user rate and/or repayment schedules which would be required under the different financing alternatives. Client will provide information on existing assessments, user fees, annual budgets, and historic water system cost expenditures.

Engineer will meet with Client to review implementation and financing alternatives. If desired, Engineer will make a presentation to homeowner's association regarding these alternatives. Based on Client input and direction, Engineer will finalize the recommended plan including the selected implementation and financing plan.

Client Services: Provide water system financial data. Arrange homeowner's meeting. Provide input and direction regarding preferred financing and implementation strategies.

Task 7. Prepare Report. Engineer will prepare a draft water system master plan which summarizes the data, findings, and results of the previous tasks. The master plan will include the water system base map with recommended improvements identified, population and water usage projections, design criteria, preliminary designs for the recommended alternatives, cost estimates, phasing plan, financial plan, and implementation plan. Engineer will provide 10 copies of the draft master plan to Client. Engineer will meet with the Client to present the draft master plan, answer questions, and receive comments.

Engineer will resolve and incorporate comments and prepare 10 copies of the final master plan to the Client. The final master plan will include an executive summary. Additional copies of the plan, if requested, will be provided at Engineer's cost.

Client Services: Review and comment on draft master plan.

CHAPTER 2

BACKGROUND DATA

This chapter identifies the service area, provides water usage records and water quality data, and presents population and water usage projections.

SERVICE AREA BOUNDARY

SVR is located in Sections 24, 25, and 36, T35N, R119W; Section 1, T34N, R119W; Sections 30 and 31, T35N, R118W; and Section 6, T34N, R118W.

For planning purposes, the water service area boundary is defined to include the approved plats (2,032 residential lots), and the SVRA common facilities located within the plats (offices, clubhouse, pools, cook shack, pro shop, Silo restaurant and lounge, maintenance shop, and restrooms/showers, and miscellaneous other).

Water service is presently provided outside the plat boundaries to the three Clark homes, Mary's Restaurant, a real estate sales office, the LVI facilities located at Muddy String Road and Vista Drive, and the RV Park. SVRA and LVI are negotiating an agreement to disconnect certain LVI facilities and the RV Park from the SVRA water system. Therefore, these facilities are excluded from the future service area boundary.

No additional residential plats are anticipated at SVR. The service area will be limited to the existing residential plats. Possibly some additional development could occur at SVR, such as convenience stores, restaurants, etc., which would serve the local residents. Water usage at such facilities would be minimal compared to total residential use.

POPULATION PROJECTIONS

On August 17 and 18, 1996, SVRA conducted a population census at SVR. Census takers went door to door to all 467 SVRA homes. A total of 311 responses were received. On the census day, there were 674 SVRA residents and 338 guests of SVRA residents present at the 311 homes responding, for a total population of 1,012 residents and guests. This works out to 3.3 (number rounded) persons at each home responding on that day. Assuming 3.3 persons at each of the 467 homes would yield a SVRA population of 1,541 people. A copy of the census data as prepared by SVRA is included in the appendices.

Table 1 presents a summer population projection at build-out of SVRA, based on 2,032 homes, 3.3 persons per home, and an 80 percent occupancy factor. Under these conditions,

Table 1. Population and Water Demand Projections						11/11/96				Persons/Home	3.3
Jorgensen Engineering and Land Surveying, P.C.						10:32 am				Occ. Factor	0.85
Project No 96014										GPD per Lot	2300
										Peaking Factor	1.5
				SVRA Summer Build-Out Conditions							
		1996	1996	Persons			Water Usage Maximum Day		Peak Hour		
	No.	Homes	Percent	Per	Buildout	Total					
Plat No.	of Lots	Built	Built	Home	Factor	People	Per Lot	GPD	Flow (gpm)		
1	86	12	14%	3.3	0.85	241	2300	168,130	175		
2	61	20	33%	3.3	0.85	171	2300	119,255	124		
3	125	20	16%	3.3	0.85	351	2300	244,375	255		
4	13	0	0%	3.3	0.85	36	2300	25,415	26		
5	161	12	7%	3.3	0.85	452	2300	314,755	328		
6	132	46	35%	3.3	0.85	370	2300	258,060	269		
7	117	41	35%	3.3	0.85	328	2300	228,735	238		
8	66	8	12%	3.3	0.85	185	2300	129,030	134		
9	96	39	41%	3.3	0.85	269	2300	187,680	196		
10	100	41	41%	3.3	0.85	281	2300	195,500	204		
11	17	4	24%	3.3	0.85	48	2300	33,235	35		
12	104	24	23%	3.3	0.85	292	2300	203,320	212		
13	87	37	43%	3.3	0.85	244	2300	170,085	177		
14	88	28	32%	3.3	0.85	247	2300	172,040	179		
15	79	12	15%	3.3	0.85	222	2300	154,445	161		
16	93	22	24%	3.3	0.85	261	2300	181,815	189		
17	131	36	27%	3.3	0.85	367	2300	256,105	267		
18	189	30	16%	3.3	0.85	530	2300	369,495	385		
20	105	22	21%	3.3	0.85	295	2300	205,275	214		
21	114	8	7%	3.3	0.85	320	2300	222,870	232		
22	68	5	7%	3.3	0.85	191	2300	132,940	138		
SVRA Common Facilities								50,000	52		
Totals	2032	467				5700		4,022,560	4,190		

the total population at SVRA on an August day at buildout is projected to be 5,364 people. (Note that many homes at SVR are summer or seasonally-occupied. An 80 percent occupancy factor is used to account for the fact that not all homes will be occupied simultaneously at buildout.)

Previous reports and data, shown in Table 2, indicate the following cumulative number of homes constructed at SVRA. (Data was not available for all years):

Table 2. Cumulative Number of Homes Built at Star Valley Ranch

Year	Cumulative No. of Homes Built
1976	40
1978	70
1983	136
1984	170
1990	300
1992	345
1993	376
1994	410
1996	467

Since 1990, the annual rate of home building has been in the range of 7 to 9 percent per year. Table 3 presents future home building projections for SVR, for different growth rates.

Table 3. Star Valley Ranch Home Building Projections

	Assumed Annual Growth Rate, and Cumulative Number of Homes Built			
Calendar Year	4 %	7%	10%	Cumulative Year
1996	467	467	467	0
2001	568	655	752	5
2006	691	919	1211	10
2011	841	1288	1951	15
2016	1023	1807	3142	20
2021	1245	2535	-----	25
2026	1515	-----	-----	30
2031	1843	-----	-----	35
2036	2242	-----	-----	40

From the table, it can be seen that, at a 7 percent annual rate of growth, SVRA will reach buildout conditions (that is, a home constructed on every lot) in 20 to 25 years. At a 4 percent growth rate, buildout would take between 35 and 40 years, and at 10 percent annual growth, buildout would occur between 15 and 20 years from now.

Based on the recent 7 to 9 percent annual growth rate, buildout would occur between 15 and 25 years from now. At a 7 percent growth rate, the number of homes would double, to approximately 1,000 homes, by the year 2007. These growth assumptions will be used for planning future water system improvements.

Note that it is not likely that a home would be built on every lot. Some people own two or more lots, and would probably construct only a single home on them.

WATER USAGE RECORDS

In order to estimate current water usage, flow meters were installed during the Spring of 1996 in each of the transmission supply mains, and at major points of use. Table 4 presents meter data. Meter locations were selected to account for all water entering, and the major points of use, within the SVRA system. In conjunction with installation of flow meters, the tank level control valves were repaired so that the tanks would not overflow when full. Instead, the overflow would occur upstream of the supply flowmeters. Also, all irrigation connections to the culinary system were closed or disconnected.

Referring to the table, the Lower Green Canyon meter measures flow entering the culinary system. The difference between the upper meter and lower meter is the water released to the Brog irrigation pipeline. While this water is available for culinary use, it is presently not needed and is released to the Brog pipeline in order to maintain reasonable pressures in the Green Canyon supply main.

Again referring to the table, with this meter configuration, water metered by "Supply" meters minus water metered by "Major Services" thus equals the water used by the SVRA homeowners.

Table 4. Water System Flow Meters

Location	Size	Notes
Supply Meters		
Prater Canyon supply main	4-inch	At USFS boundary, downstream of zeroing box
Upper Green Canyon supply main	6-inch	Upstream of diversion to Brog pipeline
Lower Green Canyon supply main	6-inch	Downstream of diversion to Brog pipeline
Major Services		
RV Park	2-inch	
LVI facilities	3/4-inch	
Real estate sales office	5/8-inch	
Mary's Restaurant	3/4-inch	
SVRA Clubhouse Facilities	1-inch	
SVRA Recreation Center	1-inch	

Table 5 presents water usage at Star Valley Ranch for the period August 12 through August 25, 1996. During this period, the average daily water supply entering the culinary system was 1,323,000 gallons per day (gpd), or 1.323 million gallons per day (mgd). Assuming 10 percent leakage (leakage typically ranges from 5 to 10 percent), the average daily culinary usage for SVR was 1,190,700 gpd. The RV Park service was the single largest culinary water user, consuming an average of 105,229 gpd. The rest of the services were minor points of use. The LVI facilities, real estate sales office, Mary's Restaurant, SVRA Clubhouse Facilities, and SVRA Recreation Center, all used less than 10,000 gpd each.

The water remaining after subtracting all metered uses from the net water supply yields the water used by the aggregate SVRA homeowners. For this time period, the homeowners used an average of 1,051,526 gpd. Based on 467 homes currently built, this works out to an average usage during this period of 2,252 gpd per home. Assuming all homes were occupied with 3.3 persons per home, this is equivalent to an average usage during this period of 682 gallons per capita per day (gpcd).

Table 5. Star Valley Ranch Water Usage, August 1996

Jorgensen Engineering and Land Surveying, P.C.

Job No. 96014

	SUPPLY							DEMAND											
Aug 1996 Date	Upper Green gpd	Lower Green gpd	Diverted to Brog gpd	Prater gpd	Gross Supply gpd	Leakage gpd*	Net Supply gpd	RV Park gpd	Mary's Rest gpd	LVI Shops gpd	Sales Office gpd	Silo Rest/Bar gpd	Club house gpd	SVRA Home owners gpd	SVRA Homes Built	SVRA gpd/ home	SVRA Popu-lation	SVRA Persons Per Home	SVRA Home owners gpcd
12	1569000	813000	756000	536000	1349000	134900	1214100	105333	7533	5560	2500	*10000*	*10000*	1073174	467	2298	1541	3.30	696
13	1560000	860000	700000	537000	1397000	139700	1257300	105333	7533	5560	2500	*10000*	*10000*	1116374	467	2391	1541	3.30	724
14	1486000	858000	628000	513000	1371000	137100	1233900	105333	7533	5560	2500	*10000*	*10000*	1092974	467	2340	1541	3.30	709
15	1435000	870000	565000	513000	1383000	138300	1244700	124450	9700	4185	1080	*10000*	*10000*	1085285	467	2324	1541	3.30	704
16	1570000	1262000	308000	528000	1790000	179000	1611000	124450	9700	4185	1080	*10000*	*10000*	1451585	467	3108	1541	3.30	942
17	1407000	718000	689000	486000	1204000	120400	1083600	84600	8000	2510	1080	*10000*	*10000*	967410	467	2072	1541	3.30	628
18	1403000	705000	698000	491000	1196000	119600	1076400	109200	8000	2890	0	*10000*	*10000*	936310	467	2005	1541	3.30	608
19	1419000	720000	699000	489000	1209000	120900	1088100	99500	5333	4410	3340	*10000*	*10000*	955517	467	2046	1541	3.30	620
20	1469000	829000	640000	489000	1318000	131800	1186200	99500	5333	4410	3340	*10000*	*10000*	1053617	467	2256	1541	3.30	684
21	1424000	769000	655000	462000	1231000	123100	1107900	99500	5333	4410	3340	*10000*	*10000*	975317	467	2088	1541	3.30	633
22	1457000	800000	657000	479000	1279000	127900	1151100	116800	*7400*	*4500*	*2300*	*10000*	*10000*	1000100	467	2142	1541	3.30	649
23	1452000	770000	682000	466000	1236000	123600	1112400	117500	*7400*	*4500*	*2300*	*10000*	*10000*	960700	467	2057	1541	3.30	623
24	1443000	770000	673000	457000	1227000	122700	1104300	87000	*7400*	*4500*	*2300*	*10000*	*10000*	983100	467	2105	1541	3.30	638
25	1476000	885000	591000	447000	1332000	133200	1198800	94700	*7400*	*4500*	*2300*	*10000*	*10000*	1069900	467	2291	1541	3.30	694
			Averages:		1323000	132300	1190700	105229						1051526		2252			682

Numbers in italics are estimates

*Assumed leakage: 10 Percent

On August 18, the day of the SVRA census, the actual count of the SVRA population was 1,012 people, or 3.3 people at each of the 311 responding homes. (Numbers are rounded.) If we assume that 3.3 people occupied each of the 467 total homes, then the total population at SVRA that day would have been 1,541 people.

SVRA homeowners' water usage on August 18, the census day was 936,310 gallons, which works out to 608 gpcd based on a population of 1,541. Based on the actual population count of 1,012 people, the per capita consumption would have been 925 gpcd. Presumably, the reason some people did not respond to the census was because they were not at SVRA that day. Most likely, the actual population that day was somewhere between the counted population of 1,012 and the estimated population of 1,541 people. Therefore, it is difficult to determine accurately the per capita consumption, particularly on days other than the actual census day.

Because the SVRA population presumably fluctuated daily, but the number of homes built (467) was constant during the August 12 to 25 period of record, it is more reasonable to determine average water usage on a per home rather than a per person basis. With this approach, there is also no need to determine an occupancy factor, as it is already taken into account in the usage records.

The maximum day usage during this period occurred on August 16, however, this value is so much higher than other days that it should be treated as an outlier and ignored. Other daily values during this period ranged from 2,100 to 2,400 gpd per home. For planning purposes, 2,300 gpd per home is selected as a maximum day value.

WATER USAGE PROJECTIONS

Table 1 presented earlier shows summer water usage projections per plat and in total for SVR homes and facilities at buildout conditions. Residential water usage projections are based on the historical usage measured in August 1996 of 2,300 gpd per home for the maximum day. A "build out" factor of 85 percent is applied. Some people own adjacent lots, and will build only one home on the two lots. For this and other reasons, it is probable that not all lots will be built on. An 85 percent build out factor means that no more than 1,727 homes would be constructed, leaving 15 percent or 305 lots unbuilt.

SVRA facilities' usage is based on the metered usage presented earlier, plus a 50 percent increase to allow for future expansion. The RV Park and LVI facilities are not included, because they will be disconnected from the SVRA system and will be responsible to provide their own water supply.

Based on past usage, maximum day water usage at buildout conditions is projected to be 4.1 mgd. This usage can be reduced if SVRA undertakes certain water conservation measures as

described in Chapter 5. This is the total amount of water that the springs and wells must be capable of providing on any given day during peak summer occupancy at buildout.

A peaking factor of 2.0 peak hour to maximum day usage was selected to estimate peak hour flows in the distribution system. Peak hour flows are shown in Table 1 for each plat.

WATER QUALITY

With more than 15 service connections and service to more than 25 year-round residents, the SVR water system is classified as a Public, Community water system and is regulated under the Safe Drinking Water Act (SDWA). Because Wyoming does not have primacy under the SDWA, the Environmental Protection Agency, Region 8 Office in Denver, provides regulatory oversight.

The SDWA specifies maximum contaminant levels, monitoring frequency, and sampling locations for primary drinking water contaminants regulated under the SDWA. Table 6 presents the regulated contaminants, monitoring frequency, and date last tested for SVR water system.

We have reviewed the laboratory analyses and reports for the test dates shown in Table 6. All of the parameters appeared to be well within SDWA-specified maximum contaminant levels. Copies of laboratory reports may be found in the appendices.

The only water quality concern of which we are aware is the potential for the Green Canyon and/or Prater Canyon spring sources to be under the direct influence of surface water, and thus not be true groundwater sources. Some limited particulate testing has been done, but the results were inconclusive. Refer to the appendices for test results.

The EPA defines ground water under the direct influence of surface water as: Any water beneath the surface of the ground with (i) significant occurrence of insects or other macroorganisms, algae organic debris, or large-diameter pathogens such as Giardia lamblia, or (ii) significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity, or pH which closely correlate to climatological or surface water conditions.

The evaluation procedure involves a records review, site inspection and sanitary survey, and ultimately, a particulate analysis. A particulate analysis consists of filtering a large quantity of the source water (several hundred to several thousand gallons), then examining the filter beneath a microscope for evidence of the listed plant or animal debris.

Table 6. EPA-SDWA Water Quality Monitoring				9/20/96 18:34
Jorgensen Engineering and Land Surveying, P.C.				
Job No. 96014				
	Date Analysis Complete			
Contaminant	Prater Canyon	Green Canyon	Airstrip Well No. 1	Notes
Asbestos	NA	NA	NA	No certified lab.
Nitrate	8/15/95	8/15/95	8/15/95	Annually. Due now.
Nitrite	8/15/95	8/15/95	8/15/95	Once only. Complete
Inorganic chemicals	8/15/95	8/15/95	8/15/95	Every 3 years. Due 1998.
Volatile organics	12/20/94	12/20/94	12/20/94	Every 3 years. Due 1997.
Pesticides (SOC)	9/9/93	9/9/93	?	Every 3 years. Due now.
Unregulated IOC	8/15/95	8/15/95	8/15/95	Once only. Complete.
Unregulated VOC	12/20/94	12/20/94	12/20/94	Every 3 years. Due 1997.
Lead/copper	10/16/95	10/16/95	10/16/95	Annually. Due now.
Radionuclides	3/19/90	3/19/90	3/29/93	Every 4 years. Springs due now.
Particulates	5/23/90	6/14/96	NA	See report discussion.
		7/8/94	NA	
		5/23/90	NA	

If a source water is determined by EPA to be under the direct influence of surface water, it would then be subject to the filtration requirements of the SDWA Surface Water Treatment Rule (SWTR). Under the SWTR, the source water must then either be filtered, or abandoned as a drinking water source.

CHAPTER 3

EXISTING SUPPLY AND SYSTEM INVENTORY

This chapter provides a general description of the water system, and detailed data including capacities and physical condition of the system components. This chapter also presents the approach and results of the distribution system modeling.

Charles V. King of Salt Lake City was the engineer who designed the SVR water system. His involvement with the water system ended in the early 1990's. Reference is made to his drawings and reports in this chapter.

SYSTEM DESCRIPTION

The water system consists of two developed spring sources, known as Prater Canyon spring and Green Canyon spring (also referred to as Stewart spring); a transmission pipeline, flow meters and storage tank associated with each spring; distribution piping (including a high pressure interconnect pipe between the two sources); and various pressure control and air relief valves. Two new supply wells were recently completed, but are not yet integrated operationally with the existing system, and are not yet routinely used to supply water to the system. The water system is shown on Figure 1 (located in a pocket at the end of this report).

Water from each spring is collected and conveyed by gravity via a transmission pipeline, through a flow meter(s), and into a storage tank. Because the pipeline profile drops substantially in elevation, pressure relief stations (zeroing boxes) or overflows are located in each transmission pipeline at intervals upstream of the flow meter. These zeroing boxes operate at atmospheric pressure and serve to limit pipeline pressures to acceptable values. The pipeline pressures at the downstream terminus are sufficient to force water into the storage tanks, and also to provide service to some pressure zones directly.

Downstream of the flow meters is located a 4-inch high-pressure interconnect pipe, which also functions as part of the distribution system. This pipe allows the operator to transfer water between the Prater Canyon and Green Canyon systems. The transfer is accomplished by setting a manually-adjusted pressure relief valve located on the Green Canyon pipeline. When the valve is set to a low pressure, it discharges water from the Green Canyon pipeline into settling basins which supply water to irrigate the Cedar Creek golf course via the Brog pipeline. When the valve is set to a higher pressure, flow to the settling basins is reduced, and pressure in the Green Canyon pipeline increases to the point where water is forced into the Prater Canyon system. The Green Canyon supply is often used during the summer to augment the Prater Canyon supply. During most of the summer, water is relieved to the Brog pipeline in order to maintain a reasonable pressure in the Green Canyon pipeline.

After leaving the tanks, water flows through the distribution system to all of the various points of use. Because of the extreme topographical relief, the distribution system is divided into many pressure zones, and pressure reducing valves (PRV) are located throughout the system to maintain pressures within reasonable limits. The two new water supply wells are connected directly to the distribution system.

SPRINGS

Two springs currently provide culinary water: Prater Canyon and Green Canyon.

Water Rights

The information and history pertaining to water rights is extensive and complicated. Our review of the information revealed the following: (1) SVRA, the RV Park, and LVI each apparently have permitted water rights to the Prater Canyon and Green Canyon springs. (2) The permits allow up to 900 gpm to be taken from Prater Canyon spring and 1,000 gpm (2.2 cfs) from Green Canyon spring, for culinary purposes. (3) The specific allocation to either SVRA, the RV Park, or LVI (in gpm or gpd) is apparently not defined. (4) According to a map submitted in support of the permit applications, dated March 1987, and signed by representatives of SVRA, the RV Park, and LVI, the SVR platted lots (i.e. SVRA) have priority for water over the RV Park and LVI. (5) The water is allowed to be commingled in the distribution system prior to use. The SVRA water rights, as best as we can determine, are presented in Table 6A. (Note that the Green Canyon Spring (Stewart Pipeline) is classified as surface water.)

Table 6A. SVRA Culinary Water Rights

Permit No.	Name of Facility
UW 13319	Prater Canyon No. 1
UW 82826	First Enlargement of Prater Canyon No. 1
UW 82827	Second Enlargement Prater Canyon No. 1
28143	Stewart Pipeline / Stewart Springs
6973 Enl.	First Enlargement Stewart Pipeline/Stewart Springs
6974 Enl.	Second Enlargement Stewart Pipeline/Stewart Springs
UW 90328	Star Valley Ranch Associates North Airstrip Well #1
UW 37449	Cedar No. 1 Well

Soring Development

The Prater Canyon spring was developed as a water source in about 1972, the first of the two springs to be developed. The spring is located high in Prater Canyon, at about EL 7390. Spring development is shown on King drawing no. 2660.097 sheet 1, dated February 1972. The collection box is shown as a buried, 12-foot deep section of perforated, corrugated metal pipe (CMP), surrounded by rock backfill.

We inspected the spring development area on September 13, 1996. There are several features visible at the surface. A 30-inch square steel box with locking hatch provides access to the collection box. The collection pipe is routed through a second 36-inch CMP vault. A third 30-inch CMP vault houses a shutoff valve and overflow pipe. The transmission pipe exists this vault and proceeds down the hill. A 2-inch vent pipe is a source of air entrainment to the system. A fourth 30-inch CMP vault has apparently been abandoned. Although there is no indication on the drawing of how the spring area is sealed or protected against contamination, some concrete has been poured on the ground surface around the boxes.

The Prater spring exits from the base of a steep hillside. It may be that the water flows along the top of a formation, or less permeable layer, which then ends abruptly at the hillside where the water exits.

The Green Canyon spring (also known as Stewart springs) was developed in about 1985, and is shown on King drawing no. 2030, dated August 1985. The spring is located in Green Canyon, at about EL 7540. The collection system consists of perforated PVC pipe laid in gravel-filled trenches. The drawing shows a 40-mil PVC sheet laid over the spring area, and covered with 18 inches of fill.

We inspected the Green Canyon spring, also on September 13. The only feature visible on the surface is a concrete vault where the collection pipes are routed and connect to the transmission main. The ground surface around the collection area has been extensively graded and leveled. The collection area is located in the bottom of a ravine, where a small creek also flows. This collection area may actually capture this creek where it flows underground; in fact, it was noted that the small creek did disappear in the ground adjacent to the collection area.

Based on surface observations of the two springs, it appears that the Prater Canyon spring may capture a higher-quality water, and would be less likely to come under the direct influence of surface water. The Green Canyon spring appeared to have a greater potential to come under the direct influence of surface water.

We understand that Cascade Springs, a spring adjacent to Green Canyon spring, was later developed and connected to the transmission pipeline. However, high coliform levels were found in the water supply immediately thereafter, whose source was traced to Cascade Springs. These springs were then disconnected and abandoned as a water source, and have not been used since.

According to Jeff Van Deburg, formerly the water system operator for many years, effectively all of the springs' flow is currently intercepted at the spring improvements. That is, it would be difficult to develop more water from the springs than is currently produced.

Spring Flows

Flow meter records for the springs have been kept since October 1986. The meters have occasionally been repaired but never calibrated since the initial installation. The Green Canyon meter was replaced once in June of 1990, and again in the fall of 1994. In the Spring of 1996, a second flow meter was installed in the Green Canyon pipeline, downstream of the diversion to the Brog pipeline. This second meter allows accurate determination of both culinary usage and the quantity of water relieved to the Brog irrigation pipeline.

During the ten years of record, the Prater Canyon meter has indicated a flow generally in the range of 100 to 500 gpm. The Green Canyon meter has indicated a flow generally in the range of 150 to 1,200 gpm. The metered flow from Prater Canyon spring has always been much less than the permitted flow. The metered flow from Green Canyon spring has occasionally in the summer exceeded the permitted flow. The flow meter records are included in the appendices to this report.

Water production from the springs varies seasonally, and is highest during June through September, and lowest in February and March. Fortunately, the period of highest spring flow coincides with the period of greatest water demand. The flow from the springs also varies from year to year, depending on the antecedent precipitation conditions and the amount of groundwater recharge.

Since the springs' flow varies from year to year, an evaluation of the adequacy of the water supply must be based on historical low spring flows. That is, based on the historical record, a flow value must be selected which represents the minimum firm, reliable flow that can be expected, even in a drought year. The average total spring production during August 1987 was 730 gpm and represents the lowest average August flow on record. This is equivalent to approximately 1.05 mgd. Note that this low flow may not be representative of a historic low flow, because the period of record is relatively limited, covering only ten years from 1986 to the present. It is likely that the springs' average August flow has been less than 730 gpm at some time in the last 20 to 50 years. However, for planning purposes, 1.05 mgd is assumed to be the lowest reliable spring flow during August, the period of peak demand. Spring data is summarized in Table 7.

Table 7. Green Canyon and Prater Canyon Spring Data

Green Canyon Spring	
Flow	150 to 1,200 gpm
Year Developed	1985
Prater Canyon Spring	
Flow	100 to 500 gpm
Year Developed	1972
Minimum Combined Flow	730 gpm or 1.05 mgd
Date	August 1987

TRANSMISSION PIPELINES

Each of the two springs is connected to the SVRA water system via its own transmission pipeline. King drawing no. 2660.097 sheet 1 dated February 1972 depicts the Prater Canyon pipeline. Drawing no. 3001.0700 sheet 1 undated and drawing no. 2030 dated August 1985 depict the Green Canyon pipeline. Table 8 presents pipeline data.

Table 8. Transmission Pipeline Data

	Green Canyon	Prater Canyon
Year Built	1985	1970
Length, feet	7,200	4,800
Diameter, inches	6	6
Material	PVC	Steel
Capacity (approx.)		
gpm	1,100	1,100
cfs	2.45	2.45
Velocity, ft/sec.	13	13
Elevation, feet		
Upper Terminus	7520	7390
Lower Terminus	6460	6670
Vertical Drop, feet	1,060	720
Number of Zeroing Boxes	2	1

Little documentation exists regarding pipe class, joint type, depth of cover, bedding, or backfill. Access roads parallel both pipelines, and we walked the length of both pipelines on September 13, 1996. The Prater Canyon pipeline is exposed in 10 or 12 places. The pipe is often located in the traffic area, and has been flattened in places due to vehicle traffic. The pipe was observed to be a spiral-welded steel pipe, with Victaulic grooved-end couplings. It appears to be a thin-wall pipe. Short lengths of heavy-wall steel pipe are welded on the ends to accommodate the grooved couplings. This pipe is believed to have been used in oilfield or irrigation applications. The noise of water rushing through the pipeline was audible throughout its length. This pipeline must be very shallow, perhaps one to two feet deep. Several repair clamps were observed, and one leak visible at the surface.

There are several creek crossings along its length. At the creek crossing immediately below the spring collection box, the pipe was observed exposed in the creek bottom. PVC pipe was installed at this location years ago, when the original steel pipe was washed out in a flood. Due to its age, material, and depth, the Prater Canyon pipeline is very susceptible to physical damage, freezing, flood washout, and/or failure.

We did not observe the Green Canyon pipeline exposed at the surface. It is reported to have only 3 to 4 feet of cover. One leak was observed, but we could not tell if this was from the Green Canyon culinary pipeline or the Brog irrigation pipeline which parallels it. It is reported that push-on joints were used for Green Canyon pipeline.

The Green Canyon pipeline also crosses the creek in several places, and is susceptible to flood damage. Steel pipe was observed suspended in the air at the creek crossing just below the collection box. The Green Canyon pipeline was extensively exposed and damaged by flooding in 1995.

It is reported that neither pipe is properly bedded. Instead, apparently the pipes were laid in the trench, which was then backfilled with whatever material came out of the trench. During repairs, large cobbles and rocks are often found in contact with the pipe, which can damage the pipe.

Both pipelines have sufficient capacity to carry the permitted and available spring flows. At peak flows, pipeline velocities are high enough such that water hammer and surge pressures could be a problem when valves are rapidly opened or closed. Excessive surge pressures could contribute to leakage and pipe failure.

Pipeline leaks not only waste water, but are a potential source of contamination. As pipeline pressures vary, water can be alternately discharged and then pulled back into the pipe, bringing contaminants with it.

"Zeroing boxes" are located on each pipeline. The zeroing boxes serve to control pipeline pressures to an acceptable limit. The pipeline discharges into the upstream side of the zeroing box, which is at atmospheric pressure. The flow then exits the downstream side of the box and the pipeline continues on down the mountain.

These zeroing boxes are a source of air entrainment and also contamination to the water system. The tops of the concrete boxes are near the ground surface and poorly sealed. They are vulnerable to contamination by surface water runoff. Turbulence in the zeroing box outlet pulls air into the pipeline, which is then a source of problems. Air in the distribution system can restrict flow, cause pressure surges, and leads to complaints from consumers not happy with the water's appearance. The zeroing boxes also have open, vertical standpipes located immediately downstream, which are connected to a tee in the mainline. These standpipes experience a venturi effect and negative pressure due to high velocities in the mainline, and thus pull air into the mainline.

STORAGE TANKS

A storage tank is associated with each spring and transmission pipeline. Tank data is presented in Table 9. King drawing nos. 2024 sheets 1 and 2, dated July 1986 and March 1987, respectively, depict the Green Canyon tank. We could not locate any drawings for the Prater Canyon tank.

Table 9. Storage Tank Data

	Green Canyon	Prater Canyon
Year Built	1985	1977
Capacity, gallons	400,000	175,000
Type	Above-grade	Buried
Material	Reinforced concrete	Reinforced Concrete
Water Level Elev.		
Min	6500	6800
Max	6515	6812

Each transmission pipeline discharges water to its respective storage tank. Water level in each tank is controlled by level-sensing float switches and a level control valve. The level control systems were installed in June 1996. The tank inlet valve closes when the tank is full, and opens when the tank level drops. At each tank, water enters through an inlet pipe, and is released to the distribution system via a separate outlet pipe. Each tank also has an overflow pipe. The Prater Canyon tank overflows to Prater Creek. The Green Canyon tank overflows to the Brog irrigation pipeline.

The tanks appear to be in good condition. Security and vandalism has been a problem. Fencing may need to be installed. The tanks need insect screens installed on the vent pipes. A leak test should be run to confirm that there are no major leaks from the tanks. This would require merely closing the inlet and outlet valves for a few hours and checking that the tank water level remains constant.

DISTRIBUTION SYSTEM AND APPURTENANCES

The distribution system delivers water from the storage tanks and transmission pipelines to all points of use connected to the SVR water system. Construction of the system began in about 1970, and proceeded in phases as additional plats were approved and developed. Due to the extreme topographical variation, the system is divided into multiple pressure zones, regulated by PRV's.

A system inventory, including year built, pipe size, material, length, etc. for each plat is presented in Table 10.

Charles V. King, engineering consultant for the water system during its development, prepared many drawings, specifications, and reports which were intended to serve as the basis for construction of the system. However, it appears that these plans were not always followed during construction, as will be noted later in this section.

Interconnect Pipe

In 1986, a 4-inch pipe was installed to interconnect the Green Canyon and Prater Canyon systems. This pipe allows water to be transferred from one system to the other. This is accomplished by operating valves and adjusting one or two PRV's. Today, this pipe is often used during the summer to deliver water from the Green Canyon system to the Prater Canyon system, and is an important feature of the distribution system.

According to correspondence from DEQ to SVRA we have seen (letters dated April 17 and May 15, 1987) this line was not properly installed. Apparently, the line was installed with only 4 feet of cover, not the 6 feet which was specified and permitted by DEQ (Permit No. 86-243R). Also, approximately 1,500 feet of 2-inch pipe was installed, instead of the 4-inch pipe which was specified and permitted. DEQ notes that this discrepancy is a violation of the DEQ permit and must be corrected. It is not known whether this has been done. As this is a critical pipe link, this should be investigated and corrected.

Table 10. Star Valley Ranch Water Distribution System Inventory — 11/11/96

Jorgensen Engineering and Land Surveying, P.C. — 11:01 am

Project No. 96014

				Distribution Pipe, feet												
				PVC						Steel						
Year Plat Approved	Plat No.	Age, years	No. of Lots	2"	3"	4"	6"	8"	Total PVC	4"	6"	8"	Total Steel	Total Pipe	No. of PRV's	No. of ARV's
1970	2	26	61	400	1,925	2,575	1,400		6,300	250			250	6,550	2	
1970	20	26	105	3,850	4,300	300			8,450				0	8,450	0	
1971	1	25	86	2,700	2,560	1,450			6,710				0	6,710	2	
1971	5	25	161			10,240	375		10,615		7,420		7,420	18,035	2	
1971	6	25	132	1,780	450	5,655	600		8,485		1,695		1,695	10,180	2	2
1971	7	25	117	1,800		3,200	1,850		6,850		1,580		1,580	8,430	2	
1971	8	25	66			1,855	5,525		7,380		900		900	8,280	0	
1974	3	22	125	4,800	2,900	1,525			9,225				0	9,225	0	
1975	9	21	96	1,100		1,700	400	3,495	6,695		3,650		3,650	10,345	2	
1975	10	21	100			6,575		1,785	8,360				0	8,360	1	
1977	12	19	104			3,580		840	4,420			1,920	1,920	6,340		
1977	13	19	87	570		480		1,590	2,640	6,145	1,830		7,975	10,615	1	
1977	14	19	88			6,480		500	6,980				0	6,980		
1978	15	18	79				1,850		1,850	4,485	2,215		6,700	8,550	0	
1978	16	18	93			7,445			7,445				0	7,445		
1979	17	17	131			7,906	3,705		11,611		1,125		1,125	12,736	2	
1979	18	17	189			11,365	3,100		14,465				0	14,465		
1982	21	14	119			7,830	1,450		9,280				0	9,280		
1984	11	12	17						0				0	0		
1984	22	12	68			3,240	2,240		5,480				0	5,480	2	
1985	4	11	13						0				0	0		
TOTALS			2,032	17,000	12,135	83,401	22,495	8,210	143,241	10,880	20,415	1,920	33,215	176,456	18	2

Distribution Piping

Specifications prepared by Charlie King which we have seen generally required PVC pipe conforming to the American Water Works Association (AWWA) C-900 standard, Class 150 or 200, with push-on joints. This is a typical pipe specification. It is not clear what fitting type or material was intended.

During construction, steel pipe was, unfortunately, often substituted for the specified PVC pipe. Over the years, some of this pipe was replaced as its shortcomings became obvious (primarily corrosion and leakage.) According to our estimate, about 20 percent of the system today consists of steel pipe. Sections of steel pipe we have seen removed from the system have some type of asphaltic coating, but no lining. This pipe is dimensionally unusual, that is, it does not appear to conform in O.D., I.D., or wall thickness to typical steel pipe. Pipe such as this would not generally be allowed in water system construction.

It is reported that glued PVC joints are often found in the system, instead of push-on joints.

The King specifications also required concrete thrust blocks at fittings, proper pipe bedding and backfill, and a minimum cover of 54 to 60 inches. These requirements were often not followed during construction. The system operator reports that thrust blocks are rarely encountered during repair excavations. It is reported that the pipe is generally improperly bedded. Apparently the pipes were laid in the trench, which was then backfilled with whatever material came out of the trench. During repairs, large cobbles and rocks are often found in contact with the pipe, which can damage the pipe. It is reported that the depth of cover generally averages about 48 inches, and sometimes as little as 36 inches.

All of these deviations from the engineer's specifications now contribute to pipe cracking, leakage, failure, or freezing which is experienced at SVR.

Pressure Reducing Valves

The water system was designed with PRV's throughout the system. Table 11 lists the PRV stations. The King specifications required that they be installed in vaults, with bypass piping, valves, and pressure gauges or gauge connections. The vaults were required to be either sections of concrete pipe, corrugated pipe, or timber boxes. A Cla-Val 90-01 was typically specified for the PRV.

Table 11. PRV Schedule

No.	Location	Size, in.	Type	Model	Bypass
1	McGuinnes	2	Red/sust	Cla-Val	3/4-inch
2	Spruce Drive	2	Red	Cla-Val	3/4-inch
3	Kunz	4	Red	Cla-Val	No
4	---	2	Red	Watts U5	No
5	N. Forest	2	Red	Watts U5	No
6	E. Forest	4	Red	Cla-Val	No
7	Vista West	4	Red	Cla-Val	3/4-inch
8	Cedar Dr.	2	Red	Watts U5	No
9	Redwood	2	Red/sust	Cla-Val	3/4-inch
10	Vista E. Upper	4	Red	Cla-Val	3/4-inch
11	Lower Green	4	Red	Muesco	No
12	Vista E. Lower	2	Red/sust	Cla-Val	No
13	---	2	Red	Watts U5	No
14	Vista	4	Red	Cla-Val	2-inch
15	---	2	Red	Watts U5	No
16	Barberry	4	Red	Cla-Val	2-inch
17	Canyon Pines	4	Red/sust	Muesco	2-inch
18	Hardman	4	Red	Cla-Val	3/4-inch
19	Middle Branch	4	Red	Cla-Val	2-inch

Red = reducing Sust = sustaining

Today, many of the PRV stations are unsatisfactory. Apparently, the engineer's design was not always followed. Many are unsanitary or unsafe, are missing bypass pipes, have missing or inoperable valves, and missing gauges. Most, if not all, of the PRV stations will need to be upgraded or replaced.

Gate Valves

The King specifications generally required gate valves to be iron bodied, bronze mounted, double disc, non-rising stem, push-on or mechanical joints, 2-inch square operating nut, conforming to AWWA C500 standard. This is a typical valve specification. The valves encountered in the system are reported to be generally satisfactory. There appear to be a sufficient number of valves at appropriate locations for maintenance operations.

Air Relief Valves

Air relief valves (ARV) should be installed at all system high points. These valves automatically vent accumulated air. Today, a few air relief valves are installed, but more are

required. This is particularly important since the SVRA water contains a considerable amount of entrained air.

Blow-Offs

Blow offs should be installed at all piping dead ends. These allow stagnant water and/or accumulated sediment to be periodically flushed from the system. Blow-offs have generally been installed at most dead-ends.

Services

It is reported that many of the early services to individual homes are galvanized pipe. Stop and waste valves were also provided on the service. Beginning in the 1980's, services were constructed of copper pipe, which is also the practice today. Stop and waste valves are no longer used, as they are a potential cross-connection and source of contamination. The galvanized services are prone to corrosion and early failure. These will need to be replaced as the need dictates.

WATER SUPPLY WELLS

Two water supply wells were completed within the last several years at SVR. One well, known as Airstrip Well #1, is owned by SVRA. The other, known as RV Park #1, is owned by LVI. The permit application for the SVRA well states that the water is to serve as additional supply for the SVRA platted lots, SVRA amenities, and SVRA common areas. The application for the LVI well (UW 89402) states that the water is to serve the RV Park only. The LVI well will be disconnected from the system when the RV Park disconnects, therefore, it will not be considered further.

There have been earlier attempts at well drilling and development. The 1978 King report mentions a well that was drilled to a depth of 600 feet, just west of the clubhouse, which was dry. A well was later drilled at the mouth of Cedar Canyon, known as the Cedar Creek well, or Cedar No. 1.

Airstrip Well #1

Data for Airstrip Well # 1 is presented in Table 12.

Table 12. SVRA Airstrip Well #1 Data

State Permit No.	UW 90328
Location	SW1/4 NW1/4 S31 T35N R118W
Completion Date	July 30, 1993
Surface Elev.	6200 (approx. feet above MSL)
Total Depth	545 feet
Static Water Level	187 feet
Maximum Permitted Withdrawal	600 GPM

Copies of the UW-5 Permit Application, UW-6 Statement of Completion, Aquifer Test Data, and other information is included in the appendices.

SVRA Airstrip Well #1 was designed by Sunrise Engineering, and drilled by Thomas Drilling, Inc., Afton, WY, in the Spring of 1993. The well was completed and a submersible pump installed. The well is screened at several intervals.

There are some apparent inconsistencies, and missing information, which must be resolved for this well. According to information we have seen, this well penetrates two aquifers, with perforated casing installed at the upper aquifer, thus allowing the upper aquifer to flow into the lower. Normally, this interconnection of two aquifers would not be allowed under DEQ Water Quality Rules and Regulations, Chapter XII. A letter from Sunrise Engineering to DEQ dated 3 February 1993 proposed to install perforated casing at the upper aquifer. DEQ's reply indicates that they agree with this approach. The UW-6, prepared and submitted by Sunrise, does not show the perforated casing at the upper aquifer; however, it does appear on a sketch prepared by Thomas drilling. This question should be resolved, and the UW-6 revised if necessary.

The screen slot size is not provided on the UW-6, which also states that the well is gravel-packed. Gravel-pack is not shown on the Thomas sketch, nor is the slot size. Data should be obtained on the screen and gravel pack, in order to completely evaluate the well's production potential.

According to the Aquifer Test Data, Airstrip Well #1 was pump tested at 690 gpm for 37 hours with a drawdown of 14 feet. Reportedly, a permanent 50 hp pump was then installed, which produced 300 gpm. According to reports, the discharge from this well later decreased to about 200 gpm. The cause of this flow reduction was unknown.

We spoke with Tyson Thomas of Thomas Drilling. He related the following events: He indicated that the first pump which they installed, to the engineer's specifications, did not produce sufficient flow. It was thought that the pump was not performing properly. This pump was then pulled from the well, and shipped back to the factory for testing. Tests confirmed that the pump did comply with specifications. At that time, it was decided to add additional stages to the pump, in order to increase the flow. The pump was modified and

shipped back to SVR. In transit, the pump fell out of the truck, damaging the motor. A new motor was installed at Thomas' shop. The pump was then installed in the well.

We obtained information on pump performance characteristics from Thomas Drilling. The pump is reportedly a Marley-Red Jacket Model 6D330, with nine "A" stages (4.40-inch dia. impeller) and six "C" stages (3.80-inch impeller). Although the reported flow vs. head values do not agree completely with the manufacturer's pump curve, we were able to calculate that the currently installed pump would deliver about 225 gpm into the distribution system. This is in close agreement with the reported flow of 200 gpm. We believe that this pump was never capable of delivering 300 gpm into the distribution system, which operates at a pressure of about 125 psi at the well connection. The reported 300 gpm discharge we believe may have been observed when the pump was discharging through a test pipe, not into the distribution system.

It is reported that, when the well pump is operated, large quantities of sediment are flushed into the distribution system. It is not known whether this sediment comes from the well, or is scoured from deposits in the distribution system pipes which have accumulated over the years. Most likely, it is scoured from the system pipes. This situation needs to be investigated and corrected.

A wellhouse was constructed adjacent to Airstrip Well #1. The discharge piping runs through the wellhouse, and contains an air release valve, check valve, control valve, flow meter, and isolation valve. A liquid-hypochlorite disinfection system is provided in the wellhouse. The well discharge is connected via a 6-inch PVC pipe to a distribution main at Vista Drive. A test connection allows the well to bypass the distribution system and pump to waste.

The well pump is currently operated manually. That is, there is no control system provided which would operate the pump based on tank level, system pressure, or otherwise. Some type of automatic control system must be provided if this well is to be integrated with daily operation of the water system. One approach would be to have the springs serve as the primary water supply. Then, if high demand caused the tank levels to fall to a low level, the well pump would be automatically started to supplement the springs.

Cedar Creek Well

The 1978 King engineering report recommends a well be drilled at the mouth of Cedar Canyon. The February, 1983 King report states that, in December 1981, a well had been drilled to a depth of over 400 feet, without encountering water bearing strata. No well location was given.

The September, 1984 King report states that a well was drilled in the SE 1/4 of the SW 1/4, S32, T35N, R118W. The permit number is given as UW 37449, known as Cedar No. 1. The report states that the well was tested at 400 gpm and was capped. The output from this well was also included in the available water supply calculations. Later, the January 1985 King report excludes the well output from water supply calculations.

We have seen the UW-5 Permit Application for this well, but no UW-6, Statement of Completion, or pump test records. We are told by the State Engineer's Office that they do not have a UW-6 on file, and that the permit has been canceled. A video camera was sent down the well in 1992. Reportedly, the casing is misaligned. This well should be further investigated as a potential water supply source.

DISTRIBUTION SYSTEM MODELING

The entire existing water distribution system was recently modeled by Jorgensen Engineering using the Waterworks Version 1.2 computer program by Synex Systems. For complex water distribution networks such as the one found at Star Valley Ranch computer simulation is a powerful tool.

Model Description

The model is based on data from the Water System Analysis Work Sheets by King Associates - April 1985 (Job. No. 2024 - Sheets 1 through 4) updated by Jorgensen Engineering - August 1996. It includes all piping, water main connections, transmission lines, storage tanks, and pressure reducing valves used in the current system. Elevations are attached to each major distribution location (node) and point of water inflow (source node). Water demand can be appropriated to the various distribution locations based current or future development. Waterworks analyses the network using an iterative process employing one of three different formulas for pipe friction. We choose the Hazen-Williams formula for this model. The program calculates the flow (gpm), head loss (feet), and velocity (fps) for each pipe and the pressure (psi) at each node. Problems within the system are readily apparent upon analysis of the output data, indicated by low pressure at nodes or high head loss in pipes.

Set Up and Approach

The initial task was to create a model that simulated the existing system as accurately as possible. The original King work sheets were compared to "as-built drawings" and information obtained from the current water system operator Bart Barge and updated accordingly. All major pipes were numbered and pipe lengths, diameters, and friction factors were entered as input data. Hazen-Williams friction factors of 110 for the steel pipe and 130 for PVC were used. Individual service connections and minor dead-end (cul-de-sac) lines were not considered in the model. All locations where valves were closed or broken closed were noted and no connection made at these points. Each major pipe connection or distribution point (node) was numbered and appropriate elevation attached and entered. Water demand at each node was based on the current or projected peak hourly demand for each plat within Star Valley Ranch.

There are four sources of water into the system: Prater Canyon spring, Prater storage tank, Green Canyon spring, and Green Canyon storage tank. The existing wells were not

considered in the model as they are not integrated into the system at the present time. Prater Canyon spring was considered a constant flow source limited to 300 gpm. Both Prater and Green Canyon storage tanks were considered fixed grade sources based on tank elevation. Green Canyon spring was also considered a fixed grade source based on the elevation and pressure setting of the Green Canyon pressure relief valve.

Finally, all existing pressure reducing valves were added with their associated pressures and elevations. This creates the pressure zones of the existing system. The model was then run and refined until the we felt that the output (node pressures and pipe head loss) closely resembled the existing conditions.

The purpose of the modeling effort is not only to analyze and trouble shoot the existing system, but to predict and solve problems created by future development. First, some modifications were made to the model to improve the existing system. Different scenarios of higher water demand based on 50%, 75%, and 100% build-out at Star Valley Ranch, were then run with the model. Problem areas (low pressure areas, high pipe head loss) were found and defined for each stage of development. From these results, it is possible to recommend a schedule of system improvements.

Model Results

Case 1: August 1996 Water Demand - Existing System - Current Conditions. Water demand was based on the peak hour flow which was estimated based on actual metered water usage and summarized in Tables 1 and 5. All pipes with closed valves were modeled accordingly. All PRVs were set at their current reported pressures.

The resulting pressures at the nodes were all above 30 psi. However, some of the upper lots in Plats 1, 15, 7, and 8 may experience lower pressures than the nearby nodes if the point of use is at a higher elevation. Some nodes located at lower elevations within a pressure zones experienced excessive pressures, as high as 178 psi. This may be related to the locations and settings of the PRVs. It was found that it was impossible for PRV12 (Vista East Dr.- Lower) to operate properly, presumably because of it's location just up stream from a connection to the 8" main from the Green Canyon tank. With PRV12 open, water was allowed to be directed away from the higher Prater tank area to the lower Green Canyon tank area at a high flow rate. This may be one reason that the Prater side of the system is currently experiencing low pressure problems and water shortage during peak periods.

Case 2: August 1996 Water Demand - Existing System - Modified Conditions. Based on the results of Case 1, the model was modified slightly attempting to improve system performance. All valves within each pressure zone were opened ro provide increased looping. This should improving water flow by reducing pipe friction and water velocity. Problem PRV12 was replaced with a closed gate valve effectively separating the Prater Canyon system from the Green Canyon tank. The Prater Canyon and Green Canyon systems are still connected by the 4-inch interconnect pipe, however. Finally, most of the PRVs were set at lower pressures attempting to reduce excessive pressures at low points in each pressure zone.

The most notable result of Case 2 was that caused by replacing PRV12 with a closed gate valve. Pressures in Plats 7 and 8 of the Prater Canyon system improved significantly. In addition, water from the Green Canyon spring source helped supply the Prater tank through the interconnect pipe. Opening all possible gate valves within pressure zones also helped improve pressures. Only one valve was required to remain closed and is located between Zones 1 and 2 . Setting the existing PRVs at lower pressure helped relieve points of excessive pressure somewhat, but the locations and numbers of PRVs may need further analysis to bring pressures at these points to reasonable values, without sacrificing pressure at points of high elevation. Maintaining pressure at the highest lots of Plats 1 and 15 without generating excessive pressures at low points within this area will prove difficult because the main comes into the plats at a relatively low elevation.

Case 3: 50% Build-Out Water Demand - Existing System - Modified Conditions. For this scenario the same system configuration and conditions as Case 2 were used with no further improvements. Water usage was set at peak hourly demand for a 50% build-out condition. Unlike the water demand for Case 1 and Case 2, where the current development of each plat varies widely, this case assumes that each plat is equally developed, with a home built on one half of the lots within Star Valley Ranch.

Pressure problems developed in the upper nodes of Plats 1 and 15, apparently caused by the high head loss in the 2", 3", and 4" water mains supplying theses areas. Plats 1, 2, 3, 15, 20 ,and 22 are all supplied by only one continuous water main that starts at the Prater tank as a 6" steel main and then goes to 4" PVC at the connection between Plat 15 and 1. High pipe friction is starting to become a problem as demand increases in these plats. Replacing the existing water mains with larger diameter PVC pipe and adding new mains for looping will increase pressure in these areas.

Case 4: 75% Build-Out Water Demand - Existing System - Modified Conditions. For this scenario the same system configuration and conditions as Case 2 and 3 were used (unimproved). Water usage was set at peak hourly demand for a 75% build-out condition. Again, each plat was assumed equally developed.

With this water demand, all of Plat 1, most of Plat 15, parts of Plats 3 and 20 experienced pressure problems. The upper end of Plat 8 showed some pressures lower than 35 psi, apparently caused by high pipe friction in the 4" and 2" mains in this area. The remaining entire ranch is starting to feel the effects of high head loss in the undersized water mains. Eight of the PRVs are now wide open.

Case 5: 100% Build-Out Water Demand - Existing System - Modified Conditions. For this 100% build-out situation it is assumed that Star Valley Ranch is fully developed. Again, the water usage is set at the peak hourly demand and the system is the same as in Cases 2, 3, and 4.

The high demand and increased pipe friction results in wide spread system failure with pressures falling dramatically over most of the development. All of Plats 1, 2, 3, and 15

experience severe pressure loss. In Plats 7 and 8 pressures drop to below 25 psi at the upper nodes. Plats 9, 10, 11, 12, 13, 14, 17, and 18 in the Green Canyon system are also experiencing pressures as low as 20 psi with even lower pressures likely at points of high elevation. The low lying Plats 4, 5, and 21 are maintaining pressure due to their elevation. Plats 20 and 22 are also maintaining pressure because of the combined effect of their low elevation and proximity to the Prater tank. Most of the problem areas would show adequate improvement with the replacement of some of the small diameter water mains with new larger diameter PVC mains at specific locations.

CHAPTER 4

NEEDS AND ALTERNATIVES

This chapter identifies the planning period, design criteria, the need for service extensions, future needs, and recommended improvements.

PLANNING PERIOD

In Chapter 2, we projected that SVRA will reach buildout in 15 to 25 years, depending on the rate of growth. A typical planning period for this type of study is 20 to 30 years, which would encompass the estimated time period to reach buildout at SVRA. For the purposes of this report, we will assume a 20-year planning period, and that buildout will occur near the end of the 20-year planning period.

DESIGN CRITERIA

All system upgrades must comply with Wyoming DEQ Water Quality Rules and Regulations, Chapter VII. New source development must comply with the requirements of the Wyoming State Engineer's Office. As a minimum, design and construction will comply with Wyoming Public Works Standard Specifications. Water demand projections will be based on historic water usage, as determined by our evaluation of flow meter records.

SERVICE EXTENSIONS

No service extensions are planned or anticipated beyond the limits of the current SVR plats.

SYSTEM NEEDS AND RECOMMENDED IMPROVEMENTS

An increased water supply, and other system improvements, will be required in order to continue to provide an adequate, reliable water supply to SVRA residents. Some improvements, such as replacing all steel pipe, should be made as soon as funds are available. Other improvements, such as additional water supply wells and larger distribution pipes, will not be required until a certain number of homes are built on the ranch. This section identifies and discusses system improvement needs, alternatives, and timing.

Water Supply Wells

Until automatic controls are installed at the Airstrip No.1 well, and operational problems with this well resolved, only the flow from the two springs can be considered as a firm, reliable source. The historic, minimum combined spring flow is 1.05 mgd. According to the flow meter records, during the period August 12 to August 25, 1996, the 467 SVRA homeowners used approximately 1.05 mgd. Therefore, for planning purposes, there is currently no water available to serve additional homes. If a drought similar to August 1987 were to recur, and spring flows dropped to historic levels, existing SVRA homes would suffer a water shortage.

Therefore, the first priority is to fit the Airstrip No. 1 well with automatic controls tied to Green Canyon tank level, and test and resolve the operational problems with this well. This should be done immediately. When this is done, the flow from this well could be included in the firm water supply, which would increase the reliable supply to 1.35 mgd. Based on August 1996 usage of approximately 2,300 gpd per home, approximately 600 homes could then be served even during a drought year.

When approximately 550 homes are built on the ranch, a larger pump should be installed in the Airstrip No. 1 well. Based on recent growth, we estimate that 550 homes will be reached in about two years. This well was reportedly pump tested at 690 gpm, therefore, a 600 gpm pump should work satisfactorily, and should be installed in the year 1998. This would increase the water supply to 1.90 mgd, sufficient to serve 850 homes.

A new well must be constructed prior to reaching 850 homes. Ultimately, four to six new wells may be required, along with a third storage tank. As discussed later in this section, this tank should be located in the southeast part of the ranch, in the Cedar Canyon area. It makes sense then to consider the water system as having three divisions: Prater Canyon, Green Canyon (served by Airstrip wells), and Cedar Canyon. We would recommend that each division have its own storage tank and wells. Under this scenario, two wells and a tank would serve the Prater Canyon area, and so on for the Green Canyon area and Cedar canyon area, for a total of three tanks and up to six wells which may ultimately be included in the system. Each pair of wells would be controlled by its respective storage tank level, via a radiotelemetry system.

Proposed well locations are shown on Figure 1. Factors we considered in site selection included proximity to the storage tanks, the ability to pump directly into the distribution system, and availability of three phase power, among others. According to file documents, the best well locations would be at least one mile west of the foot of the mountains. Based on available data, we believe that it may be possible to develop wells capable of producing at least 300 gpm in one or more of these locations. The proposed well sites must be reviewed and the best site(s) confirmed by a hydrogeological study prior to drilling. This study should be undertaken within the next year.

Based on historic homeowner usage, each new 300 gpm well would be capable of serving 180 to 200 additional homes. The water supply program is presented in Table 13.

Table 13. SVRA Water Supply Program

Construct When No. of Homes Built	Estimated Year Cumul.	Calendar	Action	Firm Capacity, mgd	Adequate to Serve No. of Homes
--	0	1996	Exist conditions	1.05	467
Now	1	1997	Install automatic controls, Airstrip No. 1 well	1.35	600
550	2	1998	Install 600 gpm pump, Airstrip No. 1 well	1.90	850
750	6	2002	Construct Airstrip No. 2 well	2.33	1030
930	9	2005	Construct Prater No. 1 well	2.76	1210
1110	12	2008	Construct Cedar No. 1 well	3.19	1390
1290	14	2010	Construct Prater No. 2 well	3.63	1570
1470	16	2012	Construct Cedar No. 2 well	4.06	1750

Notes:

1. Assumes buildout occurs in approximately 20 years.
2. Assumes all new wells 300 gpm each.
3. Assumes current water demand of 2,300 gpd per lot does not change.
4. Assumes Prater Canyon spring remains in service.
5. An additional standby well should be constructed per DEQ requirements.

Flow meter records and the pace of home building should be monitored and the timing of the new wells adjusted to reflect changed conditions. For example, replacement of the steel pipe in the distribution system will eliminate leaks and thus reduce the average water consumption, thereby allowing construction of new wells to be deferred. Or the rate of growth could increase, requiring accelerated well construction.

Each well in a pair would be located in close proximity to each other, but with enough separation to avoid drawdown interference. A small building at the site of each pair of wells

would house a flowmeter and piping, power and controls, and chlorination system. The existing Airstrip No. 1 well and wellhouse will form the nucleus for the Airstrip/Green Canyon division.

Ideally, each pair of wells would pump directly into the distribution system. However, this may not be possible in all cases, depending on the final well location and configuration of pressure zones. In this case, a force main would be constructed for the wells to pump directly into the storage tank.

SVRA should begin investigating the availability of sites or easements in the vicinity of the proposed well locations, and acquire the sites or easements in advance of the need for well construction. We understand lots 11 through 14 and 85, Plat 17, are owned by SVRA. These could be potential well sites, subject to further hydrogeologic investigation.

Springs

The two springs provide a significant supply of water to SVRA, and at low cost. Based on the field observations, it does not appear that any improvements to the spring collection areas are warranted at this time. However, as discussed in Chapter 3, either spring has the potential to come under the direct influence of surface water during parts of the year. We recommend that SVRA begin a regular particulate testing program for each of the springs, and collect data for several years. This data may be needed in the future in order to demonstrate that the water meets EPA water quality requirements. It will also be useful to guide SVRA decisions involving spring improvements, whether or not to invest in replacement of the Prater Canyon transmission pipeline, and, ultimately, whether or not the springs should be abandoned at some time in the future.

We can provide assistance with setting up a testing program, and recommending a testing laboratory. The cost of the testing program should be minimal.

Also, SVRA should endeavor to reach an agreement with LVI with respect to the spring water rights. We recommend that these water rights be transferred to SVRA in their entirety. Adjudication of water rights for the SVRA platted lots could then proceed. At the time of this writing, the State Engineer's Office was unsure when the water rights could be adjudicated. Must a home be built on each lot? Or could the existence of a service tap for each lot suffice? Or would the existence of the distribution pipes alone suffice?

Transmission Pipelines

The transmission pipelines are a critical element of the SVRA water system. A break in either of these pipelines would curtail the flow of water from the respective spring. The Green Canyon pipeline is the more important of the two, because it generally carries three times the water carried by the Prater Canyon pipeline.

Prater Canyon Pipeline. If the Prater spring is to remain in service as a source of culinary water, then the entire length of the 25-year old, steel pipeline should be replaced with a properly installed PVC pipe. It would probably be less expensive to drill a new well and abandon the Prater spring as a source of drinking water. A new 300 gpm well would make up for the water typically supplied by Prater Canyon in the month of August. If this new well was constructed to replace the lost culinary water, the Prater Canyon spring and pipeline could then be used as an irrigation source. In this case, we would not recommend that the Prater Canyon pipeline be replaced, because an interruption in irrigation service is more easily tolerated should the pipeline break. Sufficient head is available in Prater pipeline to force water over the hill to the SVRA golf courses, or a storage reservoir. It would be necessary to file an application for change of use with the State Engineer's Office.

Green Canyon Pipeline. The Green Canyon pipeline is only 10 years old, is constructed of corrosion-resistant PVC, and delivers three times the water of Prater pipeline during the critical month of August. We recommend that the Green Canyon spring and pipeline continue in service indefinitely. The only upgrade we would recommend at this time would be to replace the steel pipe which is suspended in the air across the creek just below the spring collection box. The pipeline should be regularly inspected for damage or erosion, particularly following rainstorms or flooding.

Zeroing Boxes. All three of the zeroing boxes (one on Prater pipeline and two on Green) should be replaced with boxes of improved design as soon as possible. The existing boxes are a source of air and contamination. The collection boxes (one at each spring) should be inspected internally to determine if replacement is warranted.

Storage Tanks

The existing storage tanks are in satisfactory condition and should remain serviceable for many years. However, a third additional storage tank will be required in the future.

Good engineering practice dictates that sufficient storage be provided to ensure uninterrupted water service during a power outage or well pump failure. For this size system, DEQ regulations require that storage equal to 25 percent of the maximum day demand be provided.

We project that the maximum day demand at buildout will be approximately 4.0 mgd, based on current usage. However, demand will likely decrease as leaky steel pipe is replaced, and other water conservation measures, such as meter-based billing, are implemented. Therefore, future maximum day demand could be closer to 3.0 mgd. Assuming that maximum demand falls in the range of 3.0 to 4.0 mgd, total storage volume in the range of 750,000 gallons to 1 million gallons would be required. Current total storage volume is 575,000 gallons, therefore, the capacity of the third tank would need to be in the range of 175,000 to 425,000 gallons.

The new tank should be constructed when the maximum day demand exceeds about 2.3 mgd. (575,000 gallons / 0.25 = 2.3 mgd.) This is projected to occur when approximately 1,000 homes are constructed, which, based on recent growth rates, will occur in eight to ten years.

The new tank should be buried, and of concrete construction. The tank will serve the south end of the ranch, and will need to be located on the hill on the east side of the ranch, preferably near Cedar Canyon. It should be located at least as high as the elevation of Green Canyon tank, or EL 6500 feet. A location on private property would be easier to permit than a location on Forest Service land. No homes should exist on the property. Several lots in Plat 17 meet this criteria. SVRA should begin to investigate the possibility of purchasing one of these lots for a future storage tank site. We can provide specific lot recommendations.

Distribution System

The following system upgrade recommendations are based on the distribution system computer modeling effort and the age and material of the existing water mains.

Current - 1996

- Investigate and verify underground pipe configuration, connections and materials, especially at critical locations including but not limited to Vista East Dr., Green Canyon Dr., and Vista Dr. between Alpine Way and Star Peaks Way.

- Open all gate valves within pressure zones to facilitate looping. This would include replacing broken valves, fittings, and associated piping.

- Replace PRV12 (Vista East - Lower) with a 6" gate valve allowing the Prater system and Green Canyon system to be separated at this point.

- Set specific PRVs to lower pressures to reduce excessive pressures at low points.

Before 50% Build-out

All Plats:

- Replace all steel water mains. This should be accomplished within the next seven years at an approximate rate of 5000' of steel pipe replaced per year. In addition to increasing pressures in problem areas this will do much to reduce leakage, possible contamination, and maintenance. The long term result will be less water need and possibly fewer new wells and storage tanks required in the future. Steel pipe to be replaced is included in the list below.

Plats 1, 2, 3, 15, 20 and 22:

- Replace 7000' of steel pipe in Plat 15 with 6" PVC.

- Replace 3100' of 2", 3", and 4" PVC water main in Plat 1 with 6" PVC.

- Add 2700' of 8" PVC water main from Cedar Dr. to Muddy String Road. This provides a separate high pressure main to Plats 1, 2, 3 and 15 and reliability looping for Plats 20 and 22. Also, this main replaces 900' of steel pipe between Cedar Dr. and East Forest Dr.

Plats 6, 7, 8, 9, and 11:

- Replace 5500' of steel pipe along Cedar Way, Vista West Dr., and Vista East Dr., and Green Canyon Dr. with 6" PVC.

- Replace 1200' of steel pipe from Prater zeroing box to Plat 8 with 6" PVC.

Plats 12, 13, and 17:

- Replace 3100' of steel pipe along Alpine Way and Cedar Creek Dr. with 8" PVC.

- Replace 7200' of steel pipe along Vista Dr., Hillside Way, and Canyon Pines Way with 6" PVC.

Plats 4 and 5:

- Replace 7500' of steel pipe along Vista Dr., Muddy String Rd., and Cedar Creek Dr. with 6" PVC.

<u>Before 75% Build-out</u>

Plats 1, 2, 3, 15, 20, and 22:

- Replace 1900' of 6" PVC water main along Muddy String Rd. between Plat 22 and 15 with 8" PVC.

- Add 2200' of 6" PVC along Clark Lane connecting Plats 1, 2, and 15 to providing reliability looping.

- Reconfigure and add PRVs.

<u>Before 100% Build-out</u>

Plats 6, 7, 8, 9, and 11:

- Replace the entire interconnect line from Green Canyon tank to Prater Canyon (Cedar Dr.) with 6500' of 6" PVC.

- Replace 1100' of 2" PVC water main along Alpine Way to Walnut Dr. with 6" PVC.

Plats 12, 14, 17, and 18:

- Replace 5100' of 4" PVC water main along Solitude Drive, Alta Drive, Alpine Way, and Cedar Creek Dr. with 8" PVC.

- Replace 4600' of 4" PVC water main along Hardman Rd. with 6" PVC.

Chlorination

After sufficient particulate data is accumulated, and assuming it is decided to retain the springs as a water source, we would recommend that chlorination equipment be installed to treat water from the springs. Two chlorination systems would be required, one for each spring. The chlorination equipment would be located in a small building near the lower terminus of each pipeline, but just upstream of the storage tank.

Each pair of new wells would be furnished with a chlorination system, housed in the wellhouse.

A liquid hypochlorite system is presently installed in the Airstrip wellhouse. Either a liquid hypochlorite system with positive-displacement pump, or a gas chlorination system with booster pump, could be used on future installations. This could be decided by operator preference. A step-rate, rather than flow-paced, control system should be feasible at all locations.

Power and Controls

Electrical power and controls will be required at each of the two existing and one proposed tanks, and at each of the three proposed wellhouses. Tank level will be controlled by float switches in the tank which open and close a solenoid-operated level control valve. Each tank will be fitted with these controls, which will operate on 120 VAC. A radiotelemetry transmitter will send level signals to the tank's wellhouse, which will call for one or both well pumps to run, based on tank level. A local external alarm light at each tank and wellhouse is recommended.

Three-phase 460 volt power will be required at each of the three wellhouses, to power the pumps. A master telemetry unit will be located in one of the wellhouses, which will monitor tank level and well pump operation at the other two sites. If an alarm is initiated the master unit will activate a telephone dialer, which will dial a pre-selected phone number for alarm notification.

Electrical power (120 VAC) will also be required at the chlorination buildings for the Prater and Green pipelines.

CHAPTER 5

WATER SYSTEM PROGRAM

This chapter presents the long-range water system master plan for the Star Valley Ranch Association. The program described in this chapter includes water conservation measures, recommended projects with implementation schedule and budget cost estimates, water utility organization, funding options, a financing plan, and user rates.

WATER CONSERVATION MEASURES

Water conservation measures are a major component of the master plan. To the extent that SVRA can reduce per capita water consumption, the number of new water supply wells needed can be reduced, and/or their construction deferred.

Water meters coupled with usage-based billing are one of the most effective conservation measures. In the Town of Jackson, summertime water usage decreased 20 to 25 percent when meters were installed in 1988. SVRA will continue to install water meters with all new services. Meters will be installed on existing services which are currently unmetered. All unmetered services should be fitted with meters within ten years. Once all services are metered, SVRA can begin usage-based billing. Meters should be read periodically, either quarterly or annually, and individual services billed according to actual water usage.

Another effective conservation measure is to reduce excessive system pressures. Based on our hydraulic modeling study, many PRV's are set to maintain unnecessarily high pressures. Excessive pressures result in increased water usage, both by consumers and through leaks. A 20 psig reduction in line pressure can reduce water usage by 20 to 30 percent. Ideally, pressures within a zone should be in the range of 45 to 65 psig. Consumers are normally satisfied with these pressures, and water usage will be reduced significantly. Prior to the 1997 summer season, SVRA should reset selected PRV's to lower pressures as indicated by the model results. We will provide SVRA with the recommended pressures.

The old, steel water mains are suspected to be the source of major leaks. These steel mains are scheduled for replacement as part of the distribution system upgrade. Replacement of these lines should result in significantly decreased leakage, which will have the effect of reducing per capita usage.

Homeowners should be encouraged to water lawns during the cool evening and early morning hours. This will result in less evaporation loss, and so less water will need to be applied. This will also help to maintain adequate system pressures during peak daytime use periods.

PROGRAM DESCRIPTION

The SVRA water system master plan incorporates the recommended improvements presented in Chapter 4 of this report. The improvements will be phased over a 20-year period. The timing of improvements such as additional wells, and upsizing of distribution pipes, is linked to the rate of home construction, and to the trend in per capita water usgage. The master plan program is summarized in Table 14.

Response to SVRA Board of Directors Comments

Several board members had comments on the recommended program which was presented at the board meeting on September 21, 1996. The general concern centered around the cost of pumping the new wells which will be needed. Several alternatives to new wells were suggested:

1. *Could we capture additional water at the Green Canyon springs, and install a second pipeline to convey it to the SVRA culinary system?* At $35 per foot, a second parallel pipeline 7,550 feet long would cost approximately $264,000 to construct. The annual cost of pumping one 300 gpm well will be approximately $15,000 per year, for full time pumping. (This is based on a 200 foot lift, discharge into a 65 psig system pressure, pump efficiency of 60 percent, and a power cost of 5 cents per kilowatt-hour). Assume that an additional 300 gpm could be developed from the springs, equivalent to one new well. The avoided pumping cost would then be $15,000 per year. Thus it would take nearly 18 years of avoided pumping to pay back the cost of constructing the second pipeline. On a present worth basis (where the value of future dollars is discounted relative to present dollars) it would take longer than 18 years to payback the cost of constructing the pipeline. (Note that the well would need to be constructed regardless, in order to be available for use during years of low spring flow, thus the cost of the well construction is not saved.)

Another way to look at it is to assume that the new pipeline would have a useful life of 30 years. At a 7 percent discount rate, the present worth value of 30 years of avoided pumping cost at $15,000 per year is $186,000. Under these assumptions, it is less expensive to pump the well for 30 years than to build a second pipeline.

In any case, it is not likely that additional water of satisfactory quality could be developed from the Green Canyon springs. At least two attempts have been made over the years. One attempt in the 1980's to develop Cascade springs did develop some additional water, but also introduced coliform contamination into the system. This attempt was quickly abandoned. The other attempt in 1992 was unsuccessful in developing new water, which then apparently led to the decision to construct the Airstrip Well #1.

2. *Could we capture the overflow from the zeroing boxes?* Yes. During periods of high flow, some water overflows from a pipe in the lower zeroing box in Green Canyon. When the zeroing boxes are reconstructed, we will design them so they no longer overflow. We

believe that the overflow does not exceed more than 100 to 200 gpm. In the meantime, a flow meter should be installed on the overflow pipes to measure the amount of overflow.

3. *Could we capture the water that is currently discharged through the Green Canyon PRV into the Brog pipeline?* Yes, during periods of high flow. This PRV is located in the Green Canyon culinary pipeline at the Brog settling basins, and functions to relieve excessive pressure in the culinary pipeline. Pressure in the culinary pipeline is inversely related to flow, that is, the pressure is lower under high flow conditions. The PRV is set to relieve at about 90 psig. We modeled this pipeline under various flow conditions. The model indicates that the pressure in the culinary pipe is about 90 psig at a flow of 950 to 1,000 gpm in the culinary line. Thus at higher flows, the PRV is closed and no water is discharged to the Brog pipeline.

When flows are less than about 950 gpm, the PRV will discharge. This will occur during periods of low demand, when the storage tank is full. The only way to capture and utilize this water would be to construct an additional storage tank and a pipeline to convey the water from the PRV to the storage tank. We estimate the cost of a second 400,000 gallon tank, and a 2,200 foot pipeline, to be about $500,000. Assume that this arrangement could yield an additional 400,000 gallons of water per day. This is equivalent to the production of a new 300 gpm well. The construction cost of the well is estimated to be no more than $100,000. The present worth value of 30 years of pumping at $15,000 per year is $186,000. The total present worth of the well plus pumping is then $286,000. Clearly, a new well is a less expensive alternative.

4. *Consider installing a separate force main pipeline for the Airstrip Well #1 to pump directly into Green Canyon tank. The pumping head would be less than pumping directly into the distribution system, and more water could be pumped.* Currently, the static head on the system where the well connects is equal to the water level in the tank. That is, the water stored in the tank "floats" on the distribution system. Therefore, the total head would be no less with a dedicated force main, and might be greater due to friction losses in a smaller pipe. Thus, no more water could be pumped.

Three Year Administrative Program

This section summarizes, for quick reference, the administrative actions SVRA will need to undertake during the next three years.

1. Execute the water system separation agreement with LVI.

2. Form an Improvement and Service District (ISD), for the purpose of funding water system capital projects.

3. Begin building a capital improvements fund by levying annual assessments in accordance with the ISD procedures for water system improvements.

4. Transfer the culinary water rights from LVI to SVRA, in accordance with the separation agreement. This will involve preparing and filing documents with the State Engineers Office.

5. Undertake a hydrogeologic study to investigate and determine the best locations for new water supply wells. A consultant specializing in this area should be retained by SVRA. We recommend Hinckley Consulting, located in Laramie, a well-regarded consultant with whom we often work.

6. Begin to identify and acquire sites for new wells, and the Cedar Canyon storage tank.

7. File applications (UW-5) with the State Engineers Office for new wells, as follows:

Two wells, located in SE1/4 NE1/4 S25 T35N R119W. (Prater Canyon wells, Plat 20)

One well, located in SW1/4 NW1/4 S31 T35N R118W. (Second Airstrip well)

Two wells, located in SE1/4 SE1/4 S31 T35N R118W. (Cedar Creek wells, Plat 17)

Two wells, located in SE1/4 SE1/4 S6 T34N R118W. (Cedar Creek wells, Plat 21)

Note: Only one of the two Cedar Creek locations may ultimately by used.

8. Maintain the water rights permits in good standing by requesting time extensions each year until the time is right for adjudication.

9. Begin detailed design and preparation of plans and specifications for construction of the first capital projects.

COST ESTIMATES

The cost estimates presented in Table 14 are given in 1996 dollars. Construction costs include a total contingency of 10 to 15 percent. Engineering, permitting, legal, and administrative costs are budgeted at 33 percent of construction costs. O&M costs presented in a later section include labor and fringes, power, equipment, materials and supplies, laboratory testing services, and chlorine.

The cost estimates for the wells include drilling and casing the well, development and testing, well pump, and connection to the system. The cost assumes that a force main will be required for the well to discharge to its tank. The cost for the first well in each pair includes a wellhouse to house piping, power, controls, and chlorination equipment.

Replacement cost for the Prater Canyon pipeline is based on $30 per foot. Replacement cost for the steel distribution pipe is based on $25 per foot, including road surface restoration. The Cedar Canyon tank cost assumes a 300,000 gallon tank at $1.50 per gallon.

Detailed construction cost estimates will be prepared at the time each improvement is scheduled for construction. The budget level costs given in Table 14 are provided for planning purposes.

IMPLEMENTATION SCHEDULE

The implementation schedule is as shown on Table 14. As explained in Chapter 4, the timing of new wells and upsizing of distribution pipes is linked to the number of homes built on the ranch, and the trend in per capita water usage.

PERMITTING

A number of permits will be required to construct the various improvements. These include the Forest Service Special Use Permit, DEQ Permit to Construct, Right-Of-Way and Easement Acquisition, Water Rights, Archeological Review, and Lincoln County Building Permit.

Forest Service Special Use Permit

A Special Use Permit is required for any improvements constructed on the Bridger National Forest. This includes reconstruction of the zeroing boxes, any improvements at the spring areas, replacement of the Prater Canyon pipeline, and any other work on the transmission pipelines.

DEQ Permit to Construct

The DEQ Permit to Construct is required for all improvements, additions, expansions, or extensions to the culinary water system. DEQ must review and approve the plans and specifications for each project prior to construction. These must conform to DEQ regulations for design and construction of community water systems.

Right-Of-Way and Easement Acquisition

Some of the improvements, such as new wells and the storage tank, will need to be constructed on property which is currently privately owned. For the wells, it might be possible to negotiate with the property owner to purchase an easement for the well site and pipe connecting to the distribution system. The feasibility of this option will depend on the size and configuration of the lot, and whether or not a home has been built. It would be

desirable to purchase unbuilt lot(s) outright for the new wells. Siting of the new Cedar Canyon tank will require that an unbuilt lot be purchased on the hillside in Plat 17. We can recommend an appropriate lot for the tank site. Although preliminary inquiries can be made, final acquisition of well sites should not proceed until the hydrogeologic study is completed.

Construction of the steel pipe replacement project along Muddy String Road and Cedar Creek Drive will require a license agreement from Lincoln County for construction within county right-of-way.

Water Rights

As mentioned earlier, culinary water rights shared with LVI will be transferred to SVRA following execution of the separation agreement. This will require application to the State Engineers Office. For the new wells, application must be made to the State Engineers Office via the UW-5, "Application for Permit to Appropriate Ground Water."

Archeological Review

Wyoming law requires that these types of projects must be reviewed by a qualified archeologist to ensure that significant relics are not disturbed without proper investigation. Most of the land which improvements will be constructed upon has already been disturbed, therefore, this permit should be relatively straightforward to obtain.

Building Permit

Lincoln County may require review and issuance of a building permit for structures such as new wellhouses.

WATER UTILITY ORGANIZATION AND ADMINISTRATION

SVRA should form an Improvement and Service District (ISD) for the purpose of funding water system improvement projects. The ISD is the only district available to SVRA because it is the only type of district in which nonresident landowners are qualified to vote as members. The ISD is managed and controlled by a three member board, and has the authority to borrow money, receive grants, and levy special assessments against property, subject to a vote of the members. Attorney David Palmerlee kindly prepared a memorandum which describes how the ISD can be formed and operated. This memorandum is included in the appendices.

The water utility budget should be set up as an enterprise fund, that is, a self-sustaining fund where revenues equal expenses, all utility-related revenues go into the fund (not into the general fund), and user fees are set each year at a level sufficient to generate the revenue needed to fund that year's budget.

FUNDING OPTIONS

A number of water utility funding options are available to SVRA following formation of the ISD. These include the annual assessments currently allowed by the DCCR's, special assessments as allowed under the ISD, grants and low-interest loans from the Wyoming Water Development Commission or Wyoming Farm Loan Board, commercial bank loans, or general obligation bonds. Recent amendments to the Safe Drinking Water Act provide for the establishment of a State Revolving Fund (SRF) which will make loans for water system improvements, however, the details and timing of this program are not yet available. Other programs, such as Community Development Block Grants, and Rural Development Association (formerly FmHA) are only available to municipalities and/or low to moderate income residents.

Ultimately, when all services are metered, SVRA should fund the water utility at least in part with usage-based charges.

DCCR Annual Assessments

The DCCR's allow annual assessments to be made against each lot for the purposes of operating and maintaining SVRA common facilities and infrastructure. In the past, a portion of the monies collected each year have been made available that year to fund operation, maintenance, and replacement of the water system. The annual assessment is currently the most practical funding source available to SVRA.

The DCCR's also allow for Special Assessments for Capital Improvements. A Special Assessment may be made in addition to the annual assessment, if approved by a 2/3 majority of the voting members, for the purpose of capital improvements. Special Assessments must be authorized by the members each year they are proposed.

Improvement and Service District Special Assessments

The ISD has the power reserved to governmental entities to assess the lands within the ISD to repay debt incurred for construction of water system or other improvements and operation and maintenance of those improvements. Whenever a specific project is proposed by the ISD board and authorized by the landowners within the ISD, an assessment roll is prepared assessing the annual costs of the project to the lands within the ISD. The assessment roll is delivered to the county tax officials who are responsible for annually assessing and collecting the assessments from the landowners within the ISD.

Wyoming Water Development Commission

The WWDC provides grants and loans which fund water development and rehabilitation capital projects within the State. Eligible project costs may qualify for up to 60 percent grant

funding if approved. The balance of eligible costs may be loaned by the WWDC. The interest rate for these loans was recently increased from 4 percent to 7-1/4 percent, equal to the Farm Loan Board rate. The term of the loan is generally 20 to 30 years. Project O&M costs must be paid by the sponsor.

The New Development Program funds eligible project costs for development of new water supplies. Eligible costs can include groundwater wells, storage tanks, and transmission pipelines. The New Development Program does not fund distribution system projects, nor water treatment facilities. The due date for project applications and fees is the 15th of September each year.

The Rehabilitation Program funds rehabilitation of existing water systems. Eligible project costs are generally the same as the New Development Program. Maximum grant funding is limited to 50 percent of project costs.

Wyoming Farm Loan Board

The Farm Loan Board provides loans and grants for water system capital projects, among others. Loans are made under the Wyoming Joint Powers Act Political Subdivision Loans program. The interest rate is 7-1/4 percent. Grants are made under the Federal Mineral Royalty Capital Construction Account Grants program. Grants may be authorized for up to 50 percent of eligible project costs. Grants may exceed 50 percent under special conditions. Whether water meters have been installed or will be installed is a consideration. The Farm Loan Board meets monthly to consider loan applications. Loan applications must be received at least ten days prior to the monthly meeting. The Board meets in January and July to consider grant applications. Grant applications must be received in October and April, respectively.

USER RATES AND FINANCING PLAN

In the 1996 fiscal year (which is the same as the calendar year), SVRA assessed $308.10 per lot as the annual assessment under the DCCR's. The total revenue generated was approximately $662,000. This revenue goes into the general fund. A portion of this revenue went to fund the water utility budget. The 1996 water utility budget and expenses are presented in Table 15.

Table 15. 1996 SVRA Water Utility Budget and Expenses

Description	Budget	Actual YTD	Variance
Payroll	$63,869	$41,777	-$22,092
Payroll Taxes	12,737	7,757	-4,980
Benefits	3,600	3,300	-300
Culinary Maintenance	65,000	62,116	-2,284
Culinary Replacement	0	31,009	31,009
Totals	$145,206	$145,959	$753

Notes: 1. YTD is through October 1996.
2. Water system payroll, taxes, and benefits shown in Table 15 are estimates based on the estimate by SVRA personnel that 75 percent of total utilities labor went towards the water system.

Hook-up fees are currently $1,200 per new connection. To date in 1996, hook-up fees have generated $44,550 in revenue. The balance of the water utility revenue came out of the general fund. The 1996 water utility revenues are presented in Table 16.

Table 16. 1996 SVRA Water Utility Revenue

Description	Revenue
Hook-Up Fees	$44,550
General Fund	100,656
Total	$145,206

Note: All general fund revenue is generated from the annual assessment under the DCCR's.

In 1996, not including hook-up fees to new homes, each property owner paid $100,656 / 2,032 lots / 12 mos. = $4.13 per month to fund the water utility.

Monthly O&M expenses (including new hook-ups) averaged $11,495 per month (disregarding the $31,009 unbudgeted expense for "Culinary Replacement"). Projecting this level of expense through November and December, the total annual O&M expense for 1996 is projected to be $137,940. This is slightly less than the $145,206 which was budgeted.

For 1997, the O&M budget should be increased 3 percent to account for inflation, or $145,206 x 1.03 = $149,562. For budgeting purposes, this will be rounded up to $150,000.

Funding for the recommended capital projects program must raise a total of approximately $3.7 million over the next 17 years, or an average of approximately $225,000 per year. Initially, SVRA should plan on generating this revenue internally, by an annual assessment as allowed under the ISD. Later, when the first new well is needed, or another eligible project such as the storage tank or transmission pipeline replacement, SVRA can make application to WWDC or the Farm Loan Board for funding assistance. It may be advantageous to group several projects within a single funding application, rather than submitting multiple applications for individual projects in successive years. This approach should be discussed with the prospective funding agencies.

Approximately $31,000 was spent in 1996 on unbudgeted "Culinary Replacement." A replacement fund should be established in the budget to allow for these unanticipated expenses related to repair and/or replacement of worn-out or obsolete system components. For 1997, this fund should be established at $40,000.

Finally, a reserve fund should be established, which would not normally be expended except in unusual or emergency situations. We recommend a reserve fund of $50,000, which should be accrued over the next five years at $10,000 per year until the fund reaches the target amount. Thereafter, this fund should be carried forward in the water utility budget from year to year. Charges against this fund should not be allowed except by special resolution of the ISD board.

Table 17 presents the recommended 1997 water utility budget. We recommend that the hook-up fee be increased to $1500. Estimated revenue from hook-up fees is based on 30 new connections x $1500 per hook-up.

Table 17. **Recommended SVRA 1997 Water Utility Budget**

Description	Amount	
Expenses		
Operation & Maintenance	$150,000	
Capital Projects Fund		225,000
Replacement Fund	40,000	
Reserve Fund	10,000	
Total Expenses	$425,000	
Revenue		
Hook-Up Fees	$45,000	
Annual Assessments	380,000	
Total Revenue	$425,000	
Assessment Per Lot (Based on 2,032 lots)		
Per Year	$187.01	
Per Month	15.58	

The assessment needed to be assessed against each property is $380,000 / 2,032 lots = $187.01 per lot per year, or $15.58 per month. This monthly rate is comparable to what other Wyoming municipalities pay for water service. Based on data reported in the Municipal Survey conducted in 1992 by the Wyoming Water Development Commission, we calculated the state-wide monthly average household water bill to be $15.95 per month in 1992. Adjusted 10 percent for inflation, the average would be $17.55 per month in 1996. For metered services, we calculated the 1996 average household bill to be $19.32 per month, and for unmetered services, $12.83 per month. For the Star Valley communities which responded to the survey (Afton, Bedford, Freedom, and Thayne), we calculated the 1996 average to be $17.05 per month.

Given that SVRA intends to apply to WWDC or the Farm Loan Board for funding assistance for future projects, it is important that SVRA water rates be set at a level comparable to other users in the state. This will improve the likelihood that the agencies will look favorably on funding a proposed project in the future.

Operating costs for the new wells will be the major component of future O&M cost increases. We estimate the power cost to pump one well full-time for an entire year will be approximately $15,000 per year. However, not all of the wells will need to be pumped year-round in any given year. During a drought year, most or all of the wells may need to be pumped during peak summer water usage. During the winter, only one or two wells may need to be pumped. For planning purposes, we estimate that four wells may need to be

pumped for six months during the summer, and two wells for 6 months during the winter, for an average of three wells pumped year-round. The projected impact on user rates is presented in Table 18.

Table 18. Projected SVRA Monthly Rates, Based on No. of Wells Pumped Year-Round

Year	No. of Wells	Annual O&M Cost	Monthly Bill
1997	0	$380,000	$15.58
2002	1	395,000	16.20
2007	2	410,000	16.82
2012	3	425,000	17.44
2017	4	$440,000	$18.06

Note: All costs presented in 1997 dollars.

The annual water utility budget should be reviewed yearly, and expenses and revenue requirements adjusted up or down as experience dictates. For example, once the reserve fund is built to the target level, this annual expense should be removed from the budget. If money is accumulating in the capital fund at a faster rate than capital expenditures, the assessment to SVRA property owners may be decreased. Note that the capital fund monies should be invested in an interest-bearing account consistent with prudent financial management. Any interest income should be applied against the following year's assessment, or returned to the property owners in the form of a dividend. Finally, as SVRA approaches build-out, and the identified capital projects are nearing completion, the assessment required to maintain the capital projects fund can be sharply reduced.

Omohundro, Palmerlee & Durrant
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William D. Omohundro, P.C. *David F. Palmerlee* *Sean P. Durrant*

October 28, 1996

Steve Wonacott
Jorgensen Engineering
P. O. Box 1142
Jackson, WY 83001

Re: Star Valley Ranch Association

Dear Steve:

At your request, I have prepared a brief memorandum describing "Improvement and Service District" and how such a district could be utilized by the Star Valley Ranch Association. I also enclose selected excerpts from the Wyoming Improvement and Service District Statutes.

Yours truly,

David F. Palmerlee

DFP/nkm
Enclosure

STAR VALLEY RANCH ASSOCIATION

IMPROVEMENT AND SERVICE DISTRICTS

OCTOBER 28, 1996

THE PROBLEM:

If a major improvement to the Association's water system is to be implemented, the Association, as a nonprofit corporation, faces several significant hurdles because it is a Wyoming nonprofit corporation. First, it cannot qualify for grant funds or low interest, long term loan funds from the Wyoming Water Development Commission ("WWDC"). Second, because of the cumbersome and restrictive requirements in the DCC&R's for special assessments for capital improvements, it will be difficult, if not impossible to obtain commercial bank financing in lieu of state financing. Finally, as a nonprofit corporation, the Association does not have the statutory authority to issue bonds to finance capital improvements.

THE SOLUTION, AN IMPROVEMENT AND SERVICE DISTRICT:

Under Wyoming law, there are a variety of special districts which can solve all three of these problems. The only district available to the Association is the Improvement and Service District ("I and S District") because it is the only district in which nonresident landowners are qualified to vote as members.

The key characteristic of an I and S District is that it has the power to assess the lands within the I and S District to repay indebtedness incurred for construction of improvements and for operation and maintenance of improvements, which assessments have the same status as county property taxes. This qualifies an I and S district to receive grant funds or loan funds from the WWDC.

FORMATION OF AN I AND S DISTRICT:

The County Commissioners in the county in which the district is to be formed have jurisdiction of the proceedings for creation of an I and S District. The proceedings are started by filing a petition with the Commissioners signed by not less than 60 percent of the persons owning land within the proposed district. The petition describes the territory to be included in the district, the proposed improvements and the method of financing. After notice, the Commissioners hold a hearing on the petition to determine whether the I and S District should be formed. If after the hearing the Commissioners determine that the public convenience and necessity would be served by formation of the I and S District, the Commissioners call for an election by the landowners in the proposed I and S District. The election can be a part of a regularly scheduled governmental election, or it can be a special election held by mail. If a majority of the votes cast in the election favor organization of the I and S District, the Commissioners are required to declare the district to be organized.

OPERATION OF AN I AND S DISTRICT:

The I and S District is managed by a Board of Directors consisting of three members who are selected in the election to organize the district. The I and S District has the typical powers of a corporation plus the special power reserved to governmental entities to assess the lands within the I and S District to repay debt incurred for construction of improvements and operation and maintenance of improvements.

Before commencing an actual improvement project, the Board of Directors of the I and S District must give notice of their intent to undertake an improvement project which will result in a special assessment against the lands in the I and S District. If more than 30 percent of the owners of the property within the I and S District object, the improvement project may not be authorized. Absent objections by 30 percent of the landowners within the proposed I and S District, the Board of Directors may by resolution authorize the project. Thereupon, an assessment roll is prepared assessing the annual costs of the project to the lands within the I and S District. The assessment roll is delivered to the county tax officials who are responsible for annually assessing and collecting the assessments from the landowners within the I and S District.

SELECTED EXCERPTS FROM THE IMPROVEMENT AND SERVICE DISTRICT STATUTES

§ 18-12-101. Title; purpose; application and construction

This act may be cited as the "Improvement and Service District Act".

§ 18-12-102. Definitions

(vii) "Elector" or "voter" means a person who is an owner of land in the district,
(viii) "Improvement" means . . .water facilities

§ 18-12-103. Districts authorized; general function

(a) Any unincorporated territory in this state may be formed into an improvement and service district to perform any of the following functions:

(i) Acquire, construct, operate and maintain improvements of local necessity and convenience;

(ii) Obtain improvements or services hereunder by contracting for the same with any city, town, county or other entity;

(iii) Furnish or perform any special local service which enhances the use or enjoyment of any improvement or facility.

(b) A district is a separate entity and a political subdivision of the state.

§ 18-12-104. Jurisdiction

The commissioners of each county shall hear proceedings for the creation of improvement and service districts within the county.

§ 18-12-105. Commencement by petition

Proceedings for the formation of a district shall be commenced by filing a petition addressed to the commissioners of the county in which the land proposed to be included in the district is situated. The petition shall be accompanied by a filing fee of two hundred dollars ($200.00).

§ 18-12-106. Petition for formation

A petition to form a district shall be signed by not less than sixty percent (60%) of the persons owning land within the territory proposed to be included in the district, whose land in the

proposed district has an assessed value of sixty percent (60%) or more of the assessed value of all of the land within the proposed district.

§ 18-12-107. Contents of petition

(a) The petition for formation shall:

(i) State the proposed name for the district;

(ii) Set forth the boundaries of the district and describe the lands situated therein;

(iii) Request that a district be formed under this act;

(iv) Describe generally the improvements proposed to be acquired or constructed and operated and the services to be furnished to inhabitants of the district;

(v) Detail the proposed method for financing the improvements or services;

(vi) Nominate three (3) persons or the commissioners to serve as the initial board of directors of the district.

§ 18-12-108. Hearing procedures

(a) When the formation petition is filed commissioners shall fix a time and place for hearing the petition, which shall be not less than twenty (20) nor more than forty (40) days after filing of the petition.

(b) The notice of hearing shall be published at least once in a newspaper of general circulation in the county ten (10) days or more prior to the date of the hearing. . . .The hearing shall be conducted in accordance with the Wyoming Administrative Procedure Act [§§ 16-3-101 through 16-3-115].

§ 18-12-109. Criterion; resolution

The criterion for establishing a district shall be the public convenience and necessity. If after a hearing the commissioners find that the establishment of the proposed district would serve the public convenience and necessity in that area and that the petition has been properly presented, the commissioners shall adopt a resolution to establish the formation of the district and shall call an election on the organization of the district as specified in W.S. 18-12-122, to be held at least forty (40) days after passage of the resolution.

§ 18-12-111. Establishing boundaries

If the formation of the district is approved the commissioners shall establish and describe the boundaries and designate a name for the district. The name may be that proposed in the petition or any other name the commissioners select. The commissioners may modify the terms and conditions proposed for the control of the district or condition their approval upon subsequent events.

§ 18-12-112. Powers of district

(a) Each district may:

(iii) Enter into contracts for the purpose of providing any authorized improvements and the maintenance and operation thereof, or otherwise to carry out the purposes of the district;

(iv) Accept from any public or private source grants, preferred loans, contributions and any other benefits available for use in the furtherance of its purposes;

(v) Borrow money and incur indebtedness and other obligations and evidence the same by certificates, notes or debentures, and issue bonds;

(vi) Assess the costs of improvements within the district against the property specially benefited upon a frontage, zone, or other equitable basis, in accordance with benefits;

(vii) Adopt bylaws not inconsistent with law;

(viii) Establish and collect charges for water, sanitation and related services and the use of improvements or services provided by the district, including authority to change the amount or rate thereof, and to pledge the revenues therefrom for the payment of district indebtedness;

(xi) Supply the inhabitants of the district with water for domestic and any other lawful use;

(xv) Provide for public recreation by means of parks, including but not limited to playgrounds, golf courses, swimming pools or recreation buildings;

(xxi) With the approval of the board of county commissioners, establish and collect charges for the use of any improvement to cover the cost of operating and maintaining the improvement.

§ 18-12-113. District board of directors

(a) The district shall be managed and controlled by a board of directors consisting of three (3) members.

§ 18-12-117. Notice of resolution; hearing; objections

(a) At the request of the board the county clerk shall give notice, by advertisement once in a newspaper of general circulation in the county, to the owners of the property to be assessed to provide:

(i) The nature of the improvement proposed;

(ii) The extent of the district to be improved;

(iii) The probable cost of the improvement;

(iv) The time at which the cost will be payable;

(v) The time when a resolution authorizing the improvements will be considered by the board;

(vi) That maps, estimates and schedules showing the approximate amounts to be assessed and all resolutions and proceedings are on file and may be seen or examined at the office of the county clerk or other designated place; and

(vii) That all complaints and objections concerning the proposed improvement by owners of property subject to assessment will be heard and considered by the board before final action, under the provisions of the Wyoming Administrative Procedure Act [§§ 16-3-101 through 16-3-115].

(b) If objections to the improvement are made by owners or agents representing property subject to thirty percent (30%) or more of the projected dollar assessments the improvement may not be authorized and a new resolution for the same or a similar purpose encompassing property representing objections may not be considered within one (1) year thereafter.

§ 18-12-118. Notice of apportionment; assessment roll

(a) A copy of the resolution as finally adopted must be delivered to the county clerk who shall by written notice, mailed or otherwise delivered, notify each owner of property to be assessed of the amount of assessment, the purpose for which the levy is made, the tax against each lot or parcel of land, and the date it becomes delinquent.

(b) The county assessor shall prepare a local assessment roll showing land assessed, the total amount of assessment, the amount of each installment of principal and interest if the same is payable in installments, and the date when each installment will become due, and deliver the same, duly certified, to the county treasurer for collection.

§ 18-12-119. Duty of county officials to levy and collect taxes

The body having authority to levy taxes or make assessments within each county shall levy the taxes or assessments authorized herein and all officials charged with the duty of assessing property and collecting taxes shall assess property and collect proceeds at the time and in the form

and manner with like interest and penalties as property is assessed and other taxes are collected, and when collected they shall pay the same to the district ordering the assessment or levy and collection. The payment of the collections shall be made monthly to the treasurer of the district and paid into its depository to the credit of the district. All taxes levied under this act, together with interest thereon and penalties for default in payment thereof, and all costs of collecting the same, constitute, until paid, a perpetual lien on and against the property taxed, and such lien shall be administered as and on a parity with the tax lien of other general taxes.

§ 18-12-122. Election procedures

(a) Except as otherwise provided in this section, the bond elections of districts shall be called by the board of the district and held in accordance with election procedures set forth in W.S. 22-21-101 through 22-21-112. A proposal submitted in the bond election shall be approved by a majority of the voters in the district casting ballots in the election.

(c) The organizational election of the district shall be called by the commissioners as provided in W.S. 18-12-109. The notice of election shall contain the information listed in the petition for formation, the names of any persons who have submitted an application for election as director in addition to those named in the petition, and the time, date and polling place or places for the election, unless the election is conducted by mail ballot under chapter 29 of the Wyoming Election Code of 1973. The notice shall be published at least once in a newspaper of general circulation in the county in which the district is located at least twenty (20) days prior to the election.

The judges of the election shall certify the returns of the election to the commissioners, and if a majority of the votes are in favor of the organization, the commissioners, by resolution shall declare the district organized.

August 20, 1996

TO: Vince Zimmer, Chairman, Long Range Planning Committee
Steve Wonacutt, Jorgensen Engineering

FROM: Sheila Fay, Water Usage Survey Coordinator

The Water Usage Survey was conducted on Saturday and Sunday, August 17th and 18th. The statistics gathered for those days are on the attached sheet.

Some facts based on these figures:

1. Of the 467 homes on the Ranch, 311 responses (67%) were obtained.
2. Fifty-six of those homes (18%) were occupied on weekends and vacations only.
3. The average length of residence on the Ranch was 7.5 months.
4. The total number of guests on the Ranch on August 18th was 338.
5. A total of 2,870 guests stayed on the ranch during the months of June, July and August.
6. 256 of the 311 respondents (82%) indicated that they used water outside of the house.

Results of Water Usage Survey conducted on 8/17 and 8/18/96

Plat #	# of homes	# of responses	# of residents	# of months	Summer guests	Length of stay	Water yard Yes	Water yard No	8/18/96 guests	Weekends Only
1	12	5	10	35	30	30	2	3	6	0
2	20	12	22	107	36	22	8	4	1	1
3	20	14	29	128	90	64	12	2	17	1
4&5	12	1	2	6	12	4	1	0	0	0
6	46	26	59	144	360	114	23	3	41	8
7	41	24	53	162	169	146	12	12	34	6
8	8	7	18	65	161	26	4	3	10	1
9	39	24	53	124	191	67	16	8	12	9
10	41	29	62	216	231	108	29	0	34	6
11	4	3	6	16	43	48	2	1	4	1
12	24	23	54	199	257	139	21	2	26	1
13	37	27	62	163	158	110	23	4	64	7
14	28	26	47	171	282	97	19	6	23	6
15	12	11	21	90	213	36	7	4	30	3
16	22	13	28	175	145	37	13	0	6	0
17	36	30	64	236	252	187	30	0	20	1
18	30	18	40	130	141	63	17	1	6	3
20	22	12	28	107	49	45	11	1	0	0
21	8	4	8	48	24	26	4	0	2	1
22	5	3	8	18	26	8	2	1	2	1
Total	467	311	674	2,320	2,870	1,367	256	55	338	66

SVRA HOMEOWNERS SURVEY

Under contract, Jorgensen Engineering is preparing a comprehensive long-range master plan for the Ranch's water system. Concurrently, Jorgensen Engineering has been providing the Ranch with required technical assistance for the installation of flow meters.

The Long-Range Planning Committee, with Board approval and in cooperation with all Board committees, is conducting a survey of people (including visiting relatives and guests) residing on the Ranch. Only total numbers from this survey will be given to Jorgensen Engineering to assist them in developing our water system master plan.

SURVEY TAKERS QUESTIONS:

A. How many people are regularly in your household?

B. How many extra people are here today?

C. How many months is your home occupied?

D. Is occupancy weekends and vacations only?

E. In June, July and August, how many relatives and guests stayed with you?

F. What was their average length of stay?

G. Do you do yard watering?

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
999 18th STREET - SUITE 500
DENVER, COLORADO 80202-2466

JUN 24 1996

Ref: 8P2-W-MS-PWI

Chuck Gibbions, President
Star Valley Ranch Association
Box 159
Thayne, WY 83127

Re: Sanitary Survey
PWD ID #5600287

Dear Mr. Gibbions:

I am enclosing your copy of the report prepared for the Environmental Protection Agency by Mike Sposit of Midwest Assistance Program (MAP) following his sanitary survey of the Star Valley Ranch Association's drinking water system on June 13, 1996. Mr. Sposit is employed by MAP, which has received a grant from EPA (TO 008532-02-0) to assist Wyoming public water suppliers.

Mr. Sposit's comments and recommendations can be found on the last pages of the report.

We sincerely appreciate the time, courtesy and helpfulness Bart Barge extended to Mr. Sposit at the time of his visit. A copy of the report is being provided to Mr. Barge and also to Joseph Iwanski.

If you have any questions about the report or your responsibilities under the National Primary Drinking Water Regulations, please call me at 1-800-227-8917, Extension 6262.

Sincerely,

Charla Colson /for

Maureen Doughtie
Wyoming Coordinator
Public Water Supply
Implementation Section

Enclosure

cc: Mike Sposit, MAP
Joseph Iwanski, General Manager
Bart Barge

U.S. EPA REGION VIII
DRINKING WATER BRANCH (8P2-W-MS-PWI)
999 - 18TH STREET, SUITE 500
DENVER, COLORADO 80202-2466
Phones: 1-800-227-8917, (303) 312-6262

SANITARY SURVEY

ADMINISTRATIVE DATA

1. Date of Survey: June 13, 1996 PWS ID No.: 5600287
2. Classification: Community Groundwater
3. Name of PWS: Star Valley Ranch Association
4. Mailing address: Box 159 Thayne, Wyoming 83127
5. County: Lincoln Telephone: (307)883-2669
6. Physical location and directions: The development is located about 10-miles north of Thayne, and 2-miles east off Route 89.
7. Name of Surveyor: Mike Sposit, Midwest Assistance Program Inc.
8. Prior Survey (By whom and date): 08/29/91 MKS
9. Date of VOC vulnerability & score: 08/29/91 score 18
10. Date of GWUDISW assessment & score: 08/29/91 score 30 springs
    06/13/96 score 0 well
11. Name and phone No. of Owner or Legal Representative, e.g. Mayor, or City Manager:
    Chuck Gibbions, President SVR Association
    Box 159 Thayne, Wyoming
12. Name(s) and phone no(s). of Public Works Director, City Engineer, and/or Water Plant Superintendent: Joseph Iwanski, General Manager
    (307)883-2669 SVR Association
    Box 159 Thayne, Wyoming 83127
13. Name(s) and phone no(s). of Operators Bart Barge (307)883-2669$_{office}$
    (307)883-2616
14. Certification(s) type and date Bart Barge, DEQ Level I Water 1991
    Gary Leavitt, DEQ Level I Water 1995
15. Person contacted for survey and phone no. Bart Barge, (307)883-2669

The following abbreviations will be used throughout this document
NI = No Information NA = Not Applicable NR = Not Requested

(Attach any available maps or diagrams of system to this report.)

Sanitary Survey
Date: June 13, 1996

PWS Name: Star Valley Ranch
PWS ID # 5600287

SERVICE DATA

1. Service Area(s) Residential, Summer Homes / Resort

2. Owner type: Private

3. Population...
   High 2,000 Low 250 Average daily 300

4. Period open Year Round
   Period qualified as PWS 01/01 to 12/31

5. No. of Connections 520 Active Metered? 76

6. Water usage (gal/day) Est. 1,000,000 Water lost (gal/day) NI
   Water usage per person/day Est. 400 gpd

7. Water sold to (Name(s) of consecutive system(s) & PWS ID#)

8. Have there been any interruptions in service...
   a. during the past year? No
   b. during the past 5 years? No
   c. when, where, why and how long?

9. Have there been any reports of waterborne disease? No
   If yes, give details

SOURCE DATA

FOR CONSECUTIVE SYSTEMS

1. Water purchased from NOT APPLICABLE
2. Water source type Ground [] Surface []

3. Does this PWS have another PWS consecutive to it?
   If so, name and PWS ID#

4. If a water hauler is involved
   a. does he haul only water?
   b. if his source is a surface source, is there a disinfection residual remaining at the time of delivery?
   c. how does he disinfect his tank?
   d. how often does he disinfect his tank?
   e. what other customers does he have?
   f. is there backflow prevention on his tank's hose?
   g. are there dust caps on the fill points?

5. Does this PWS have booster disinfection?

Include map, if available, or make drawing of distribution system.

Sanitary Survey
Date: June 13, 1996

PWS Name: Star Valley Ranch
PWS ID # 560028

WELL INFORMATION

1. Nature of recharge area Mountain / Forest
2. How is access to recharge area controlled? Uncontrolled
3. Has there been a survey of the recharge area? No
   Date Agency
4. Are abandoned wells possible sources of pollution? NI
   Comments
5. Other nearby sources of potential pollution NI
6. Formation and/or rock type (if available)
7. Describe emergency response plan (potential pollution) No formal plan

CURRENT AND ABANDONED WELLS

1. Name /Number of well Air Strip #1
2. Location: Latitude 42° 58'40" Longitude 110° 58'09"
   Section Township Range
3. Is the well housed? No Pitless adapter? Yes
   If pit vault present, is vault open [] covered []
4. Date drilled 1986
5. Well depth (total in ft) 460'
6. Hole size (in) 10" Casing size 10",8",6" Depth 460'
7. Perforations Size Total # Depth
8. Pump set at ~400' Type of pump Submersible
9. Yield/Design rate of flow (gpm) 270
10. Well head properly sealed? Yes
11. Subject to flooding? No
12. Casing 12 in above ground Yes
13. Vent 18 in above ground? Yes
14. Vent facing downward & screened? Yes
15. Working sample cock? Yes
16. Is there emergency power? No

Comments

SPRINGS AND INFILTRATION GALLERIES

1. Name/Number Green Canyon

2. Location: Latitude 42° 58'59" Longitude 110° 56'51"
   Section Township Range

3. Yield (gpm) Est. 350

4. Describe supply intake Infiltration Gallery

5. Subject to surface infiltration Current MPA Testing

6. Subject to flooding? Yes

7. Nature of recharge area Forest

8. How is access to water source controlled? Uncontrolled

9. Sources of potential pollution Wildlife

10. Has there been a watershed survey? No
    Date Agency

11. How is collection chamber constructed? Concrete Box

12. Are there seasonal or other conditions which change water quality? Possible

13. Describe emergency response action No formal plan

SPRINGS AND INFILTRATION GALLERIES

1. Name/Number Prater

2. Location: Latitude 42° 59'22" Longitude 110° 58'20"
   Section Township Range

3. Yield (gpm) Est. 150

4. Describe supply intake Infiltration Gallery

5. Subject to surface infiltration Current MPA Testing

6. Subject to flooding? Yes

7. Nature of recharge area Forest

8. How is access to water source controlled? Uncontrolled

9. Sources of potential pollution Wildlife

10. Has there been a watershed survey? No
    Date Agency

11. How is collection chamber constructed? Concrete Box

12. Are there seasonal or other conditions which change water quality? Possible

13. Describe emergency response action No formal plan

TRANSMISSION DATA (RAW WATER)

1. Name or designation Star Valley Ranch

2. Point of origin Springs

3. Point of termination Storage

4. Date in service 1971

5. Length Diameter 8" Material PVC

6. Pressure range 60 -210 psig Flow Rate (gpm) 150 -350 gpm

7. Controls and/or PRVs (describe) Overflow control

8. ARVs (number)

9. Condition

10. Have there been any breaks in the last two years? Yes
If yes, describe Green Canyon Spring was flooded out in mid-spring 1995

11. Is the pump station subject to flooding? NA

12. Is there emergency power? NA

13. Pumps

Number	Type	Standby	Flow Rate	Condition

Comments

Sanitary Survey
Date: June 13, 1996

PWS Name: Star Valley Ranch
PWS ID # 5600283

STORAGE DATA (RAW WATER)

TANKS AND CISTERNS

1. Name or designation Star Valley Ranch

2. Number and type of material...
   Ground level
   Underground Two Concrete: 143,000-gallon Prater/
   186,000-gallon Green Canyon
   Tower

3. Volume (Gal) 329,000 Gravity [X] Pressure tank []

4. Total days of supply (all sources) NA

5. Date(s) in service 1971

6. Is the site subject to flooding? Possible

7. Is the unit structurally sound and properly maintained? Yes

8. Are overflow lines...
   a. turned downward? Yes
   b. covered or screened? Yes
   c. terminated at least 3 diameters above ground? Yes
   Are air vents...
   a. turned downward? Yes
   b. covered or screened? Yes
   Are drainage lines and cleanout pipes...
   a. turned downward? Yes
   b. covered or screened? Yes
   c. terminated at least 3 diameters above ground? Yes

9. Can the tank(s) be isolated from the system? Yes

10. Is all storage covered or enclosed? Yes

11. When was the tank last cleaned? Inspected Yearly

12. If repaired, was it disinfected? Yes

13. Describe emergency response plan No formal plan

DISTRIBUTION DATA

1. Lines

	Origin	Material	Inside Diam	Length
Main Lines	Springs	PVC/ Steel	8-inch PVC 6-inch Steel	
Dist Lines	ALL	PVC	6-inch 4-inch to 1.5-inch	
Svc Lines		Copper	1/2-inch	

2. Pressure zones

Area	Pressure Range	Control		
		Auto	Manual	Remote
Upper	60-psi	Gravity/PRV		
Lower	210-psi	PRV/Gravity		

3. Cross connection control

Location	Type	Size	Last Tested
System	Check Valve		

4. Date of cross connection control training for operator 1991

5. Dead ends Some

6. Is there an adequate maintenance program? Yes
   Describe:

7. Is there interconnection with any other system? Yes
   Describe: RV Park owned by the developer

8. Are plans of the system available and current? Yes

9. Describe emergency response plan (ruptures) No formal plan

Sanitary Survey
Date: June 13, 1996

PWS Name: Star Valley Ranch
PWS ID # 5600287

SAFETY AND SECURITY DATA

1. Security

	Fenced	Locked	How Often Patrolled
Wells	Yes	No	Daily
Springs & Infilt. Galleries	No	NA	Weekly
Stream intakes			
Reservoirs/Lakes			
Pump houses			
Treat. plant			
Storage tanks	No	Yes	Weekly
Manholes & vaults			
Storage shed for chems			

2. Is access to all facilities restricted to authorized personnel? Yes

Comments

Chlorine Safety NOT APPLICABLE

1. Is there ongoing chlorine safety training for all water system personnel? Describe
2. Are chlorine room doors...
   a. posted with warnings?
   b. do they open outward?
   c. do they open to the exterior of the building?
   d. are all doors equipped with crash bars and viewports?
3. Is there a leak detector in the chlorine room with an audible alarm?
4. Are chlorine feed and storage areas isolated from other facilities?
5. Are chlorine areas adequately ventilated?
6. Are all chlorine cylinders adequately restrained?
7. Are self contained breathing units...
   a. readily available for use in chlorine emergencies?
   b. where are they stored?
10. Are water system personnel adequately trained in the use and maintenance of the self-contained breathing apparatus?
11. Are chlorine leak kits available?
12. Are all personnel trained in proper use of chlorine leak kits?

Comments

Sanitary Survey
Date: June 13, 1996

PWS Name: Star Valley Ranch
PWS ID # 5600287

MONITORING AND RECORDS

1. Number of bacteria samples per month required Two Monthly

2. Sample siting plan submitted to EPA? Yes; 19 Sites

3. Is sampling procedure adequate? Yes
   Comments

4. Are copies of monitoring results, system records and plans
   a. Retained on the premises? Yes
   b. Available to the surveyor? Yes

5. Violations (w/in last 2 yrs) Date Type(s)
   Agency action
   System response

6. Samples taken during survey Yes
   Type Conductivity Results 258 u mhos
   Turbidity 0.08 NTU's
   pH/Temp. 7.6/9.0°C

7. Are all system records and plans properly filed and available to the Surveyor? Yes

   Comments

Sanitary Survey
Date: June 13, 1996

PWS Name: Star Valley Ranch
PWS ID # 5600287

ADDENDA - RECOMMENDATIONS - SUMMARY

Star Valley Ranch Association water system is a community, ground-water supply, located about 10 miles north of Thayne, 2 miles east, off U.S. Route 89. The water system provides water for a year round population of 250 and 2,000 vacationing through currently, 520 connections.

A sanitary survey update was conducted on June 13, 1996 by Mike Sposit, Midwest Assistance Program Inc. Bart Barge, Utility Manager was interviewed.

The water source for this facility is from two springs, which are located in two canyons, Green and Prater, above the development. Water taken from the springs is stored in two 143/183 K gallon, concrete, below ground tank. This water is used both for golf course watering and a small volume for potable water consumption. Before potable water use, there is no treatment or disinfection provided. A drawing of the water system is attached.

Water samples are taken monthly and sent to the Afton Lab for bacteriological testing; a BacT sample site plan was submitted to EPA, Denver for review. There are no recorded violations for this system and all other water testing is current.

The water system seems to be operating and maintained satisfactorily; Bart has made the recommended changes to the springs. Green Canyon Spring is currently under MPA testing. Bart is also changing out the distribution piping as required and installing meters. As the new homes increase, the system design may need updating.

RECOMMENDATIONS

1) Storage tanks should be opened and inspected on a yearly basis for contamination and deterioration of tank linings. After inspection and before the tank is put back in service, the tank should be disinfected.

2) All records pertaining to the water system should be kept in one designated location where they can be accessed easily. BacT analysis must be retained for five years, inspection reports and other water analyses for ten.

3) The water system should have a current operating manual which describes all the equipment and its proper operation and maintenance, chemicals used and their proper storage, test procedures and inspection data. The manual should also include a cross-connection backflow audit and prevention plan.

4) Protection from trespassers; security-type fencing, locks on access manholes, and other precautions should be provided to prevent trespassing.

5) Continuous disinfection is not practiced, but should be considered. Further, daily monitoring of the chlorine residual is necessary in order to insure that a minimum of 0.2 mg/l is maintained throughout the distribution system.

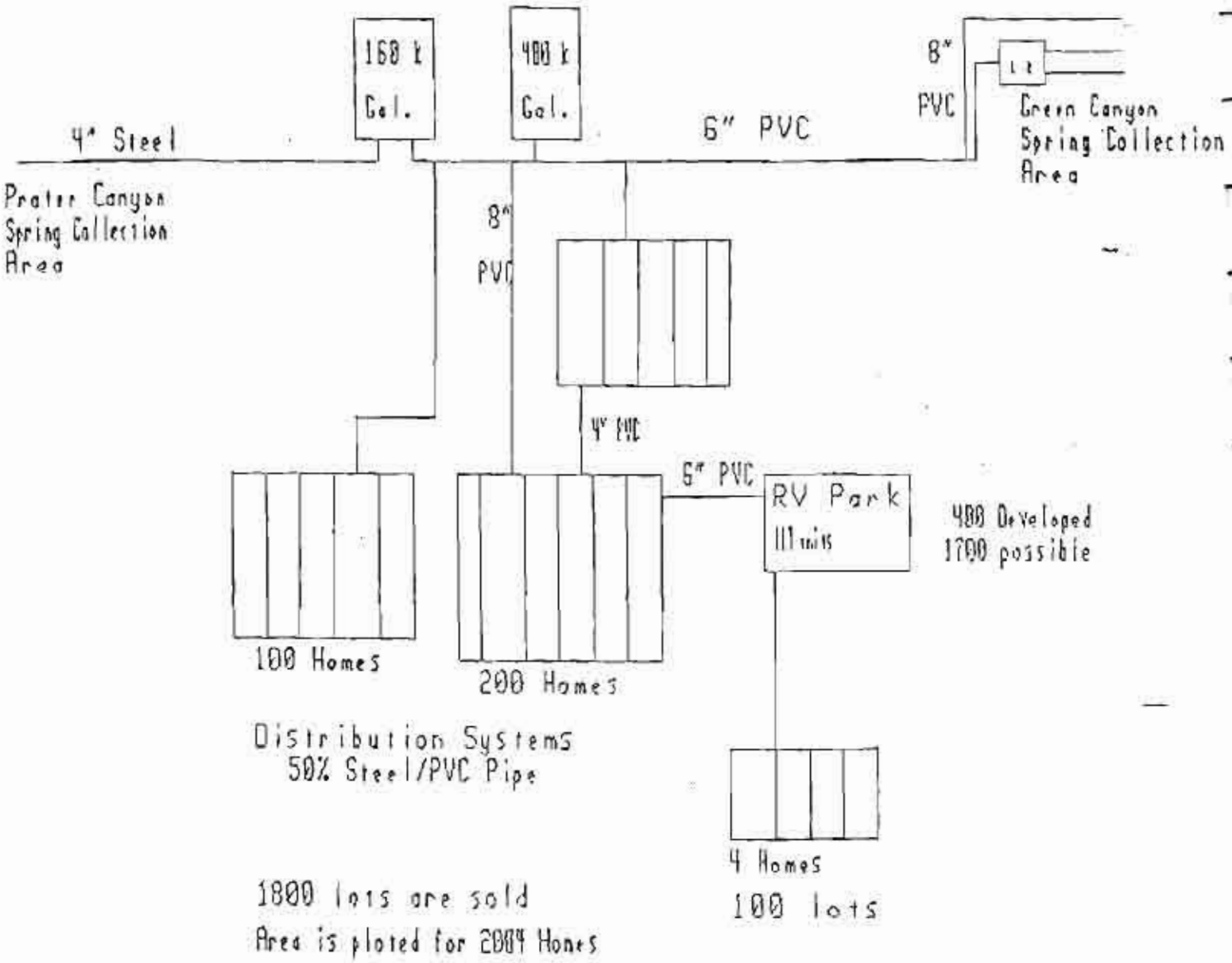
6) Emergency Plan: The utility should have a contingency plan that outlines what action will be taken and by whom. The emergency plan should meet the needs of the facility, the geographical area, and the nature of the emergency likely to occur. Conditions such as storms, floods, power outages, and civil strife should be considered.

7) Each public water system is required to be operated by a qualified water operator. A qualified water operator is required to have a complete working knowledge of the water facility. A qualified water operator should receive training in water plant operation as needed for the type of system being operated. If the water system has 20 or more connections, the state of Wyoming requires the operator to be certified by the Wyoming Department of Environmental Quality.

SANITARY SURVEY
PWS NAME: Star Valley Ranch Association

PWS# 5600287
August 30, 1991

Water System Diagram



June 14, 1996

Mary Wu (303)293-1698
EPA Drinking Water Branch 8WM-DW-PWSIE
999 18th Street, Suite 500
Denver, Colorado 80202-2405

RE: PWS 5600287 - Groundwater evaluation, Green Canyon Spring.

On August 26, 1995, a visit was made to Star Valley Ranch to evaluate the groundwater sources and extent of damage to the water system caused by the recent storm. Bart Barge, operator was shown how to do a in-house BacT test, using the Hach Mug method. Test equipment was left for operator use. Disinfection procedures were discussed and implementation of chlorination will be monitored. As a precautionary measure until bacteriological testing of the distribution system is completed, a boil order was issued. MPA testing is recommended after the water system is restored.

A storm occurred on Wednesday August 23, 1995. Flood water cascaded down the valley covering the spring source and collection area. Road damage to the spring area is preventing equipment access. Some dirt work is required around the spring to restore its integrity. Collection boxes show signs of surfacewater infiltration. Repair of the boxes will require resealing and venting changes. Dirt work will also be required after leaks in the side walls are sealed.

Bart Barge, new facility operator since May 1995, is a DEQ licensed operator. He holds operator certification in: Level I water, 1991; level IV wastewater, 1992; and a level II distribution, 1992. Bart issued a boil order as a precautionary measure when damage to the water system was discovered. Total Coliform positive test are noted in the distribution system. Disinfection procedures are started; and BacT testing is currently being performed in-house. Road work to the spring is currently under way.

When access to the spring is obtained, the following precautionary measures should be checked to help ensure source water retains its consistently high quality:

Diversion of surfacewater drainage from the site. A surface drainage ditch should be located uphill from the source area to intercept surfacewater runoff and carry it away from the spring area.

Protection from animal habitation by means of fencing is suggested.

FORM U.W. 1
Rev. 3/79
FILING FEE SCHEDULE
ON REVERSE SIDE

STATE OF WYOMING
OFFICE OF THE STATE ENGINEER
HERSCHLER BUILDING
CHEYENNE, WYOMING 82002

APPLICATION FOR PERMIT TO APPROPRIATE GROUND WATER

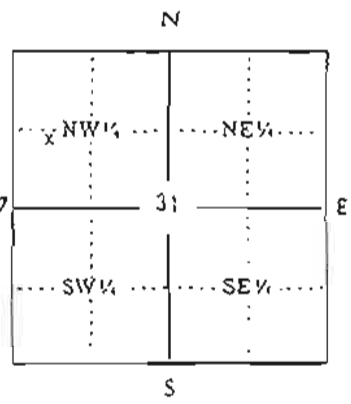
FOR OFFICE USE ONLY
PERMIT NO U.W. 90328
WATER DIVISION NO. 4 DISTRICT 16
U.W. DISTRICT Lincoln Co.

Temporary Filing No. U.W. 22-11-246

NOTE. Do not fold this form. Use typewriter or print neatly with black ink. ALL ITEMS MUST BE COMPLETED BEFORE APPLICATION IS ACCEPTABLE.

NAME AND NUMBER OF WELL Star Valley Ranch Association - North Airstrip Well #1

1. Name of applicant(s) Star Valley Ranch Association Phone: 307-883-26
2. Address of applicant(s) P.O. Box 159 Thayne, WY Zip: 83127
3. Name & address of agent to receive correspondence and notices Kurt Sirstens. P.O. Box 159, Thayne, WY 83127
4. Use to which the water will be applied: Domestic [ ] Stock Watering [ ] Irrigation [ ] Municipal [ ] Industrial [ ] Miscellaneous [X] (Describe completely and accurately) Well to serve as additional supply for residential lots and acreages shown in tabulation below within Star Valley Ranch Subdivisions.
5. Location of the well: (NOTE: Quarter-quarter (40-acre subdivision) MUST be shown EXAMPLE: SE¼NW¼ of Sec. 12, Township 14 North, Range 68 West.) Lincoln County, SW ¼ NW ¼ of Sec. 31 T. 35 N., R. 118 W. of the 6th P.M. (or W.R.M.), Wyoming. If located in a platted subdivision, also provide Lot _____, Block _____ of the _____ Subdivision (or Add'n) of _____.
6. Mark the well location on the section grid to the right. LOCATION SHOWN IN ITEM 5 MUST AGREE WITH GRID. If the proposed well is for irrigation use, sketch and label all irrigation ditches and canals, streams, reservoirs and other wells. Indicate the point of use or lands to be irrigated from other sources.
7. Estimated depth of the well is 450 feet.
8. MAXIMUM quantity of water to be developed and beneficially used: 600 gallons per minute. NOTE: If for domestic or stock use, this application will be processed for a maximum of 25 gallons per minute. SPRINGS: Only springs flowing 25 gallons per minute or less, where the proposed use is domestic or stockwatering, will be considered as ground water appropriations. After approval of this application, some type of artificial diversion must be constructed to qualify for a water right.
9. If use is not irrigation, mark the point(s) or area(s) of use in the tabulation below.
10. If for irrigation use:
    a. Describe MAXIMUM acreage to be irrigated in each 40 acre subdivision in the tabulation below.
    b. [ ] Land will be irrigated from this well only.
    c. [X] Land is irrigated from existing water right(s) with water from this well to be additional supply. Describe existing water right(s) under REMARKS.



Scale: 2" = 1 mile

Above diagram represents one full section. Locate well accurately in small square representing 40 ac.

Township	Range	Sec.	NE¼				NW¼				SW¼				SE¼				TOTALS
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	
			See following pages for tabulation of points and areas of use.																

11. If for irrigation use, describe method of irrigation, i.e. center pivot sprinkler, flood, etc. _____

SEE REVERSE SIDE

Permit No. U.W. 90328 Book No. 684 Page No. 29

12. The well is to be constructed on lands owned by Leisure Valley, Inc.
(The granting of a permit does not constitute the granting of right of way. If any easement or right of way is necessary in connection with this application, it should be understood that the responsibility is the applicant's. A copy of the agreement should accompany this application, if the land is privately owned and the owner is not a co-applicant.)

13. The water is to be used on lands owned by Star Valley Ranch Association & lots owned by members of Star Valley Ranch Assoc.
(If landowner is not the applicant, a copy of the agreement relating to usage of appropriated water on the land should be submitted to this office. If the landowner is included as a co-applicant on the application, this procedure need not be followed.)

REMARKS: See attached sheet for description of existing irrigation rights.

Under penalties of perjury, I declare that I have examined this application and to the best of my knowledge and belief it is true, correct and complete.

Evan L. Simpson, P.E. — November 23, 1992
Signature of Applicant or Authorized Agent — Date

THE LEGALLY REQUIRED FILING FEE MUST ACCOMPANY THIS APPLICATION

DOMESTIC AND/OR STOCK WATERING USES (Domestic use is defined as a single-family dwelling and the watering of lawns and gardens not exceeding one (1) acre)	$10.00
IRRIGATION, MUNICIPAL, INDUSTRIAL, MISCELLANEOUS	$25.00
MONITOR (For water level measurements or chemical quality sampling)	NO FEE

IF WELL WILL SERVE MULTIPLE USES, SUBMIT ONLY ONE (THE HIGHER) FILING FEE.

THIS SECTION IS NOT TO BE FILLED IN BY APPLICANT

THE STATE OF WYOMING)
) ss.
STATE ENGINEER'S OFFICE)

This instrument was received and filed for record on the 30th day of November, A. D. 19 92, at 11:00 o'clock A M.

Permit No. U.W. 90328

for State Engineer

THIS IS TO CERTIFY that I have examined the foregoing application and do hereby grant the same subject to the following limitations and conditions:

This application is approved subject to the condition that the proposed use shall not interfere with any existing rights to ground water from the same source of supply and is subject to regulation and correlation with surface water rights, if the ground and surface waters are interconnected. The use of water hereunder is subject to the further provisions of Chapter 169, Session Laws of Wyoming, 1957, and any subsequent amendments thereto.

Granting of a permit does not guarantee the right to have the water level or artesian pressure in the well maintained at any specific level. The well should be constructed to a depth adequate to allow for the maximum development and beneficial use of ground water in the source of supply.

If the well is a flowing artesian well, it shall be so constructed and equipped that the flow may be shut off when not in use, without loss of water into surface formations or at the surface.

FOR ADDITIONAL CONDITIONS AND LIMITATIONS SEE ATTACHED STATUS SHEET

Approval of this application may be considered as authorization to proceed with construction of the proposed well.

Construction of well will begin within one (1) year from date of approval. A Statement of Completion will be filed within thirty (30) days of completion of construction, including pump installation.

Completion of construction and completion of the beneficial use of water for the purposes specified in Item 4 of this application will be made by December 31, 1993.

The amount of appropriation shall be limited to the quantity to which permittee is entitled as determined at time of proof of application of water to beneficial use.

Witness my hand this 13th day of December, A.D. 1992.

Jason W. Fassett
State Engineer

PERMIT NO. U.W. 90328

T.F. No. U.W. 22-11-246

PERMIT STATUS

Priority Date November 30, 1992 Approval Date December 13, 1992

ADDITIONAL CONDITIONS AND LIMITATIONS:

1. A meter acceptable to the State Engineer is required to accurately measure the quantity of water produced from this well.

2. An annual report shall be submitted to the State Engineer no later than February 15 of each year stating the total amount of water produced from this well each month during the previous January 1 to December 31, twelve (12) month period.

3. The report shall identify the well by name, location, permit number and shall identify the type of meter used for the measurement.

4. The report shall contain at least two (2) semi-annual measurements of the pumping water level in the well as measured after a minimum of twenty-four (24) consecutive hours of pumping. The dates the measurements were obtained and period of time the well was pumped prior to obtaining the measurements must be specified.

5. The report shall contain at least two (2) semi-annual measurements of the static water level in the well as measured twenty-four (24) consecutive hours after pumping has ceased. The dates the measurements were obtained and the period of time the well was "shut-in" prior to obtaining the measurements must be specified.

6. The State Engineer may, upon written request, waive all or any portion of these conditions and limitations.

December 13, 1992
DATE OF APPROVAL

Gordon W. Fassett
Gordon W. Fassett, State Engineer

The following points of use have original supply under Permit U.W. 13319
(Prater Canyon No. 1) with additional supply under Permit 6974 Enl.
(2nd Enl. Stewart Pipeline) and this permit.

Item 9 continued

			NE¼				NW¼				SW¼				SE¼				
Township	Range	Sec.	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	Totals
35	11W	HES 63															x Sec 30		1
			Star Valley Ranch Plat 6, Lot 47																
35	11W	31						x											2
			Ranch House																
			Leisure Valley Shops																

The following points of use have original supply under Permit 28143
(Stewart Pipeline) with additional supply under Permit U.W. 82826
Item 9 continued (1st Enl. Prater Canyon No. 1) and this permit. Pg. 2

			NE¼				NW¼				SW¼				SE¼				
Township	Range	Sec.	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	Totals
35	118	HES 83															x Sec 30		
			Star Valley Ranch Plat 6																
				All of 41, 42, 43, 44, 45, 46, 48, 50, 51, 52, 53															
				Part of Lot 49															
			Star Valley Ranch Plat 11																
				Part of Lots 1, 2, 3, 4															
35	118	HES 83																x Sec 30	
			Star Valley Ranch Plat 11																
				All of Lots 16 and 17															
				Part of Lots 10, 11, 12, 13, 14, 15, and 18															
35	118	31	x																
			Star Valley Ranch Plat 9																
				All of Lots 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60															
				61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80															
				81, 82, 83, 84, 85, 91, 92, 93, 94, 95, 96, and															
				Part of Lots 44, 45, 86, 88, 89, 90,															
			Star Valley Ranch Plat 11																
				Part of Lots 10, 11, 12, 13, 14, 15, 18															
35	118	31		x															
			Star Valley Ranch Plat 9																
				All of Lots 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16, 17, 18, 19, 20,															
				21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 87 and															
				Part of Lots 13, 44, 45, 86, 88, 89, 90															
			Star Valley Ranch Plat 10																
				Part of Lots 12, 13, 14, 15, 16, 38															
			Star Valley Ranch Plat 11																
				Part of Lots 1, 2, 3, 4															
35	118	31					x												
			Star Valley Ranch Plat 10																
				All of Lots 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26,															
				27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 39, 40, 41, 42, 43, 45, and															
				Part of Lots 44, 46, 38, 15, 16, 12, 13, 14, and															
			Star Valley Ranch Plat 9																
				Part of Lot 13															
35	118	31						x											
			Star Valley Ranch Plat 10																
				All of Lots 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 63, 64, 65,															
				66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85,															
				86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 00, and															
				Part of Lots 44, 46, 61, 62															

The following points of use have original supply under Permit 28143
(Stewart Pipeline) with additional supply under Permit U.W. 82826
Item 9 continued (1st Enl. Prater Canyon No. 1) and this permit.

			NE¼				NW¼				SW¼				SE¼				
Township	Range	Sec.	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	Totals
35	118	31									x								
			Star Valley Ranch Plat 16																
			All of Lots 1, 2, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68,																
			69, 70, 71, 87, 88, 89, 90, 91, 92, 93, and																
			Part of Lots 83, 84, 85, 86, 72, 73, 52, 53, 3, 4, and																
			Star Valley Ranch Plat 12																
			Part of Lots 1, 2, 3, 4, 5, 6, 7, 8																
35	118	31			x														
			Star Valley Ranch Plat 12																
			All of Lots 9, 10, 11, 12, 13, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48																
			49, 50, 51, 52, 53, 54, 55, 56, 85, 86, 87, 88, 89, 90, 91, 92, 31, 32 and																
			Part of Lots 93, 57, 30, 23, 22, 33, 34, 14, 15																
			Star Valley Ranch Plat 16																
			Part of Lots 80, 81, 82, 83, 84, 85, 86																
35	118	31				x													
			Star Valley Ranch Plat 12																
			All of Lots 27, 28, 29, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 70, 71, 72, 73, 74,																
			75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 94, 95, 96, 97, 98, 99, 100, 101, 102,																
			103, 104, and																
			Part of Lots 93, 57, 30, 22, 23, 24, 25, 26, 68, 69, and																
			Star Valley Ranch Plat 13																
			Part of Lots 58, 59, 60, 61, 62, 63, 64																
35	118	31													x				
			Star Valley Ranch Plat 12																
			Part of Lots 23, 24, 25, 26, 68, 69																
			Star Valley Ranch Plat 14																
			All of Lots 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 16, 17, 18, 19, 20, 60, 61, 62, 63,																
			64, 65, 66, 67, 68, 69, 70, 71, 72, 41, 42, and																
			Part of Lots 35, 36, 37, 39, 40, 43, 44, 45, 46, 47, 48, 49, 58, 59, 73, 74, 75,																
			13, 14, 15, 21, 22																
35	118	31														x			
			Star Valley Ranch Plat 12																
			All of Lots 16, 17, 18, 19, 20, 21, and																
			Part of Lots 22, 23, 33, 34, 14, 15																
			Star Valley Ranch Plat 14																
			All of Lots 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, and																
			Part of Lots 13, 14, 15, 21, 22, 39, 40																
			Star Valley Ranch Plat 16																
			All of Lots 77, 78, 79, 41, 42, 43, 44, 45, 46, and																
			Part of Lots 37, 38, 39, 40, 47, 48, 74, 75, 76, 1, 12, 13, 14, 15, 16, 17, 80, 81, 82																
35	118	31									x								
			Star Valley Ranch Plat 16																
			All of Lots 5, 6, 7, 8, 9, 10, 49, 50, 51, and																
			Part of Lots 3, 4, 11, 12, 13, 47, 48, 72, 73, 74, 75, 76, 52, 53																

The following points of use have original supply under Permit 28143
(Stewart Pipeline) with additional supply under Permit U.W. 82826
(1st Enl. Prater Canyon No. 1) and this permit.

Item 9 continued

			NE¼				NW¼				SW¼				SE¼				
Township	Range	Sec.	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	Totals
35	118	31															x		
			Star Valley Ranch Plat 16																
				All of Lots 18, 19, 20, 21 and															
				Part of Lots 36, 37, 38, 39, 40, 22, 14, 15, 16, 17															
35	118	31																x	
			Star Valley Ranch Plat 14																
				All of Lot 50 and															
				Part of Lots 43, 44, 45, 46, 47, 48, 49, 51, 52, 57, 58 and															
			Star Valley Ranch Plat 16																
				All of Lots 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34 and															
				Part of Lots 35, 36, 37, 22															
			Star Valley Ranch Plat 17																
				All of Lots 19, 20, 127, 128, 129 and															
				Part of Lots 126, 21, 22 and															
				1.29 Acres of Common Land															
35	118	HES 67						x Sec 32											
			Star Valley Ranch Plat 13																
				All of Lots 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 65, 66, 67, 68, 69, 70, 71, 72, 73,															
				74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 50, 51, 52, 53, 54, 55,															
				56, 57, and															
				Part of Lots 13, 49, 58, 59, 60, 61, 62, 63, 64															
35	118	HES 67										x Sec 32							
			Star Valley Ranch Plat 13																
				All of Lots 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31,															
				32, 33, 42, 43, 44, 45, 46, 47, 48 and															
				Part of Lots 13, 34, 35, 39, 40, 41, 49, 58, and															
			Star Valley Ranch Plat 14																
				All of Lots 76, 77, 78, 79, 80, and															
				Part of Lots 73, 74, 75, 81, 82, 57, 58, 59															
35	118	HES 67												x Sec 32					
			Star Valley Ranch Plat 17																
				All of Lots 1, 2, 3, 4, 5, 6, 7, 8, 130, and															
				Part of Lots 9, 10, 47, 48, 50, 51, 52, 54, 55 and															
				16.2 Acres of Common Area															
35	118	HES 67											x Sec 32						
			Star Valley Ranch Plat 17																
				All of Lots 11, 12, 13, 14, 15, 16, 17, 23, 24, 28 and															
				Part of Lots 9, 10, 18, 21, 22, 25, 26, 27, 29, 45, 46, 47															
			Star Valley Ranch Plat 13																
				All of Lots 36, 37, 38 and															
				Part of Lots 34, 35 and															
			Star Valley Ranch Plat 14																
				All of Lots 53, 54, 55, 56, 83, 84, 85, 86, 87, 88 and															
				Part of Lots 51, 52, 57, 82, 81, 9, 10															
				11.66 Acres of Common Area															

The following points of use have original supply under Permit 28143
(Stewart Pipeline) with additional supply under Permit U.W. 82826
(1st Enl. Prater Canyon No. 1) and this permit.

Item 9 continued

			NE¼				NW¼				SW¼				SE¼				
Township	Range	Sec.	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	Totals
34	118	5						x											
			Star Valley Ranch Plat 17																
			All of Lots 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 43, 44, 71, 85, 86, 87, 88,																
			89, 90, 91, 92, 93, 94, 95, 96, 103, 104, 105, 106																
			Part of Lots 97, 98, 99, 100, 101, 102, 107, 113, 114, 68, 69, 72, 42, 25, 26,																
			27, 29, 45, 46, 47, 48																
			Star Valley Ranch Plat 18																
			All of Lots 114 and																
			Part of Lots 115, 113, 112 and																
			6.46 Acres of Common Area																
34	118	5					x												
			Star Valley Ranch Plat 17																
			All of Lots 49, 53, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 70, 73, 74, 75,																
			76, 77, 78, 79, 80, 81, 82, 83, 84 and																
			Part of Lots 48, 50, 51, 52, 54, 55, 68, 69, 42, 72 and																
			Star Valley Ranch Plat 18																
			All of Lots 116, 182 and																
			Part of Lots 115, 117, 181, 183, 184, 185, 186 and																
			6.52 Acres of Common Area																
34	118	5						x											
			Star Valley Ranch Plat 17																
			All of Lots 108, 109, 110, 111, 112																
			Part of Lots 113, 114, 107 and																
			Star Valley Ranch Plat 18																
			All of Lots 1, 2, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108,																
			109, 110, 111, 123, 124, 125, 126, 127, 128, 129, 130, 131 and																
			Part of Lots 112, 113, 119, 120, 121, 122, 170, 171, 172, 132, 133, 94,																
			95, 96, 41, 3, 4 and																
			7.69 Acres of the Common Area																
34	118	5								x									
			Star Valley Ranch Plat 18																
			All of Lots 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158,																
			159, 160, 161, 162, 163, 166, 167, 168, 169, 173, 174, 175, 176, 177, 178,																
			179, 180, 187, 188, 118 and																
			Part of Lots 132, 133, 134, 135, 136, 164, 165, 170, 171, 172, 117, 119, 120,																
			181, 183, 184, 185, 186, 145 and																
			6.11 Acres of Common Area																
34	118	5										x							
			Star Valley Ranch Plat 18																
			All of Lots 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23,																
			24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 42, 43, 44, 45,																
			46, 47, 48, 49, 50, 51, 91, 92, 93 and																
			Part of Lots 3, 4, 41, 94, 95, 96, 89, 90, 52 and																
			1.43 Acres of Common Area																

The following points of use have original supply under Permit 28143
(Stewart Pipeline) with additional supply under Permit U.W. 82826
Item 9 continued (1st Enl. Prater Canyon No. 1) and this permit. Pg. 6

			NE¼				NW¼				SW¼				SE¼				
Township	Range	Sec.	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	Totals
34	118	5									x								-
			Star Valley Ranch Plat 18																
				All of Lots 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69,															
				70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 89, 137,															
				138, 139, 140, 141, 142, 143, 144 and															
				Part of Lots 52, 89, 90, 133, 134, 135, 136, 145 and															
				6.68 Acres of Common Area															
34	118	6	x																
			Star Valley Ranch Plat 17																
				All of Lots 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125 and															
				Part of Lots 126, 97, 98, 99, 100, 101, 102															
35	118	5											x						
			Star Valley Ranch Plat 21																
				All of Lots 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35,															
				36, 37, 38, 39, 40, 41, 42, 43, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63,															
				64, 65, 66, 67, 68, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 90 and															
				Part of Lots 69, 81, 82, 88, 89, 91, 18															
35	118	6																x	
			Star Valley Ranch Plat 21																
				All of Lots 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 44, 45, 46,															
				47, 48, 49, 50, 51, 83, 84, 85, 86, 87, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101,															
				102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114 and															
				Part of Lots 18, 91, 89, 88, 81, 82, 69															
34	119	1		x															
			Star Valley Ranch Plat 5																
				All of Lots 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35,															
				36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 1 and															
				Part of Lots 2, 3, 4, 5, 6, 7, 13, 14, 15, 16, 53, 54, 55, 56, 88, 89															
34	119	1			x														
			Star Valley Ranch Plat 5																
				All of Lots 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84,															
				85, 86, 87, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105,															
				108 and															
				Part of Lots 106, 107, 109, 110, 111, 112, 113, 114, 115, 65, 66, 55, 54, 53, 88, 89															
34	119	1								x									
			Star Valley Ranch Plat 5																
				All of Lots 116, 117, 118, 119, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132,															
				133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149,															
				150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161 and															
				Part of Lots 120, 121, 63, 64, 65, 66, 106, 107, 109, 110, 111, 112, 113, 114, 115 &															
			Star Valley Ranch Plat 4																
				All of Lot 13 and															
				Part of Lots 11 and 12															

The following points of use have original supply under Permit 28143
(Stewart Pipeline) with additional supply under Permit U.W. 82826
(1st Enl. Prater Canyon No. 1) and this permit.

			NE¼				NW¼				SW¼				SE¼				
Township	Range	Sec.	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	Totals
34	119	1					X												
			Star Valley Ranch Plat 4																
				All of Lots 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and															
				Part of Lots 11 and 12 and															
			Star Valley Ranch Plat 5																
				All of Lots 8, 9, 10, 11, 12, 57, 58, 59, 60, 61, 62 and															
				Part of Lots 120, 121, 63, 64, 65, 56, 13, 14, 15, 16, 2, 3, 4, 5, 6, 7															

The following points of use have original supply under Permit U.W. 82827 (2nd Enl. Prater Canyon No. 1) with additional supply under this permit.

			NE¼				NW¼				SW¼				SE¼				
Township	Range	Sec.	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	Totals
Unsurveyed																			
35	118	Hes 67												x Sec 32					
			Recreation Building (Silo) with restaurant office and																
			pro-shop. 6 basins, 6 toilets, 4 showers																
Unsurveyed																			
35	118	Hes 67											x Sec 32						
			One 40,000 gallon swimming pool located on																
			Lot 12 Star Valley Ranch Plat 17																
			The following points of use have original supply under Permit 6973 Enl.																
			(1st Enl. Stewart Pipeline) with additional supply under																
			Permit U.W. 82827 (2nd Enl. Prater Canyon No. 1) and this permit.																
Unsurveyed																			
35	118	Hes 67												x Sec 32					
			Recreation Barn with Bar																
Original Survey																			
35	118	31							x										
			Recreation Barn with restrooms having 2 toilets and 2 basins																
			2 Green Houses																
			Barn																
Original Survey																			
35	118	31						x	x										
			Barn with 2 mobile homes																

Item 10 continued: REMARKS:

Star Valley Ranch Association North Airstrip Well #1

The following lands are irrigated under the following permits with the water from this well to be additional supply:

Township 35N Range 118W BES 67 (Section 32)
SE¼ SW¼ 18.64 acres
SW¼ SW¼ 8.92 acres

Lands having original supply under the Frank A. Roberts appropriation, Proof No. 6788, diverting from Prater or Green Canyon Creek, through the S.H. Ditch, under Permit No. 1579, with priority of September 13, 1897, as amended and changed to the Brog Ditch and Brog-Golf Course Pipeline; and having supplemental supply under the Reynold Bateman appropriation, Proof No. 25725, diverting from North Branch Cedar Creek, through the Reynold Ditch, under Permit No. 20836, with priority of July 2, 1951, as amended and changed to the Swainston Ditch via Cedar Creek Pipeline by OR 36 Pg 192-304.

Township 34N Range 118W (Section 5)
NE¼ NW¼ 9.4 acres - Lot 3
NW¼ NW¼ 6.9 acres - Lot 4
SW¼ NW¼ 9.2 acres
SE¼ NW¼ 6.4 acres
NW¼ SW¼ 1.2 acres
NE¼ SW¼ 4.9 acres

Lands having original supply under the Leisure Valley, Inc., (as successor to Wm. J. Berrick, original appropriator) appropriation, Proof No. 7786, diverting from Prater or Green Canyon Creek, through the Enl. S.H. Ditch Permit No. 904 Enl. with priority of August 3, 1902, as amended and changed to the Brog Ditch and Brog-Golf Course Pipeline; and having supplemental supply under the Reynold Bateman appropriation, Proof No. 25725, diverting from North Branch Cedar Creek, through the Reynold Ditch, under Permit No. 20836, with priority of July 2, 1951, as amended and changed to the Swainston Ditch via Cedar Creek Pipeline, by OR 36 Pg 192-304.

Form U.W. 1
Rev. 7-83

STATE OF WYOMING

OFFICE OF THE STATE ENGINEER

IF WELL IS TO BE ABANDONED, SEE STATEMENT OF COMPLETION AND DESCRIPTION OF WELL ITEM 15, PAGE 4

NOTE: Do not fold this form. Use typewriter or print neatly with black ink.

PERMIT NO. U.W. 90328 NAME OF WELL Star Valley Ranch Association North Air Strip Well #1

1. NAME OF OWNER Star Valley Ranch Association

2. ADDRESS P.O. Box 159, Thayne, WY Zip Code 83127

3. USE OF WATER: Domestic ☐ Stock Watering ☐ Irrigation ☐ Municipal ☐ Industrial ☐ Miscellaneous ☒

4. LOCATION OF WELL: SW ¼ NW ¼ of Section 31 T. 35 N., R. 118 W., of the 6th P.M. (or W.R.M.), Wyoming, being specifically
(Bearing and Distance)
or _____ ft. North/South and _____ ft. East/West from the _____ corner of Section ____, T. _____ N., R. _____ W.
(Strike out words not needed.)

5. TYPE OF CONSTRUCTION: Drilled ☒ Air Rotary (Type of Rig) Dug ☐ Driven ☐ Jetted ☐

Other

6. CONSTRUCTION: Total Depth of Well 545 ft. Depth to Static Water Level 187 ft.

a. Casing Schedule New ☒ Used ☐

12" diameter from 0 ft. to 300 ft. Material steel Gage _____

8" diameter from 0 ft. to 330 ft. Material steel Gage _____

6" diameter from 475 ft. to 545 ft. Material steel Gage _____

b. Perforations: Type of perforator used N/A

Size of perforations _____ inches by _____ inches.

Number of perforations and depths where perforated:

_____ perforations from _____ ft. to _____ feet.

_____ perforations from _____ ft. to _____ feet.

c. Was well screen installed? Yes ☒ No ☐

Diameter: 7" slot size: _____ set from 345 feet to 375 feet. 30

Diameter: _____ slot size: _____ set from 415/465 feet to 425/475 feet. 10/10

d. Was well gravel packed? Yes ☒ No ☐ Size of gravel _____

e. Was surface casing used? Yes ☒ No ☐ Was it cemented in place? Yes ☒ No ☐

7. NAME & ADDRESS OF DRILLER Thomas Drilling, Inc., Rt. 1, Afton, WY 83110

8. DATE OF COMPLETION OF WELL (including pump installation) July 30, 1993

9. PUMP INFORMATION: Manufacturer Red Jacket Type Submersible

Source of power Lower Valley Power Horsepower 50 Depth of Pump Setting 428 ±

Amount of Water Being Pumped 400 Gallons Per Minute. (For springs or flowing wells, see Item 11.)

Permit No. U.W. 90328 Book No. 684 Page No. 29

10. PUMP TEST: Was a pump test made? Yes ☒ No ☐

If so, by whom Thomas Drilling, Inc. Address Rt 1, Afton, WY 83110

Yield: 152 gal./min. with 2.5 foot drawdown after 1 hours.

Yield: 690 gal./min. with 12 foot drawdown after 3 hours.

11. FLOWING WELL (Owner is responsible for control of flowing well).

If well yields artesian flow, yield is _____ gal./min. Surface pressure is _____ lb./sq. inch. or _____ feet of water.

The flow is controlled by: valve ☐ cap ☐ plug ☐

Does well leak around casing? Yes ☐ No ☐

12. LOG OF WELL: Total depth drilled 545 feet.

Depth of completed well 545 feet. Diameter of well 8" inches.

Depth to first water bearing formation 187 feet.

Depth to principal water bearing formation, Top 345 feet to Bottom 375 feet.

Ground Elevation, if known _____

From Feet	To Feet	Material Type, Texture, Color	REMARKS (Cementing, Shutoff, Packing, etc.)	Indicate Water Bearing Formation	Indicate Perforated Casing Location
0	2	Top Soil			
2	30	Clay & Gravel - Red			
30	50	Clay & Gravel			
50	80	Clay			
80	90	Clay & Gravel			
90	100	Clay & Gravel-Changing to yellow			
100	150	Clay & Gravel			
150	160	Clay & very little Gravel-Tan & Sandy			
160	170	Clay & very little Gravel			
170	180	Clay & Gravel-Reddish tan			
180	190	Clay & Gravel-Gravel is increasing			
190	210	Clay & Limestone Gravel			
210	235	Clay-Tanish-Red			
235	250	Clay & Limestone-Gravel with small ledges			
250	260	Limestone Gravel with traces of Clay-Some water			
260	287	Limestone Gravel			
287	290	Clay & Limestone Gravel			
290	300	Clay & Gravel	12" casing to 300'		
300	330	Limestone Gravel-Some Water			
330	338	Clay-Red			
338	375	Limestone Fractured Saturated			
375	390	Limestone Fractured w/ traces of Clay			
390	407	Limestone w/ traces of Clay			
407	432	Limestone Broken			
432	459	Limestone w/ Interbed of mud stone			
459	476	Limestone-Broken	Total Water Approx: 250 gpm		
476	490	Solid Limestone — Water barrier			
490	500	Limestone & Mud Stone			
500	533	Mud Stone			
533	545	Limestone & Mud Stone			

QUALITY OF WATER INFORMATION:

Was a chemical analysis made? Yes ☒ No ☒

If so, please include a copy of the analysis with this form.

If not, do you consider the water as: Good ☒ Acceptable ☐ Poor ☐ Unusable ☐

13. TABULATION

a. If for irrigation, the land proposed to be irrigated should be described in the following tabulation. Describe in the "Remarks" section, under Item 14, the means of conveying the water to the lands and the method of irrigation.

(Give irrigable acreage in each legal subdivision. If proposed use is for additional supply for lands with a right from another source, indicate in the tabulation the priority or permit number, the source of supply and the name of the ditch or other well.)

b. If not used for irrigation, state the area and point(s) of use and location of well in the tabulation below. Also describe the method of conveyance in the "Remarks" section under Item 14.

Town Ship	Range	Sec.	NE¼				NW¼				SW¼				SE¼				TOTALS
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	

TOTAL NUMBER OF ACRES TO BE IRRIGATED _____

Original Supply _____ acres

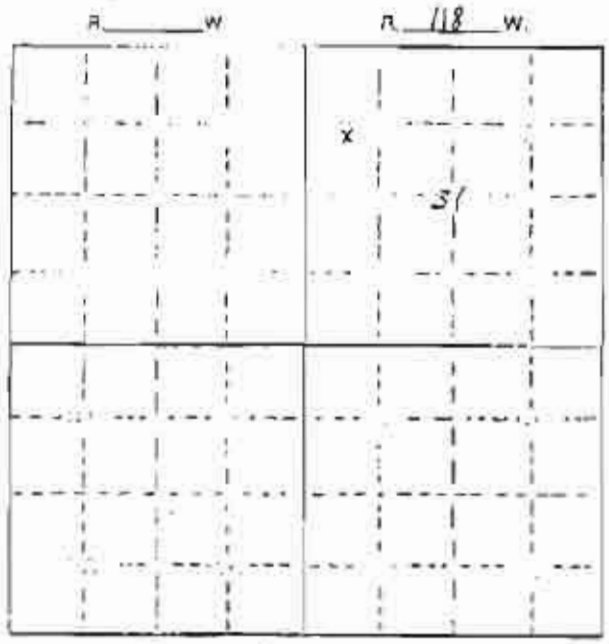
Additional Supply _____ acres

14. PLAT

a. If the well is to be used for irrigation, industrial, miscellaneous or municipal use, show the location of the well on the plat below. For such uses, a plat certified by a licensed engineer or land surveyor is required to be submitted at the time the Proof of Appropriation and Beneficial Use of Ground Water is submitted.

b. For other uses, accurately show the well location, point of use or uses and describe method of conveyance of water to points of use on plat and in "Remarks" section below. Make certain location on plat agrees with written description.

c. A separate map may be submitted if the information required cannot be shown on this plat.



REMARKS: Engineered map will be submitted.

15. IF WELL IS TO BE ABANDONED, complete Items 1 through 3, Item 17 (Plugging Method) and state reason for abandonment and details of the plugging below.

It is the responsibility of the owner to properly plug or fill in the well in order to prevent contamination of ground water and to cover or cap the well at ground level.

Under penalties of perjury, I declare that I have examined this form and to the best of my knowledge and belief it is true, correct and complete.

Signature of Owner or Authorized Agent

September 21 1983
Date

Date of Receipt _____, 19

Date of Priority _____, 19

Date of Approval _____, 19

for State Engineer

AQUIFER TEST DATA

RECEIVED [illegible] 1993

1

Owner Star Valley Ranch Address _____ County Lincoln State Wyo.

Company performing test Thomas Drilling Inc. Measured by _____

Test No. #1 Part Distance from pumping well 10' Type of test Air Strip Well #1 Test No. _____

Date of test 3/25/93

Time Data	Water Level Data	Discharge Data	Comments on factors affecting test data
Pump on: Date _____ Time _____ (I.)	Static water level 187	How Q measured Flow meter	Pump setting at 303'
Pump off: Date _____ Time _____ (I')	Measuring point Top 8" Casing	Depth of pump/air line 299.33	Bottom of motor 310'
Duration of aquifer test:	Elevation of measuring point _____	Previous pumping? Yes ___ No X	
Pumping _____ Recovery _____		Duration 32 Hr End _____	

Clock time	Time since pump started t	Time since pump stopped t'	t/t'	Water level measurement	Correction or Conversion	Water level	Water level change s or s'	Discharge measurement	Rate	
10:45	0 min			48 Est		187		146.66		Meter set
46				46		191.68	4.68'			
47				45		193.79	6.79'			
48				45		193.79	6.79'			
49				44		176.36	9.36			
50				48		187	-			
51				48		"				
52				48		"				
53				48		"				
54				48		"				146.66 Average GPM in
55				48		"				0 min.
56				48		"				Draw down 1'6"
57				48		"				
58				49		"				
59				48		"				
11:00				48		"				15 min pump in 2200 Gl
01				48		"		145		
02				48		"		"		145 Average Gpm in
03				47		189.14	2.14	"		5 min
04				48		187		"		Draw down same 1'6"
05				48		"		"		2900 Gl
06				48		"		133 Gpm		
07				48		"		"		
08				48		"		"		
09				48		"		"		
10				48		"		"		
11				48		"		"		

(1)

FIGURE III-9 : AQUIFER TEST DATA FORM

AQUIFER TEST DATA

2

Owner Star Valley Ranch Address _____ County Lincoln State Wyo.

_____ Company performing test Thomas Drilling Address _____

Test No. _____ Distance from pumping well _____ Type of test _____ Test No. _____

Measuring equipment 3/25/93

Time Data
Pump on: Date _____ Time _____ (L)
Pump off: Date _____ Time _____ (F)
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous pumping? Yes ___ No ___
Duration _____ End _____

Clock time	Time since pump started t	Time since pump stopped t'	t/t'	Water level measurement	Correction or Conversion	Water level	Water level change s or s'	Discharge measurement	Rate	Comments on factors affecting test data
11:12	AM			48		187				
13				48						
14				48						
15				48				133.33		40001
20				"				153		Increased flow
25				"						
30				"				152 GPM		30 min avg GPM Pumped
35				"						152 GPM
40				"						
45				"				152		7800
46				47		188.34	2.34	280		Increased Flow 7900
47				"		"	"			
48				"		"	"			15 min avg 280 GPM
49				"		"	"			
50				"				280		Increased Flow 9300
51				"				320		
52				"						5 min avg 320 GPM
53				"						
54				"						
55				"				326		10200
57				"				340		
57				"						
58				"						5 min Avg 340 GPM
59				"						
12:00 pm				47		"	"	340		12600

2

FIGURE III-9 : AQUIFER TEST DATA FORM

AQUIFER TE

ner Star Valley Ranch Address _____ County Lincoln State Wyo.

_____ Company performing test Thomas Drilling Measurements by _____

Pump No. _____ Distance from pumping well _____ Type of test _____ Test No. _____

Measuring equipment _____

Time Data	Water Level Data	Discharge Data	Comments on factors affecting test data
Pump on, Date _____ Time _____ (t.)	Static water level _____	How Q measured _____	
Pump off, Date _____ Time _____ (t')	Measuring point _____	Depth of pump/air line _____	
Duration of aquifer test:	Elevation of measuring point _____	Previous pumping? Yes ___ No ___	
Pumping _____ Recovery _____		Duration _____ End _____	

Clock time	Time since pump started (t)	Time since pump stopped (t')	t/t'	Water level measurement	Correction or Conversion	Water level	Water level change (+ or -)	Discharge measurement	Rate	Comments on factors affecting test data
12:00 pm				47		18939	234	340		12600
01										
02										
03										320 Avg. Gpm for 30 min
04										
05										
06								320		22200 G
07										
08										323.33 Gpm Average For
09										30 min
10										
11										
12:00 pm				47	18939	234		323.33		Total Flow 31900
01				45	19339	6.79		530 Gpm		
02				"						
03										
04				"						
05										530 Gpm Average For
06				"						10 min.
07										
08				"						
09				"						
10				45				530		Opened Valve For 37200
11				44	19636	936		6.95 Gpm		Full Discharge
12				44	"	"				
13				43	19832	11.72				
14				43		11.72				

3

FIGURE III-9 : AQUIFER TEST DATA FORM

Owner Star Valley Ranch Address _____ County Lincoln State Wyo.

_____ Company performing test Thomas Drilling Supervised by _____

Pilot No. _____ Distance from pumping well _____ Type of test _____ Test No. _____

Measuring equipment _____

Time Data	Water Level Data	Discharge Data	Comments on factors affecting test data
Pump on: Date _____ Time _____ (I.)	Static water level 187	How Q measured _____	
Pump off: Date _____ Time _____ (I')	Measuring point _____	Depth of pump/air line _____	
Duration of aquifer test:	Elevation of measuring point _____	Previous pumping? Yes ____ No ____	
Pumping _____ Recovery _____		Duration _____ End _____	

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'	Water level measurement	Correction or Conversion	Water level	Water level change s or s'	Discharge measurement	Rate	
	1:15				43		198.78	11.78	695		
	16				"		"	"			
	17				"		"	"			695 GPM Avg. for
	18				"		"	"			20 min of Pumping
	19				"		"	"			
	20				"		"	"			
	30				"		"	"	695		51100 G
	45				"		"	"			1 Hr Avg. 690 GPM
2	10				"		"	"	690		78700
	40				"		"	"			1 Hr Avg 691.66 GPM
3	10				"		"	"	691.66		120200
	40				"		"	"			1 Hr Avg 693.33 GPM
4	10				"		"	"	693.33		161800
	40				"		"	"			1 Hr Avg 691.66 GPM
6	10				"		"	"	691.66		203300
	40				"		"	"			
6	10				"		"	"			2 Hr Avg 692.5 GPM
					43		"	"			
7	10				43		"	"	692.5		286400
											1 Hr Avg 693.33 GPM
8	10								693.33		332800
											3 Hr Avg 691.11 GPM
11	10	pm	3/26/93		43		201.09	14.09	691.11		902400
					"		"	"			
					"		"	"			6 Hr Avg 694.17 GPM
					"		"	"			
5	10	Am	3/27/93		42		"	"	694.17		702300

(4)

FIGURE III-9 : AQUIFER TEST DATA FORM

Owner STAR Valley Ranch Address _____ County Lincoln State Wyo.

_____ Company performing test Thomas Drilling Measured by _____

No. _____ Distance from pumping well _____ Type of test _____ Test No. _____

Measuring equipment _____

Time Data
Pump on: Date _____ Time _____ (L)
Pump off: Date _____ Time _____ (F)
Duration of aquifer test: Pumping _____ Recovery _____

Water Level Data
Static water level 187
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous pumping? Yes ___ No ___
Duration _____ Rate _____

Comments on factors affecting test data

Clock time	Time since pump started t	Time since pump stopped t'	t/t'	Water level measurements	Correction or Conversion	Water level	Water level change + or - s	Discharge measurement	Rate	Comments on factors affecting test data
				42		201.04	14.04			
				"		"	"			6 Hr Avg 695.23 GPM
				"		"	"			
11:10 pm 3/26/93				42		"	"	695.22		952600
				"		"	"			
				"		"	"			
				"		"	"			
				"		"	"			
5:10 pm				42		"	"			12 Hr 35 min Avg. 693.70 GP
				"		"	"			
				"		"	"			
				"		"	"			
				"		"	"			
11:45 pm 3/26/93				42		201.04	14.04	695.70		1469400

Test pumping End at 11:45 pm on 3/26/93
Total pumping 37 Hr
Total Draw Down from Starting static water Level of 187' was 14.04' to 201.04 Ft

(50)

FIGURE III-9 : AQUIFER TEST DATA FORM

GREEN CANYON (Upper)

DATE	METER READING INSTALLED 10-27-86	TIME	ELAPSED TIME (MIN)	GAL.	AVERAGE G.P.M.
10-27-86	61,040,800	4:50 PM			
10-29-86	62,236,500	4:15 PM	2,845	1,195,700	420.28
11-5-86	66,012,800	2:15 PM	9,900	3,776,300	379.45
11-18-86	71,467,700	10:30 A.M.	18495	5,454,900	294.93
11-18-86	71,470,300	10:40 A.M.	10	2,600	260.00
12-2-86	75,389,300	2:50 P.M.	20,410	3,919,000	192.01
12-10-86	77,341,800	3:37 P.M.	11,564	1,952,500	168.87
12-22-86	79,867,800	1:15 P.M.	17,141	2,526,000	147.36
12-27-86	80,745,000	12:00 noon	7125	927,200	130.13
12-31-86	CHECKED FLOW FOR 45 MIN WHILE GETTING				124.00
1-6-87	82,763,800	3:04 P.M.	14534	1,968,500	135.00
1-5-87	CHECKED FLOW FOR 15 MIN				154.00
1-7-87	83,202,800	2:33 P.M.	2,849	439,000	154.09
1-12-87	84,054,600	12:50	5,657	851,800	150.57
1-15-87	84,780,400	2:02	4,392	725,800	165.26
1-19-87	85,705,800	2:02	5,760	925,400	160.66
1-29-87	87,896,700	1:30	14,368	2,190,900	152.45
2-6-87	89,526,100	12:31 PM	11,461	1,629,400	142.17
2-13-87	90,919,600	12:22 P.M.	10,071	1,393,500	138.37
2-20-87	92,269,200	3:29 P.M.	10,267	1,349,600	131.45
2-27-87	93,529,800	4:01 P.M.	10,112	1,260,600	124.66
3-6-87	~~93,529,800~~ 94,776,600	1:10 P.M.	9,909	1,246,800	125.82
3-12-87	95,991,600	1:57 P.M.	8,687	1,215,000	139.86
3-19-87	97,278,400	4:06 P.M.	10,203	1,286,800	126.12
3-30-87	99,074,400	11:30 A.M.	15,564	1,796,000	115.39
4-7-87	1,155,700	11:01 A.M.	11,491	2,081,300	181.12
4-20-87	5,777,400	10:03 A.M.	18,662	4,621,700	248
4-27-87	9,233,400	12:24 P.M.	10,221	3,456,000	338
5-4-87	15,039,400	8:37 A.M.	9853	5,806,000	589
5-11-87	22,779,500	9:20 A.M.	10123	7,740,100	765
5-11-87	UNHOOKED TEMPORARY COLLECTION SYSTEM				736
5-15-87	27,498,300	2:58 P.M.	6098	4,718,800	774

DATE	METER READING	TIME	ELAPSED TIME (MIN)	GAL.	AVERAGE G.P.M.
	42,896,000				
5-26-87	~~[illegible]~~	11:56 a.m.	15,774	15,397,700	976
5-29-87	45,850,600	11:01 a.m.			1046
6-8-87	61,645,700	2:53 P.M.			1197
6-17-87	75,184,000	9:03 a.m.			1074
[illegible]	[illegible]	[illegible]			[illegible]
[illegible]	[illegible]	[illegible]			962
[illegible]	[illegible]	[illegible]			774
[illegible]	[illegible]	[illegible]			[illegible]
8-12-87	38,737,000	1:52			552
8-13-87	39,478,700	1:41			519
8-15-87	40,831,000	9:55			510
8-19-87	43,649,400	10:59			484
8-25-87	47,481,000	11:36 a.m.			442
9-3-87	52,413,700	3:29 P.M.			375
9-10-87	55,129,900	4:12 P.M.			268
9-12-87	56,107,000	10:18 a.m.			387
9-16-87	57,666,600	9:15			274
	CUT IN NEW COLLECTION SYSTEM		9-17-87		
9-18-87	58,758,700	10:10			570
9-23-87	62,734,100	11:30			546
10-2-87	69,077,500	9:41			494
10-8-87	73,061,200	9:24			462
10-15-87	77,480,200	10:54			435
10-22-87	81,661,400	3:35			404
10-30-87	85,951,500	10:50			379
11-11-87	92,123,000	11:17			357
11-19-87	96,006,700	1:58			332
11-25-87	98,734,400	12:46			319
12-4-87	2690,200	2:18			303
12-11-87	563,5300	3:07			291
12-28-87	12,284,800	12:52			273
1-6-88	15,623,500	1:20			258

DATE	METER READING	TIME	G.P.M.
1-19-88	20,260,000	2:25	246
1-28-88	23,323,100	1:20	238
2-11-88	27,916,600	12:51	228
2-19-88	30,467,300	1:56	220
2-26-88	32,657,700	1:26	218
3-11-88	37,371,200	1:32	234
~~3-24-88~~	~~41,677,100~~	~~12:53~~	
4-7-88	46,664,400	12:45	239
4-20-88	57,207,100	10:08	568
5-9-88	71,725,700	3:18	525
5-17-	81,275,500	9:48	852
5-24	92,578,000	10:04	1120
5-24	92,644,500	11:03	1127
6-10	22,418,700	12:28	1212
6-14	29,554,000	10:58	1258
6-23	45,893,400	3:29	1241
6-28	00,		
7-6	69,450,600	2:58	1260
7-14	83,781,200	2:50	1245
7-25	565,200	9:03	1084
7-29	6,567,900	9:26	1038
8-12	27,321,400	1:20	1018
8-18	35,936,300	11:18	1011
8-29	51,838,300	2:18	993
9-2	57,070,800	2:11	910
9-6	61,766,300	9:47	851
9-21	77,487,000	10:04	727
10-7	90,463,400	11:40	561
10-13	94,567,300	10:08	477
10-24	1,593,600	3:12	436
11-7	9,379,600	2:04	388
11-18	14,924,600	12:50	352
12-12	25,598,700	1:52	310

METER READING	TIME	G.P.M.
1-3-89 METER NOT WORKING		
3-30-89 305,269,00	11:17	—
4-4-89 320,877,00	2:06	211
4-25-89 48,802,400	3:07	552
4-26-89 49,939,100	11:40	922
5-4-89 59,147,300	2:41	787
5-11-89 68,605,400	1:18	946
5-18-89 78,071,700	8:14	963
5-25-89 88,077,700	12:28	968
6-1-89 97,636,000	9:47	964
6-16-89 METER NOT WORKING	NEEDS NEW GEARS	
10-27-89 GOT GEARS & INSTALLED	10-27-89	
~~10-27-89~~		
10-27 21,563,700	11:36	—
10-30 23,720,900	9:38	506
11-20 37,120,400	10:32	419
12-21-89 52,874,500	12:22	352
1-3-90 58,508,500	12:22	301
1-9-90 61,018,100	2:39	286
2-21-90 76,758,700	2:06	254
3-5-90 80,892,500	2:12	299
3-19 85,650,100	10:28	239
3-26 87,787,000	12:53	209
4-16-90 92,266,700	11:14	149
4-19 93,008,200	11:54	170
4-20 93,231,300	9:20	173
4-23 94,050,000	8:51	190
4-24 94,362,000	8:47	217
~~4-24~~ ~~94,444,700~~	~~0:00~~	~~0~~
5-1-90 96,956,100	3:54	247
METER HEAD WORN OUT HAS NOT BEEN WORKING CORRECTLY		
6-7-90 PUT NEW NEPTUNE METER IN SYSTEM		

	METER READING	TIME	GPM
6-7-90	18000	1:51	
6-12-90	8209000	9:05	1185
6-12-90	8383,000	11:32	1184
6-15-90	13283,000	8:36	1182
6-25-90	31,644,000	1:47	1248
7-2-90	44,322,000	2:04	1256
7-9-90	56697,000	2:45	1223
7-18-90	72527,000	2:10	1218
8-1-90	96,631,000	10:35	1211
8-7-90	107,161,000	2:54	1183
8-13-90	116,833,000	10:24	1156
8-20-90	144,678,000	3:19	1124
9-12-90	163,519,000	11:22	1019
10-1-90	186,088,000	2:54	819
10-9-90	193,495,000	2:26	641
10-24-90	205,350,000	2:22	549
12-3-90	229,541,000	2:43	420
1-10-91	247,143,000	1:57	322
2-5-91	257,474,000	1:31	276
2-28-91	266,418,000	12:17	271
4-5-91	280,099,000	9:40	265
5-7-91	295,597,000	1:55	334
5-24-91	312,655,000	4:06	693
6-24-91	364 821,000	10:51	1179
6-25-91	366,665,000	11:50	1230
7-17-91	406,049,000	9:04	1250
7-29-91	428,553,000	2:40	1277
8-14-91	465,111,000	9:54	1220
10-2-91	530,939,000	11:17	1036
10-14-91	544,836,000	8:38	655
10-28-91	548,690,000	11:20	609
11-5-91	560,270,000	11:30	524
12-3-91	577,582,000	10:30	430

DATE	METER READING	TIME	G.P.M.
12-30-91	591,357,000	2:15	352
3-3-92	617,961,000	10:03	289
4-1-92	632,608,000	1:00	349
4-20	644,736,000	11:50	444
4-28	650,474,000	9:45	504
~~5-15~~	~~673,166,000~~	~~2:00 PM~~	~~707~~
5-6	658,679,000	10:23	709
5-15	673,166,000	2:07	1099
5-26	691,523,000	10:26	1175
6-10	716,797,000	9:00	1175
6-23	738,655,000	8:25	1170
7-6	760,289,000	5:00	1102
7-21	782,277,000	9:37	1040
7-28	792,244,000	12:57	969
7-29	793,357,000	8:40	941
7-30	794,994,000	2:01	930
8-3	799,952,000	8:57	909
8-5	802,715,000	1:11	881
8-10	808,855,000	2:04	846
8-11	810,148,000	4:27	817
8-12	810,935,000	8:56	796
8-17	816,528,000	8:45	778
8-19	818,951,000	3:22	739
8-22	821,775,000	9:11	715
8-26	825,880,000	1:22	683
9-1	831,417,000	1:36	640
9-14	842,085,000	3:50	566
9-18	844,883,000	10:22	513
9-23	848,579,000	3:39	492
9-29	852,646,000	3:40	471
10-2	854,431,000	10:50	443
10-15	862,131,000	9:01	414
11-16	878,544,000	1:31	354

GREEN CANYON

DATE	METER READING	TIME	AVG GPM
12-8-92	888,164,000	1234	304
12-11	887,371,000	1026	288
1-28 93	907,449,000	12.03	261
1-28	TIMED READING		235
3-3	918,861,000	3:14	232
3-23	925,205,000	10:12	223
5-10	946,042,000	11:10	301
5-10	TIMED		350
7-9 93	04854400	11:08	1186
7-13	056,086,000	1:10	1282
9-21-93	183,492,000	2:06	1263
9-21	1 min Timed	"	1180
10-4 -	205,801,000	3:02	1188
" 17	262,367,000	9:24	898
12-24	289,817,000	9:54	515
1-24 94	94,306,691,000	11:35	377
2-4 "	311,963,000	9:53 AM	335
2-16 "	317,496,000	10:01	320
3-7 "	318,916,000	9:44	517
3-22 "	METER NOT WORKING		
10-20 94	98270000	@ 9:20	
10-24 94	12,470,000	11:40	448
11-22 "	29,117,000	2:10	397
12-30 "	48,545,000	1:27	355
1-26 95	62,093,000	3:30	347
2-23 "	74,622,000	10:48	313
2-28	77,166-3,000	10:43	423
3-10 "	83,024,000	2:23	366

PLAT / LOT GREEN Upper

STREET ADDRESS

HOMEOWNER NAME PHONE

WATER HOOK-UP DATE ☐ WRENCH INSTALLED BY

METER HOOK-UP DATE METER # 3191477 Neptune 5/8" INSTALLED BY

Date	Last Reading	This Reading	Difference	Time
6-9-95		188882 [000]		10:30pm
7-8-95		219530 [000]		9:15Am
7-13-95		229801 [000]		5:30pm
7-19-95		238882 [000]		9:30Am
7-25-95		249407 [000]		11:00 Am
8-2-95		263722 [000]		10:15Am
8-21-95		297591 [000]		9:30Am
8-26-95		306227 [000]		12:15pm
9-12-95		324042 [000]		10:45Am
9-22-95		340362 [000]		9Am
10-3-95		358670 [000]		5:30pm
		388782 [000]		8:30Am
10-31-95		398988 [000]		4pm
11-12-95		413597 [000]		NOON

PLAT / LOT GREEN Upper

STREET ADDRESS

HOMEOWNER NAME PHONE

WATER HOOK-UP DATE ☐ WRENCH INSTALLED BY

METER HOOK-UP DATE METER # 3198477 NEPTUNE 6" INSTALLED BY

Date	Last Reading	This Reading	Difference	Time
5-13-96		508217000		10 am
			$199 ? CCF	
7-9-96		590202000		8:15 am
?			20265 CCF ⇒ 15159000 gal	
7-22-96		610467000		8:15 am
7-28-96		620616000	169150 gpd	9 am
7-29-96		622036000	142000 gpd	
7-30-96		623579000	154300 gpd	7:45 am
7-31-96		625079000	1500000 gpd	8:45 am
8-1-96		626617000	1538000 gpd	8:30 am
			1529000 Avg gpd	
8-5-96		632754000	1534000 gpd	
8-6-96		634264000	1510000 gpd	
8-7-96		635787000	1523000 gpd	7:30 am
8-8-96		637315000	1528000 gpd	7:30 am
8-9-96		638856000	1541000 gpd	9 am
8-12-96		643507000	1569000	8:45 am
8-13-96		645076000		7:30 am
8-14-96		646636000	1560000 gpd	8 am
8-15-96		648122000	1486000 gpd	7:30 am
8-16-96		649557000	1435000 gpd	7:30 am
8-17-96		651127000	1570000 gpd	7:30 am
8-18-96		652534000	1407000 gpd	7:30 am
8-19-96		653937000	1403000 gpd	8 am
8-20-96		655356000	1419000 ?	8 am
8-21-96		656825000	1469000 gpd	8 am
8-22-96		658249000	1424000 gpd	7:45 am
			1524000 Avg gpd	
8/23/96		659706000	1457000	
8/24/96		661158000	1452,000	
8/25/96		662601000	1443,000	
8/26/96		664077000	1,476,000	

GREEN #2 Lower

PLAT / LOT

STREET ADDRESS

HOMEOWNER NAME _____ PHONE _____

WATER HOOK-UP DATE _____ ☐ WRENCH SENSUS INSTALLED BY _____

METER HOOK-UP DATE _____ METER # _____ 6" INSTALLED BY _____

Date	Last Reading	This Reading	Difference	Time
7-28-96		~~007024 000~~		7:30
7-~~29~~-96		~~008400 000~~	4475 gpd	8:30
7-31-96		008400 000		8:30 am
8-1-96		208904 000	504600 gpd	8:30 am
8-5-96		011193 000		
8-6-96		011697 000	494000 gpd	
8-7-96		012101 000	414000 gpd	7:45 am
8-8-96		012690 000	589000 gpd	7:45 am
8-9-96		013276 000	586000 gpd	7:45 am
8-12-96		015176 000	633000 gpd	9:30 am
8-13-96		015989 000	543000 gpd	8 Am
8-14-96		016844 000	546000 gpd	7:45 am
8-15-96		017707 000	553000 gpd	7:30 am
8-16-96		018577 000	570000 gpd	7:30 am
8-17-96		019839 000	1262000 gpd	7:30 am
8-18-96		020557 000	718000 gpd	7:45 am
8-19-96		021262 000	705000 gpd	8 am
8-20-96		021982 000	720000 gpd	8 Am
8-21-96		022811 000	829000 gpd	8 Am
8-22-96		023580 000	769000 gpd	9:30 Am
			~~5401000~~ gpd	
8/23/96		024380 000	800,000	
8/24/96		025614 000	~~1,234,000~~ 770,000	
8/25/96		025920 000	~~306,000~~ 770,000	
8/26/96		026805 000	885,000	

(*) BYPASS OPENED 2! #2 GC MAIN (SHUT/LOCKED)

FLOW METER

PIRATOR CANYON

DATE	METER READING	TIME	ELAPSED TIME (MIN)	GAL. FLOW	AVERAGE G.P.M.
10-2-86	3,166,500	2:00 P.M.			
10-13-86	7,931,300	3:10 P.M.	15,910	4,764,800	299.48
10-13-86	7,947,600	3:40 P.M.	30	16,300	543.33
10-21-86	10,910,500	12:08 P.M.	11,732	2,962,900	252.55
10-21-86	10,914,100	12:23 P.M.	15	3,600	240.0
10-29-86	13,950,000	4:32 P.M.	11,769	3,035,900	257.96
10-29-86	13,952,900	4:43 P.M.	11	2900	263.64
11-5-86	16,604,500	2:35 P.M.	9,952	2,651,600	266.44
11-18-86	20,651,900	10:50 A.M.	18490	4,047,400	218.89
12-2-86	25,135,900	2:58 P.M.	20,408	4,484,000	219.71
12-10-86	27,676,100	3:41 P.M.	11 563	2,540,200	219.68
12-22-86	31,228,700	2:15 P.M.	17,194	3,552,600	206.62
12-27-86	32,643,300	2:00 P.M.	7185	1,414,600	196.85
1-87	35,395,400	2:37 P.M.	14,437	2,752,100	190.63
1-15-87	37,755,300	2:14 P.M.	12,937	2,362,900	182.65
1-29-87	37,955,300	NOT MOVING			
2-2-87	37,955,300	1:08 P.M.	5,762	~~6556~~	
2-6-87	38,593,900	1:06 P.M.	~~7,682~~	638,600	110.8
2-13-87	39,738,400	12:10 P.M.	10,024	1,144,500	114.17
2-20-87	40,873,900	3:54 P.M.	10,304	1,135,500	110.2
2-24-87	41,480,300	12:51 P.M.	5577	606,400	108.73
2-27-87	41,963,200	4:11 P.M.	4,520	482,900	106.8
3-6-87	43,064,100	1:33 P.M.	9,922	1,100,900	110.96
3-12-87	44,079,000	2:06 P.M.	8,673	1,014,900	117.02
3-19-87	45,216,600	3:54 P.M.	10,188	1,137,600	111.66
3-30-87	46,912,100	11:40 A.M.	15,586	1,695,500	108.78
4-7-87	48,566,400	11:05 A.M.	11,488	1,654,300	144.00
4-20-87	52,089,800	10:43 A.M.	18,695	3,523,400	189
4-27-87	54,323,800	11:34 A.M.	10191	2,234,000	219
5-4-87	56,931,500	8:23 A.M.	9889	2,607,700	263
5-87	59,105,000	8:45 A.M.	10102	2,173,500	215
5-14-87	60,083,100	9:07 A.M.			208

DATE	METER READING	TIME	ELAPSED TIME	GALLONS	AVERAGE G.P.M.
5-22-87	62,665,300	12:44	11,737	2,652,200	226
5-26-87	64,268,800	3:21	5917	1,603,500	271
5-27-87	64,635,000	12:07	1246	366,200	294
5-29-87	65,677,500	1:25			352
6-17-87	75,804,800	9:19			354
		11:01			334
7-2-87					344
7-30-87					347
					312
8-12-87	98,270,900	2:08			265
8-19-87	295,800	11:35			204
8-25-87	1,973,500	11:59			194
9-3-87	4,313,200	8:34			179
9-10-87	6,130,400	3:55			173
9-12-87	6,552,000	9:43			168
9-16-87	7,486,200	8:53			164
9-23-87	9,106,800	11:10			159
10-2-87	11,043,700	9:56			150
10-8-87	12,308,400	10:35			146
10-15-87	13,722,800	11:21			140
10-22-87	15,108,000	2:28			135
10-30-87	16,591,800	11:00			130
11-11-87	18,754,200	11:30			125
11-19-87	20,159,100	1:37			121
11-25-87	21,179,600	12:57			119
12-4-87	22,695,100	2:30			116
12-11-87	23,849,300	3:25			114
12-28-87	26,532,800	1:03			110
1-6-88	27,917,300	1:30			107
1-19-88	29,861,800	2:42			103
1-28-88	31,161,800	12:35			101
2-11-88	33,151,700	1:08			99
2-19-88	34,267,500	2:38			96

PRATER CANYON

DATE	METER READING	TIME	G.P.M.
2-26-88	35,234,800	1:35	97
3-11-88	37,420,800	1:20	108
4-7-88	41,679,100	12:53	110
4-20-88	46,294,500	10:18	249
5-9-88	51,864,200	2:40	203
5-17	55,451,200	9:12	320
5-26	61,335,800	12:55	446
~~6-10~~	~~22,078,400~~	~~1:20~~	~~302~~
6-14	71,444,700	11:31	371
6-23	76,550,000	3:13	387
~~7-5~~	~~83,066,400~~	~~9:00~~	~~384~~
7-6	83,568,700	12:26	378
7-11	86,134,100	3:31	347
7-15	92,138,900	8:35 A.M.	303
7-29	93,665,400	9:00 A.M.	264
8-12	98,481,400	1:00	236
8-18	29,500	11:45	211
8-24	20,51,400	3:08	199
9-2	4,459,300	1:53	187
9-6-88	5,433,600	9:30	178
9-21-88	9,013,900	9:37	166
10-7-88	12,509,000	2:52	143
10-13-88	13,674,300	10:22	138
10-24-88	15,825,700	3:25	133
11-18-88	20,291,100	1:03	122
2-12-88	~~25,508,700~~ 24,345,000	2:00	118
1-~~88~~ 89	27,821,800	2:48	109
1-18-89	30,061,600	12:05	104
1-13-89	33,803,600	2:57	99
1-15-89	38,357,200	10:10	106
1-~~89~~ 89	41,315,000	2:24	102
7-25-89	49358900	10:00	168
7-26-89	49993200	11:07	421

PRATER

DATE	METER READING	TIME	G.P.M.
5-4-89	53274400	3:00	280
5-11-89	57077100	1:02	382
5-18-89	61592400	8:33	457
5-25-89	65913400	12:46	418
6-1-89	70303900	9:58	443
6-16-89	80,728,200	10:51	481
6-28-	89,807,300	2:30	519
7-10-89	98,806,500	2:43	520
7-18-	03,799,700	12:37	439
8-8-89	14,420,300	2:37	350
8-21-89	19,470,000	9:15	274
9-11-89	26,472,800	3:04	219
10-19-89	35,492,000	3:04	174
10-27-89	37,240,000	11:56	151
11-8-89	39,806,700	3:44	146
11-20-89	42,146,800	10:16	138
12-21-89	47,846,100	12:37	127
1-3-90	50,068,000	12:32	119
1-9-90	51,073,400	3:00	103
2-21-90	57,739,400	2:20	108
3-5-90	59,662,500	2:25	109
3-19	61,770,900	10:48	108
3-26	63,048,500	1:04	125
4-19	68,978,600	12:28	
4-20	69,244,500	9:37	209
4-23	70,476,700	9:12	287
5-1-90	73,598,000	4:06	262
5-7-90	75,588,000	9:47	241
5-22-90	81,259,100	9:05	263
6-4-90	86,540,900	2:43	277
6-15-90	91,058,900	11:12	28
6-26-90	95,843,600	3:42	297
6-28-90	96,615,800	9:50	305

WITH VALVE IN PRATER RESERVOIR AND 4" INTERCONNECT THERE IS NO PLACE FOR ALL THE WATER TO GO. We ARE LOSEING EXCESS WATER OUT OF ZEROING BOX ABOVE METER.

DATE	METER READING	TIME	G.P.M.
7-2-90	98443000	2'18	302
7-9-90	1536000	3'00	306
7-18-90	5526100	2'45	308
8-1-90	11450000	9:38	298
8-7-90	13,876,100	2:40	271
8-13-90	15,974,600	10:38	250
8-30-90	21,432,600	2:30	221
9-12-90	24,956,200	9:54	191
10-1-90	29,617,900	2:15	169
10-9-90	31,400,200	2:45	154
10-24-90	34,430,200	2:43	140
12-3-90	41,765,000	2:55	127
1-7-91	47,569,600	2:27	115
1-[illegible]-91	48,035,100	2:08	108
2-5-91	51,919,800	1:49	104
2-28-91	55,472,700	2:37	108
4-5-91	60,993,400	10:07	107
~~5-[illegible]-91~~	~~295,597,000~~	~~6:55 PM~~	
[illegible]-24-91	83,693,800	11:05	197
7-17-91	93,588,500	8:47	300
7-29-91	98,359,400	2:19	~~[illegible]~~271
9-19-91	5,954,500	9:31	254
9-10-91	12,580,400	10:25	209
10-2-91	17,049,600	10:09	141
9-16-91	19,958,600	8:48	145
[illegible]-18-91	20,402,200	11:36	146
11-5-91	23,824,800	11:45	132
12-3-91	28,972,300	10:00	128
12-30-91	34,583,300	2:35	143
1-2-92	44,763,300	9:15	111
4-[illegible]-92	50,859,200	1:15	140
4-20-92	55,314,800	12:12	163
4-28-[illegible]	57,251,600	9:57	170

Date	meter Reading	Time		G.P.M.
~~5-15~~	~~62,811,500~~	~~2:23 2a~~		
5-6	54,631,300	10:54		203
5-15	62,811,500	2:23		242
5-26	66,287,300	10:37		223
6-10	71,110,300	9:12		224
6-23-92	75,420,000	8:38		231
7-6-92	79,785,000	2:37		224
7-21-92	83,521,400	9:15		189
7-28-92	85,370,000	1:11		179
7-29	85,578,100	9:04		176
8-3	86,807,900	8:38		169
8-5	87,327,800	12:50		166
8-10	88,496,100	1:44		160
8-11	88,747,500	4:10		15
8-11	88,779,400	7:36		155
8-19	90,331,100	3:01		138
8-22	90,900,400	9:25		143
8-26	91,727,900	11:12		141
9-1	92,893,300	1:47		133
9-14	95,227,500	3:25		124
9-18	95,909,800	10:00		126
9-23	96,840,300	5:49		121
10-2-92	98,239,900	7:45 A.M.		113
10-15	99,856,400	9:11	NOT ACCURATE	86
11-13	2,563,300	12:76	" "	64
~~11-16~~	~~3,011,900~~			
11-16	3,011,900	1:14	" "	103
12-8	5,946,700	13:04	" "	93
12-11	6,362,900	10:36	ACCURATE	100
1-28-93	12,895,300	12:32		95
	TIMED READING	2:54		4
3-3	17,251,500	3:30		84
3-23	19,786,000	10:43		8

5-10	29529,600	2:45	150
	TIMED		168
7-9-93	69,739,400	1:21	466 HP
7-13	73,326,200	1:21	623
9-21-93	132,77,200	2:21	396
9-21	1 min Timed		250 gpm
10-4	17715400	2:49	237
11-18	30419500	11:40	196
12-24	38291200	10:07	152
1-24	44,104,000	11:49	130
~~2-3~~	5.8 EARTHQUAKE IN TIGER VALLEY	2:04 A.M.	
2-4	46,048,600	10:11 A.M.	125
2-16	480,83,700	10:13	118
3 "	512,33,500	10:00	185
3-22	54388200	8:24	147
4-4	57,097,300	12:38	143
7-19-94	6,950,300	1:32 PM.	
	TIMED		288
8-9	14,558,700	11:27	
	TIMED		230 gpm
8-26-94	19,402,600	4:00	196
10-3 94	25,933,100	3:06	119
10-20	28,320,100	9:05	99
11-1	30,874,700	9:40	147
11-22 "	34,920,600	2:19	133
2-30 "	41,398,200	1:49	118
1-26 95	45,627,100	3:41	108
2-23 "	50,062,100	11:11	111

PLAT / LOT PRATER

STREET ADDRESS

HOMEOWNER NAME PHONE

WATER HOOK-UP DATE ☐ WRENCH INSTALLED BY

METER HOOK-UP DATE METER # INSTALLED BY

Date	Last Reading	This Reading	Difference	Time
OLD METER	MUESCO 6" 830198			4:15pm
6-1-99		777508 00		11:15pm
6-4-95		832000 00		
7-9-95		051205 00		10AM
7-13-96		691312 00		6pm
7-19-95		134505 00		5:45AM
7-24-95		172655 00		10AM
8-26-95		364220 00		12:45pm
8-26-95		389944 00		12:30pm
9-15-95		477165 00		12:15pm
9-21-95		500210 00		12:30pm
10-3-95		542477 00		2pm
		604269 00		8:15pm
5-13-96		095051 00		
5-23-96		140252 00		11AM
6-13-96		277490 00		3:15pm
6-17-96		300900 00		9AM
NEW SENSUS METER				
7-5-96		5642 000		10:15AM
7-9-96		8906 000		8:30AM
7-12-96		013820 000		8:45AM
7-22-96		023205 000		9:15AM

PLAT / LOT PRATER

STREET ADDRESS

HOMEOWNER NAME PHONE

WATER HOOK-UP DATE ☐ WRENCH INSTALLED BY

METER HOOK-UP DATE METER # INSTALLED BY

Date	Last Reading	This Reading	Difference	Time
7-27				
7-28		023205 000		
7-29		023865 000	660000 gpd	
7-30				
7-31		025289 000		
8-1		026976 000		
8-2		028565 000		
8-5		029181 000	616000 gpd	
8-6				
8-7				
8-8-96		029790 000		
8-9-96		030846 000		
8-12-96		032661 000	549000 gpd	
8-13-96		033210 000	536000 gpd	7:30 am
8-14-96		033746 000	537000 gpd	7:30 am
8-15-96		034283 000	513000 gpd	8 am
8-16-96		034796 000	513000 gpd	8 Am
8-17-96		035324 000	529000 gpd	9:15 am
8-18-96		035810 000	486000 gpd	8:30 am
8-19-96		036301 000	491000 gpd	7:30 am
8-20-96		036790 000	489000 gpd	7:30 am
8-21-96		037279 000	489000 gpd	7:30 am
8-22-96		037741 000	462000 gpd	7:45 am
			~~529400~~ 489 gpd	
8/23/96		038220000	479,000	
8/24/96		038686000	466,000	
8/25/96		039143000	457,000	
8/26/96		039590000	447,000	

Note beside the 7-28 to 8-6 rows: [illegible] counter did not date

Note beside the 8-15-96 to 8-19-96 rows: meter down [illegible] trend [illegible]

20

LEISURE VALLEY

R.V. BARB

PLAT / LOT

STREET ADDRESS

HOMEOWNER NAME ______ PHONE ______

WATER HOOK-UP DATE 9/20/91 ☒ WRENCH INSTALLED BY JEFF V.

METER HOOK-UP DATE ______ METER # ______ INSTALLED BY ______

Date	Last Reading	This Reading	Difference	
7-17-95		382223 00		1:15 pm
7-27-95		387781 00		10:45 am
8-2-95		396995 00		11:15 am
8-?-95		[illegible] 00		[illegible] am
8-28-95		423201 00		9:45 am
9-15-95		428823 00		
10-3-95		440616 00		
		449513 00		8:30 Am
10-31-95		451203 00		4:15 pm
5-2-96		453938 00	FINAL OLD METER NOON	
5-2-96		000010 900	NOON NEW START	
5-23-96		009637 00		10:30 Am
7-9-96		048920 00		
7-17-96		058139 00		11 Am
7-9-96		048920 00		8:45 Am
7-22-96		063844 00		8:30 Am
~~7-?-96~~		~~072683 00~~		9:45 Am
~~7-26-96~~		~~06384~~		

PLAT / LOT LVI RV PARK

STREET ADDRESS

HOMEOWNER NAME PHONE

WATER HOOK-UP DATE ☐ WRENCH INSTALLED BY

METER HOOK-UP DATE METER # 5/8 Sensus INSTALLED BY

Date	Last Reading	This Reading	Difference	
1-28		0726830		
7-31-96		0756300	97,495 gpd	
8-12		0765800		
8-6				
8-7		0816930		
8-8		0825720	93,195 gpd	
8-10		0847260		
8-12		0882600		9:15 am
8-13			105,133 gpd	
8-14				
8-15		0913600		9:45 am
8-16				
8-17		0938470	124460 -	11:30 am
8-18		0946950	84600 -	9:15 am
8-19		0957870	109200 -	8:30 am
8-20			99500 -	
8-21				
8-22		0987720	101400 gpd Avg.	8 am
8/23/96		0994000	116,806	
8/24/96		10111500	117,500	
8/25/96		10198500	87,000	
8/26/96		10293200	94,700	

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Miscellaneous Analyses

Date Sampled	: 8/15/95	Client	: STAR VALLEY RANCH ASSOC.
Date Received	: 8/17/95	Lab Project No.	: 95-2647
Client Sample ID.	: GREEN CANYON	Matrix	: Water
Lab Sample No.	: X10604		

Analysis	Result	Date Prepared	Date Analyzed	Method
Total Cyanide (mg/L)	0.02	8/18/95	8/18/95	EPA 335.2
Fluoride (mg/L)	<0.40	8/17/95	8/17/95	EPA 340.2
pH	7.90	8/17/95	8/17/95	EPA 150.1
Total Dissolved Solids (mg/L)	136	8/18/95	8/18/95	EPA 160.1
Total Alkalinity ($mgCaCO_3/L$)	131	8/21/95	8/21/95	EPA 310.1
Calcium ($mgCaCO_3/L$)	92.1	8/29/95	8/30/95	EPA 200.7
Langelier Index	+0.18			Standard Method 2330B.

Analyst

Approved

2647mn.18

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Miscellaneous Analyses

Date Sampled	: 8/15/95	Client	: STAR VALLEY RANCH ASSOC.
Date Received	: 8/17/95	Lab Project No.	: 95-2647
Client Sample ID.	: PRATOR CANYON	Matrix	: Water
Lab Sample No.	: X10605		

Analysis	Result	Date Prepared	Date Analyzed	Method
Total Cyanide (mg/L)	0.01	8/18/95	8/18/95	EPA 335.2
Fluoride (mg/L)	<0.40	8/17/95	8/17/95	EPA 340.2
pH	8.21	8/17/95	8/17/95	EPA 150.1
Total Dissolved Solids (mg/L)	157	8/18/95	8/18/95	EPA 160.1
Total Alkalinity ($mgCaCO_3/L$)	151	8/21/95	8/21/95	EPA 310.1
Calcium ($mgCaCO_3/L$)	101	8/29/95	8/30/95	EPA 200.7
Langelier Index	+0.58			Standard Method 2330B.

Analyst

Approved

2647mn.15

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Miscellaneous Analyses

Date Sampled	: 8/15/95	Client	: STAR VALLEY RANCH ASSOC.
Date Received	: 8/17/95	Lab Project No.	: 95-2647
Client Sample ID.	: AIRPORT WELL #1	Matrix	: Water
Lab Sample No.	: X10606		

Analysis	Result	Date Prepared	Date Analyzed	Method
Total Cyanide (mg/L)	<0.01	8/18/95	8/18/95	EPA 335.2
Fluoride (mg/L)	<0.40	8/17/95	8/17/95	EPA 340.2
pH	7.84	8/17/95	8/17/95	EPA 150.1
Total Dissolved Solids (mg/L)	185	8/18/95	8/18/95	EPA 160.1
Total Alkalinity ($mgCaCO_3/L$)	164	8/21/95	8/21/95	EPA 310.1
Calcium ($mgCaCO_3/L$)	117	8/29/95	8/30/95	EPA 200.7
Langelier Index	+0.29			Standard Method 2330B.

Analyst

Approved

2647mn.16

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(303)425-6021

Anions

Date Sampled : 8/15/95
Date Received : 8/17/95
Date Prepared : 8/17/95
Date Analyzed : 8/17/95

Client : Star Valley Ranch Assoc.
Lab Project No: 95-2647
Method : EPA 300.0
Matrix : Water

Evergreen Sample #	Client Sample ID	Nitrite-N(mg/L)	Nitrate-N (mg/L)	Sulfate (mg/L)
X10604	Green Canyon	<0.076	0.17	2.3
X10605	Prator Canyon	<0.076	0.14	2.0
X10606	Airport Well #1	<0.076	0.56	6.1

Analyst

Approved

2647tm.25

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

INORGANIC ANALYSIS DATA SHEET

Date Sampled :10/16/95
Date Received:10/17/95
Date Analyzed:10/23-26/95

Client :Star Valley Ranch Assoc.
Lab Project No.:95-3495
Method :600/4-79-020
Matrix :Water

Units: mg/L Basis: Total Metals

Client Sample#	Evergreen Sample#	Cu/200.7	Pb/239.2*
#1	X14195	<0.0030	<0.0023
#2	X14196	<0.0030	<0.0023
#3	X14197	<0.0030	<0.0023
#4	X14198	<0.0030	<0.0023
#5	X14199	<0.0030	<0.0023
#6	X14200	<0.0030	<0.0023
#7	X14201	<0.0030	<0.0023
#8	X14202	<0.0030	<0.0023
#9	X14203	<0.0030	0.0048
#10	X14204	<0.0030	<0.0023
Reporting Limits		0.0030	0.0023

* Analyzed by furnace atomic absorption.

Analyst

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EVERGREEN ANALYTICAL, INC.
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INORGANIC ANALYSIS DATA SHEET

Date Sampled	:8/15/95	Client	:Star Valley Ranch Assoc.
Date Received	:8/17/95	Lab Project No.	:95-2647
Date Prepared	:8/24-29/95	Method	:600/4-79-020
Date Analyzed	:8/25-31/95	Matrix	:Water

Units: mg/L Basis: Total Metals

Client Sample#	Green Canyon	Prator Canyon	Airport Well #1		
Evergreen Sample#	X10604A	X10605A	X10606A	Reagent Blank	Reporting Limits
Cu/200.7	<0.0030	<0.0030	<0.0030	<0.0030	0.0030
Ni/200.7	< 0.070	< 0.070	< 0.070	< 0.070	0.070
Na/200.7	0.99 B	1.2 B	1.6 B	0.24	0.17
Tl/279.2*	<0.0012	<0.0012	<0.0012	<0.0012	0.0012
As/206.2*	<0.0018	<0.0018	<0.0018	<0.0018	0.0018
Ba/200.7	0.0087	0.010	0.020	<0.0028	0.0028
Cd/213.2*	<0.0002	<0.0002	<0.0002	<0.0002	0.0002
Cr/200.7	< 0.012	< 0.012	< 0.012	< 0.012	0.012
Hg/245.1	<0.0002	<0.0002	<0.0002	<0.0002	0.0002
Pb/239.2*	0.0023	<0.0023	0.0046	<0.0023	0.0023
Se/270.2*	<0.0039	<0.0039	<0.0039	<0.0039	0.0039
Sb/204.2*	<0.0026	<0.0026	<0.0026	<0.0026	0.0026
Be/200.7	<0.0010	<0.0010	<0.0010	<0.0010	0.0010

* Analyzed by furnace atomic absorption.

B - This element was detected in the reagent blank. The value was not subtracted from the sample result.

Analyst Approved

Western Atlas International

CORE LABORATORIES

AIRSTRIP WFH #1

CORE LABORATORIES
A N A L Y T I C A L R E P O R T

Job Number: 930539
Prepared For:

STAR VALLEY RANCH ASSOC.
JEFF
P.O.BOX 159
THAYNE, WY 83127

Date: 04/07/93

Signature: Dr. John M. DeHart

Date: 8 Apr 93

Name: Dr. John M. DeHart

Core Laboratories, Inc.
420 West First Street
Casper, WY 82601

Title: Laboratory Supervisor

Western Atlas International

CORE LABORATORIES

LABORATORY TESTS RESULTS
04/07/93

JOB NUMBER: 930539 CUSTOMER: STAR VALLEY RANCH ASSOC. ATTN: JEFF

SAMPLE NUMBER: 1 DATE RECEIVED: 04/01/93 TIME RECEIVED: 14:10 SAMPLE DATE: 03/29/93 SAMPLE TIME: 16:00

PROJECT: WELL #2 AIRSTRIP SAMPLE: WELL #2 AIRSTRIP REM: WATER

TEST DESCRIPTION	SAMPLE 1						UNITS OF MEASURE
Gross Alpha, total	ND						pCi/l
Gross Alpha, total, error, +/-	2.6						pCi/l
Gross Alpha, total, LLD	3.3						pCi/l
Gross Beta, total	ND						pCi/l
Gross Beta, total, error, +/-	2.7						pCi/l
Gross Beta, total, LLD	3.0						pCi/l

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Casper, WY 82601
(307) 235-5741

Western Atlas International

CORE LABORATORIES

QUALITY ASSURANCE REPORT
04/07/93

JOB NUMBER: 930539 CUSTOMER: STAR VALLEY RANCH ASSOC. ATTN: JEFF

ANALYSIS				DUPLICATES		REFERENCE STANDARDS		MATRIX SPIKES		
ANALYSIS TYPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or (|A-B|)	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY
PARAMETER: Gross Alpha, total				DATE/TIME ANALYZED: 04/02/93 15:09						QC BATCH NUMBER: 132806
REPORTING LIMIT/DF:		UNITS: pCi/l		METHOD REFERENCE: 900.0						TECHNICIAN: JG
BLANK	MB	MB1AB0402	1.8							
STANDARD	LCS	LCS1A0402	32.7			32.0	102			
SPIKE	MS	930539-1	123					ND	160	77
DUPLICATE	MD	930539-1	ND	ND	0					
PARAMETER: Gross Beta, total				DATE/TIME ANALYZED: 04/02/93 15:16						QC BATCH NUMBER: 132810
REPORTING LIMIT/DF:		UNITS: pCi/l		METHOD REFERENCE:						TECHNICIAN: JG
BLANK	MB	MB1AB0402	ND							
STANDARD	LCS	LCS1B0402	15.9			17.0	94			
SPIKE	MS	930543-1	97.0					3.6	85.0	110
DUPLICATE	MD	930539-1	ND	ND	0					

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QUALITY ASSURANCE FOOTER

04/07/93

NC = Not Calculable due to values lower than the detection limit
ND = Not detected at level in limits column

(1) EPA 600/4-79-020, Methods for Chemical Analysis of Water and Wastes, March 1983
(2) EPA SW-846, Test Methods for Evaluating Solid Waste, Third Edition, November 1986
(3) Standards Methods for the Examination of Water and Wastewater, 16th, 1985
(4) EPA/6004-80-032, Prescribed Procedures for Measurement of Radioactivity in Drinking Water, August 1980
(5) Federal Register, Friday, October 26, 1984 (40 CFR Part 136)
(6) EPA 600/8-78-017, Microbiological Methods for Monitoring the Environment, December 1978

NOTE - Data reported in QA report may differ from values on data page due to dilution of sample into analytical ranges.
NOTE - The "TIME ANALYZED" as indicated in the QA Report may not reflect the actual time of analysis.
The "DATE ANALYZED" is the actual date of analysis.

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ANALYTICAL LABORATORIES

Chemical and Bacteriological Testing

RECEIVED

LABORATORY REPORT

CLIENT: STAR VALLEY RANCH
P.O. BOX 159
THAYNE, WY 83127

LAB NUMBER: 94-111620

SAMPLE ID: System #:
Source: Airstrip Well #1

DATE COLLECTED: 12/20/94, 1:00 p.m.
COLLECTED BY: J.V.
DATE RECEIVED: 12/22/94
REPORT DATE: 12/27/94

REPORT SUMMARY

This drinking water sample was analyzed for volatile organic compounds/trihalomethanes and unregulated volatile organics. All analyzed compounds were below the associated MDL's and MCL's.

Results of all associated quality control samples were within acceptance limits. No project-specific quality control was requested.

If you have any questions concerning this report, please call us at (801) 466-8761.

Approved By: _____

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○ CHEMTECH • 6100 South Stratler • Murray, Utah 84107 • (801) 262-7299 • Fax (801) 262-7378

CERTIFICATE OF ANALYSIS

CLIENT: STAR VALLEY RANCH
SAMPLE NAME: System #: 94-111620
Source: Airstrip Well #1

	Result	MDL	MCL	Units	Method	Notes
VOLATILE ORGANIC COMPOUNDS (VOC's)						
1,1,1-Trichloroethane	ND	0.5	200	ug/L	524.2	
1,1,2-Trichloroethane	ND	0.5	5	ug/L	524.2	
1,1-Dichloroethylene	ND	0.5	7	ug/L	524.2	
1,2,4-Trichlorobenzene	ND	0.5	70	ug/L	524.2	
1,2-Dichloroethane	ND	0.5	5	ug/L	524.2	
1,2-Dichloropropane	ND	0.5	5	ug/L	524.2	
Benzene	ND	0.5	5	ug/L	524.2	
Carbon Tetrachloride	ND	0.5	5	ug/L	524.2	
Chlorobenzene	ND	0.5	100	ug/L	524.2	
Dichloromethane	ND	0.5	5	ug/L	524.2	
Ethylbenzene	ND	0.5	700	ug/L	524.2	
Styrene	ND	0.5	100	ug/L	524.2	
Tetrachloroethylene	ND	0.5	5	ug/L	524.2	
Toluene	ND	0.5	1000	ug/L	524.2	
Total Xylenes	ND	0.5	10000	ug/L	524.2	
Trichloroethylene (TCE)	ND	0.5	5	ug/L	524.2	
Vinyl Chloride	ND	0.5	2	ug/L	524.2	
cis-1,2-Dichloroethylene	ND	0.5	70	ug/L	524.2	
m-Xylene	ND	0.5		ug/L	524.2	
o-Dichlorobenzene	ND	0.5	600	ug/L	524.2	
o-Xylene	ND	0.5		ug/L	524.2	
p-Dichlorobenzene	ND	0.5	75	ug/L	524.2	
p-Xylene	ND	0.5		ug/L	524.2	
trans-1,2-Dichloroethylene	ND	0.5	100	ug/L	524.2	

TRIHALOMETHANES						
Bromodichloromethane	ND	0.5	100	ug/L	524.2	
Bromoform	ND	0.5	100	ug/L	524.2	
Chloroform	ND	0.5	100	ug/L	524.2	
Dibromochloromethane	ND	0.5	100	ug/L	524.2	
Total Trihalomethanes	ND	0.5	100	ug/L	524.2	

"ND" = None Detected above Utah MRL

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CERTIFICATE OF ANALYSIS

CLIENT: STAR VALLEY RANCH

SAMPLE NAME: System #: 94-111620

Source: Airstrip Well #1

	Result	MDL	MCL	Units	Method	Notes
UNREGULATED ORGANICS:						
1,1,1,2-Tetrachloroethane	ND	1	—	ug/L	524.2	
1,1,2,2-Tetrachloroethane	ND	1	—	ug/L	524.2	
1,1-Dichloroethane	ND	1	—	ug/L	524.2	
1,1-Dichloropropene	ND	1	—	ug/L	524.2	
1,2,3-Trichlorobenzene	ND	1	—	ug/L	524.2	
1,2,3-Trichloropropane	ND	1	—	ug/L	524.2	
1,2,4-Trimethylbenzene	ND	1	—	ug/L	524.2	
1,3,5-Trimethylbenzene	ND	1	—	ug/L	524.2	
1,3-Dichloropropane	ND	1	—	ug/L	524.2	
1,3-Dichloropropene	ND	1	—	ug/L	524.2	
2,2-Dichloropropane	ND	1	—	ug/L	524.2	
Bromobenzene	ND	1	—	ug/L	524.2	
Bromochloromethane	ND	1	—	ug/L	524.2	
Bromodichloromethane	ND	1	—	ug/L	524.2	
Bromoform	ND	1	—	ug/L	524.2	
Bromomethane	ND	1	—	ug/L	524.2	
Chlorodibromomethane	ND	1	—	ug/L	524.2	
Chloroethane	ND	1	—	ug/L	524.2	
Chloroform	ND	1	—	ug/L	524.2	
Chloromethane	ND	1	—	ug/L	524.2	
Dibromomethane	ND	1	—	ug/L	524.2	
Dichlorodifluoromethane	ND	1	—	ug/L	524.2	
Fluorotrichloromethane	ND	1	—	ug/L	524.2	
Hexachlorobutadiene	ND	1	—	ug/L	524.2	
Isopropylbenzene	ND	1	—	ug/L	524.2	
m-Dichlorobenzene	ND	1	—	ug/L	524.2	
n-Butylbenzene	ND	1	—	ug/L	524.2	
n-Propylbenzene	ND	1	—	ug/L	524.2	
Naphthalene	ND	1	—	ug/L	524.2	
o-Chlorotoluene	ND	1	—	ug/L	524.2	
p-Chlorotoluene	ND	1	—	ug/L	524.2	
p-Isopropyltoluene	ND	1	—	ug/L	524.2	
sec-Butylbenzene	ND	1	—	ug/L	524.2	
tert-Butylbenzene	ND	1	—	ug/L	524.2	

"ND" = None Detected above Utah MPL

(1) Analyzed by subcontract laboratory

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Environmental Health Laboratories

110 S. Hill Street
South Bend IN 46617
(219) 233-4777
(219) 233-3272
FAX (219) 233-8207

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LABORATORY REPORT

Client: Star Valley Ranch Association
Attn: Jeff Van Deburg
P.O. Box 159
Thayne, WY 83127

Report: 80135-51

Priority: Standard Written

Status: Final

Project / Site: 16061 (Green Canyon) and 15013 (Prater Canyon)

PWS ID#: 5600287

Samples Submitted: Sixteen drinking water samples and one laboratory trip blank

Copies to: None

Collected: 09-09-93 By: Client Received: 09-10-93

REPORT SUMMARY

Two drinking water sample sites were composited into one set of analytical samples at the client's request.

None of the pesticides included in the detailed parameter list were detected in the sample submitted for analysis.

Note: EDB was analyzed by GC/MS due to the presence of an interfering peak by GC/EC.

Detailed quantitative results are presented on the following page.

Results of all associated quality control samples were within acceptance limits. No project specific quality control was requested.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call us at (219) 233-4777.

Reviewed By: Paul Brown Date 11-9-93

Finalized By: Jeff Brown Date 11/10/93

Client: Star Valley Ranch Association

Report: 80135-51

PARAMETER	FRDS Number	SDWA Method	MDL (ug/L)	Results (ug/l)	MCL ug/L
Alachlor (Lasso)	2051	525.1	0.1	< 0.1	2
Aldicarb	2047	531.1	0.5	< 0.5	3
Aldicarb Sulfone	2044	531.1	0.4	< 0.4	2
Aldicarb Sulfoxide	2043	531.1	0.5	< 0.5	4
Aldrin	2356	525.1	0.1	< 0.1	---
Atrazine	2050	525.1	0.1	< 0.1	3
Benzo(a)pyrene	2306	525.1	0.02	< 0.02	0.2
Butachlor	2076	525.1	0.1	< 0.1	---
Carbaryl	2021	531.1	1.0	< 1.0	---
Carbofuran	2046	531.1	0.9	< 0.9	40
Chlordane Alpha		525.1	0.1	< 0.1	---
Chlordane Gamma		525.1	0.1	< 0.1	---
Chlordane	2959	505	0.2	< 0.2	2
2,4-D	2105	515.1	0.1	< 0.1	70
Dalapon	2031	515.1	1.0	< 1.0	200
1,2-dibromo-3-chloropropane	2931	504	0.02	< 0.02	0.2
Dicamba	2440	515.1	0.1	< 0.1	---
Dieldrin	2070	525.1	0.1	< 0.1	---
Di (2-ethylhexyl) adipate	2035	525.1	0.6	< 0.6	400
Di (2-ethylhexyl) phthalate	2039	525.1	0.6	< 0.6	6
Dinoseb	2041	515.1	0.1	< 0.1	7
Diquat	2032	549	0.4	< 0.4	20
Endothall	2033	548	9.0	< 9.0	100
Endrin	2005	525.1	0.01	< 0.01	2
Ethylene dibromide (EDB)	2946	524.2	0.03	< 0.03	0.05
Glyphosate (Round-up)	2034	547	6.0	< 6.0	700
Heptachlor	2065	525.1	0.04	< 0.04	0.4
Heptachlor epoxide	2067	525.1	0.02	< 0.02	0.2
Hexachlorobenzene	2274	525.1	0.1	< 0.1	1
Hexachlorocyclopentadiene	2042	525.1	0.1	< 0.1	50
3-Hydroxycarbofuran	2066	531.1	1.0	< 1.0	---
BHC Gamma (Lindane)	2010	525.1	0.02	< 0.02	0.2
Methoxychlor	2015	525.1	0.1	< 0.1	40
Methomyl	2022	531.1	0.5	< 0.5	---
Dual (Metolachlor)	2045	525.1	0.1	< 0.1	---
Metribuzin (Sencor)	2595	525.1	0.1	< 0.1	---
Oxamyl (Vydate)	2036	531.1	1.0	< 1.0	200
PCB Total	2383	505	**	**	0.5
Pentachlorophenol	2326	515.1	0.04	< 0.04	1
Picloram (Tordon)	2040	515.1	0.1	< 0.1	500
Propachlor	2077	525.1	0.1	< 0.1	---
2,4,5-TP (Silvex)	2110	515.1	0.1	< 0.1	50
Simazine	2037	525.1	0.07	< 0.07	4
2,3,7,8-TCDD (Dioxin)	2063				0.00003
Toxaphene	2020	505	1.0	< 1.0	3

** Aroclor 1016 < 0.08 Aroclor 1232 < 0.5 Aroclor 1248 < 0.1 Aroclor 1260 < 0.2
Aroclor 1221 < 2.0 Aroclor 1242 < 0.3 Aroclor 1254 < 0.1

Comments: _____

FORD ANALYTICAL LABORATORIES

CHEMICAL AND BACTERIOLOGICAL ANALYSIS

DATE: 04/13/92
CERTIFICATE OF ANALYSIS

COPY MAILED TO EPH
4-21-92

STAR VALLEY RANCH
P.O. BOX 159
THAYNE, WY
83127

92-023139

SAMPLE: DRINKING WATER SAMPLES COLLECTED 3-23-92 BY J. VANDEBURG
RECEIVED 3-25-92 FOR INORGANICS ANALYSIS.

	PRATER CANYON 2:45 PM	GREEN CANYON 3:00 PM	MCL
Alkalinity,CaCO3 mg/l EPA310.2	152	145	
Arsenic, As mg/l EPA206.2	<.002	<.002	
Barium, Ba mg/l EPA 200.7	.020	.020	5 mg/L
Cadmium, Cd mg/l EPA 213.1	<.005	<.005	.005
Calcium, Ca mg/l EPA 200.7	38.72	43.02	
Chloride, Cl mg/l EPA 300.0	1.6	1.5	
Chromium, Cr mg/l EPA218.2	<.006	<.005	0.1
Color pt-co unit EPA 110.3	5	5	
Copper, Cu mg/l EPA 220.1	<.01	<.01	1.3
Fluoride, F mg/l EPA 340.2	.15	.11	
Iron, Fe mg/l EPA 236.1	<.02	<.02	
Langlier Index	.28	.13	
Lead, Pb mg/l EPA 239.1	.002	<.001	5 PPB
Manganese, Mn mg/l EPA 243.1	<.02	<.02	
Mercury, Hg mg/l EPA 245.1	<.0011	<.0011	.002
Nitrate, NO3-N mg/l EPA300.0	.27	25	10

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40 West Louise Avenue • Salt Lake City, Utah 84115 • PHONE [illegible] • FAX (801) 466-8263

CERTIFICATE OF ANALYSIS

92-023139

	PRATER CANYON 2:45 PM	GREEN CANYON 3:00 PM	
Odor Units EPA 140.1	1	1	
Selenium, Se mg/l EPA 270.2	<.001	<.001	.05
Silver, Ag mg/l EPA 272.1	<.005	<.005	
Sodium as Na mg/l EPA 200.7	<.09	<.09	
Sulfate, SO4 mg/l EPA 300.0	2.6	2.2	
Surfactants ppm EPA425.1	<.4	<.4	
Tot.Dis.Solids mg/l EPA 160.1	174	158	
Zinc, Zn mg/l EPA 289.1	.02	<.01	
pH Units EPA 150.1	8.28	8.12	

MCL

FORD ANALYTICAL LABORATORIES

CHEMTECH • FORD

RECEIVED JAN 4 1994

ANALYTICAL LABORATORIES

Chemical and Bacteriological Testing

LABORATORY REPORT

CLIENT: STAR VALLEY RANCH
P.O. BOX 159
THAYNE, WY 83127

LAB NUMBER: 94-111640

SAMPLE ID: System #:
Source: Prater Canyon

DATE COLLECTED: 12/20/94, 1:30 p.m.
COLLECTED BY: J.V.
DATE RECEIVED: 12/22/94
REPORT DATE: 12/27/94

REPORT SUMMARY

This drinking water sample was analyzed for volatile organic compounds/trihalomethanes and unregulated volatile organics. All analyzed compounds were below the associated MDL's and MCL's.

Results of all associated quality control samples were within acceptance limits. No project-specific quality control was requested.

If you have any questions concerning this report, please call us at (801) 466-8761.

Approved By: _____

○ FORD • 40 West Louise Avenue • Salt Lake City, Utah 84115 • (801) 466-8761 • Fax (801) 466-8763
○ CHEMTECH • 6100 South Stratler • Murray, Utah 84107 • (801) 262-7299 • Fax (801) 262-7378

CERTIFICATE OF ANALYSIS

CLIENT: STAR VALLEY RANCH
SAMPLE NAME: System #:
Source: Prater Canyon

94-111640

	Result	MDL	MCL	Units	Method	Notes
VOLATILE ORGANIC COMPOUNDS (VOC's)						
1,1,1-Trichloroethane	ND	0.5	200	ug/L	524.2	
1,1,2-Trichloroethane	ND	0.5	5	ug/L	524.2	
1,1-Dichloroethylene	ND	0.5	7	ug/L	524.2	
1,2,4-Trichlorobenzene	ND	0.5	70	ug/L	524.2	
1,2-Dichloroethane	ND	0.5	5	ug/L	524.2	
1,2-Dichloropropane	ND	0.5	5	ug/L	524.2	
Benzene	ND	0.5	5	ug/L	524.2	
Carbon Tetrachloride	ND	0.5	5	ug/L	524.2	
Chlorobenzene	ND	0.5	100	ug/L	524.2	
Dichloromethane	ND	0.5	5	ug/L	524.2	
Ethylbenzene	ND	0.5	700	ug/L	524.2	
Styrene	ND	0.5	100	ug/L	524.2	
Tetrachloroethylene	ND	0.5	5	ug/L	524.2	
Toluene	ND	0.5	1000	ug/L	524.2	
Total Xylenes	ND	0.5	10000	ug/L	524.2	
Trichloroethylene (TCE)	ND	0.5	5	ug/L	524.2	
Vinyl Chloride	ND	0.5	2	ug/L	524.2	
cis-1,2-Dichloroethylene	ND	0.5	70	ug/L	524.2	
m-Xylene	ND	0.5		ug/L	524.2	
o-Dichlorobenzene	ND	0.5	600	ug/L	524.2	
o-Xylene	ND	0.5		ug/L	524.2	
p-Dichlorobenzene	ND	0.5	75	ug/L	524.2	
p-Xylene	ND	0.5		ug/L	524.2	
trans-1,2-Dichloroethylene	ND	0.5	100	ug/L	524.2	

TRIHALOMETHANES						
Bromodichloromethane	ND	0.5	100	ug/L	524.2	
Bromoform	ND	0.5	100	ug/L	524.2	
Chloroform	ND	0.5	100	ug/L	524.2	
Dibromochloromethane	ND	0.5	100	ug/L	524.2	
Total Trihalomethanes	ND	0.5	100	ug/L	524.2	

"ND" = None Detected above Utah MRL

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CERTIFICATE OF ANALYSIS

CLIENT: STAR VALLEY RANCH

SAMPLE NAME. System #:

Source: Prater Canyon

94-111640

	Result	MDL	MCL	Units	Method	Notes
UNREGULATED ORGANICS						
1,1,1,2-Tetrachloroethane	ND	1	—	ug/L	524.2	
1,1,2,2-Tetrachloroethane	ND	1	—	ug/L	524.2	
1,1-Dichloroethane	ND	1	—	ug/L	524.2	
1,1-Dichloropropene	ND	1	—	ug/L	524.2	
1,2,3-Trichlorobenzene	ND	1	—	ug/L	524.2	
1,2,3-Trichloropropane	ND	1	—	ug/L	524.2	
1,2,4-Trimethylbenzene	ND	1	—	ug/L	524.2	
1,3,5-Trimethylbenzene	ND	1	—	ug/L	524.2	
1,3-Dichloropropane	ND	1	—	ug/L	524.2	
1,3-Dichloropropene	ND	1	—	ug/L	524.2	
2,2-Dichloropropane	ND	1	—	ug/L	524.2	
Bromobenzene	ND	1	—	ug/L	524.2	
Bromochloromethane	ND	1	—	ug/L	524.2	
Bromodichloromethane	ND	1	—	ug/L	524.2	
Bromoform	ND	1	—	ug/L	524.2	
Bromomethane	ND	1	—	ug/L	524.2	
Chlorodibromomethane	ND	1	—	ug/L	524.2	
Chloroethane	ND	1	—	ug/L	524.2	
Chloroform	ND	1	—	ug/L	524.2	
Chloromethane	ND	1	—	ug/L	524.2	
Dibromomethane	ND	1	—	ug/L	524.2	
Dichlorodifluoromethane	ND	1	—	ug/L	524.2	
Fluorotrichloromethane	ND	1	—	ug/L	524.2	
Hexachlorobutadiene	ND	1	—	ug/L	524.2	
Isopropylbenzene	ND	1	—	ug/L	524.2	
m-Dichlorobenzene	ND	1	—	ug/L	524.2	
n-Butylbenzene	ND	1	—	ug/L	524.2	
n-Propylbenzene	ND	1	—	ug/L	524.2	
Naphthalene	ND	1	—	ug/L	524.2	
o-Chlorotoluene	ND	1	—	ug/L	524.2	
p-Chlorotoluene	ND	1	—	ug/L	524.2	
p-Isopropyltoluene	ND	1	—	ug/L	524.2	
sec-Butylbenzene	ND	1	—	ug/L	524.2	
tert-Butylbenzene	ND	1	—	ug/L	524.2	

"ND" = None Detected above Utah MRL

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○ CHEMTECH • 6100 South Stratler • Murray, Utah 84107 • (801) 262-7299 • Fax (801) 262-7378

CHEMTECH • FORD

ANALYTICAL LABORATORIES

Chemical and Bacteriological Testing

LABORATORY REPORT

CLIENT: STAR VALLEY RANCH
P.O. BOX 159
THAYNE, WY 83127

LAB NUMBER: 94-111630

SAMPLE ID: System #:
Source: Green Canyon

DATE COLLECTED: 12/20/94, 1:15 p.m.
COLLECTED BY: J.V.
DATE RECEIVED: 12/22/94
REPORT DATE: 12/27/94

REPORT SUMMARY

This drinking water sample was analyzed for volatile organic compounds/trihalomethanes and unregulated volatile organics. All analyzed compounds were below the associated MDL's and MCL's.

Results of all associated quality control samples were within acceptance limits. No project-specific quality control was requested.

If you have any questions concerning this report, please call us at (801) 466-8761.

Approved By: _____

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○ CHEMTECH • 6100 South Stratler • Murray, Utah 84107 • (801) 262-7299 • Fax (801) 262-7378

CERTIFICATE OF ANALYSIS

CLIENT: STAR VALLEY RANCH

SAMPLE NAME: System #

Source: Green Canyon

94-111630

	Result	MDL	MCL	Units	Method	Notes
VOLATILE ORGANIC COMPOUNDS (VOC's)						
1,1,1-Trichloroethane	ND	0.5	200	ug/L	524.2	
1,1,2-Trichloroethane	ND	0.5	5	ug/L	524.2	
1,1-Dichloroethylene	ND	0.5	7	ug/L	524.2	
1,2,4-Trichlorobenzene	ND	0.5	70	ug/L	524.2	
1,2-Dichloroethane	ND	0.5	5	ug/L	524.2	
1,2-Dichloropropane	ND	0.5	5	ug/L	524.2	
Benzene	ND	0.5	5	ug/L	524.2	
Carbon Tetrachloride	ND	0.5	5	ug/L	524.2	
Chlorobenzene	ND	0.5	100	ug/L	524.2	
Dichloromethane	ND	0.5	5	ug/L	524.2	
Ethylbenzene	ND	0.5	700	ug/L	524.2	
Styrene	ND	0.5	100	ug/L	524.2	
Tetrachloroethylene	ND	0.5	5	ug/L	524.2	
Toluene	ND	0.5	1000	ug/L	524.2	
Total Xylenes	ND	0.5	10000	ug/L	524.2	
Trichloroethylene (TCE)	ND	0.5	5	ug/L	524.2	
Vinyl Chloride	ND	0.5	2	ug/L	524.2	
cis-1,2-Dichloroethylene	ND	0.5	70	ug/L	524.2	
m-Xylene	ND	0.5		ug/L	524.2	
o-Dichlorobenzene	ND	0.5	600	ug/L	524.2	
o-Xylene	ND	0.5		ug/L	524.2	
p-Dichlorobenzene	ND	0.5	75	ug/L	524.2	
p-Xylene	ND	0.5		ug/L	524.2	
trans-1,2-Dichloroethylene	ND	0.5	100	ug/L	524.2	

TRIHALOMETHANES						
Bromodichloromethane	ND	0.5	100	ug/L	524.2	
Bromoform	ND	0.5	100	ug/L	524.2	
Chloroform	ND	0.5	100	ug/L	524.2	
Dibromochloromethane	ND	0.5	100	ug/L	524.2	
Total Trihalomethanes	ND	0.5	100	ug/L	524.2	

"ND" = None Detected above Utah MRL

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○ CHEMTECH • 6100 South Stratler • Murray, Utah 84107 • (801) 262-7299 • Fax (801) 262-7378

CERTIFICATE OF ANALYSIS

CLIENT: STAR VALLEY RANCH

SAMPLE NAME: System #: 94-111630

Source: Green Canyon

	Result	MDL	MCL	Units	Method	Notes
UNREGULATED ORGANICS						
1,1,1,2-Tetrachloroethane	ND	1	—	ug/L	524.2	
1,1,2,2-Tetrachloroethane	ND	1	—	ug/L	524.2	
1,1-Dichloroethane	ND	1	—	ug/L	524.2	
1,1-Dichloropropene	ND	1	—	ug/L	524.2	
1,2,3-Trichlorobenzene	ND	1	—	ug/L	524.2	
1,2,3-Trichloropropane	ND	1	—	ug/L	524.2	
1,2,4-Trimethylbenzene	ND	1	—	ug/L	524.2	
1,3,5-Trimethylbenzene	ND	1	—	ug/L	524.2	
1,3-Dichloropropane	ND	1	—	ug/L	524.2	
1,3-Dichloropropene	ND	1	—	ug/L	524.2	
2,2-Dichloropropane	ND	1	—	ug/L	524.2	
Bromobenzene	ND	1	—	ug/L	524.2	
Bromochloromethane	ND	1	—	ug/L	524.2	
Bromodichloromethane	ND	1	—	ug/L	524.2	
Bromoform	ND	1	—	ug/L	524.2	
Bromomethane	ND	1	—	ug/L	524.2	
Chlorodibromomethane	ND	1	—	ug/L	524.2	
Chloroethane	ND	1	—	ug/L	524.2	
Chloroform	ND	1	—	ug/L	524.2	
Chloromethane	ND	1	—	ug/L	524.2	
Dibromomethane	ND	1	—	ug/L	524.2	
Dichlorodifluoromethane	ND	1	—	ug/L	524.2	
Fluorotrichloromethane	ND	1	—	ug/L	524.2	
Hexachlorobutadiene	ND	1	—	ug/L	524.2	
Isopropylbenzene	ND	1	—	ug/L	524.2	
m-Dichlorobenzene	ND	1	—	ug/L	524.2	
n-Butylbenzene	ND	1	—	ug/L	524.2	
n-Propylbenzene	ND	1	—	ug/L	524.2	
Naphthalene	ND	1	—	ug/L	524.2	
o-Chlorotoluene	ND	1	—	ug/L	524.2	
p-Chlorotoluene	ND	1	—	ug/L	524.2	
p-Isopropyltoluene	ND	1	—	ug/L	524.2	
sec-Butylbenzene	ND	1	—	ug/L	524.2	
tert-Butylbenzene	ND	1	—	ug/L	524.2	

"ND" = None Detected above Utah MRL

(1) Analyzed by subcontract laboratory

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
999 18th STREET - SUITE 500
DENVER, COLORADO 80202-2405

MONITORING SCHEDULE
National Primary Drinking Water Regulations

Public water system name: Star Valley Ranch Association

Identification number: CO0297 Date 4/10/90

Type of public water system: COMMUNITY Source: GROUND WATER

Regulated Contaminant	Minimum Monitoring Required
Total Coliform	_____ sample(s) per month
10 Regulated Inorganic Chemicals and Sodium	Every three years Next sample due _____
Natural Radionuclides	Every four years Next sample due 3/90 Quarterly, Composite/Single sample
Corrosivity	_____ SAMPLE DUE NOW. _____ No further testing required.
Total Trihalomethanes	Quarterly/Not required/See comments
8 Volatile Organic Chemicals	First year of monitoring: _____ Single sample representative of each ground water source Next sample date to be determined by vulnerability assessment.
51 Unregulated Contaminants	Single sample representative of each ground water source; or if less than 150 service connections, letter of availability for sampling. Due _____

*Additional sampling may be required based upon initial sample results.

COMMENTS _____

Any sample exceeding the maximum contaminant level requires check sampling. Please be sure that all analytical results are forwarded to EPA. If you have any questions or require additional information, please contact Paul McIver at 293-1717.

Paul McIver
(SIGNED)

QUALITY ASSURANCE REPORT
04/03/90

JOB NUMBER: 900837 CUSTOMER: STAR VALLEY RANCH ASSOC. ATTN:

ANALYSIS				DUPLICATES		REFERENCE STANDARDS		MATRIX SPIKES		
ANALYSIS TYPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or (|A-B|)	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY
PARAMETER:Gross Alpha, dissolved				DATE/TIME ANALYZED:04/03/90 10:28						QC BATCH NUMBER:102021
DETECTION LIMIT:		UNITS:pCi/L		METHOD REFERENCE :900.0 (4)						TECHNICIAN:PLC
DUPLICATE	prep	900835-4	1.4	1.4	0					
DUPLICATE	prep	900827-7	0	0	0					
DUPLICATE	prep	900853-6	63	65	0					
DUPLICATE	prep	900862-7	163	154	5.68					
DUPLICATE	prep	900862-14	28.2	27.3	40					
DUPLICATE	prep	900652-1	19	18	5.41					
DUPLICATE	prep	900652-10	55	57	3.57					
DUPLICATE	prep	900766-12	8945	9033	0.98					
PARAMETER:Gross Alpha, diss., error, +/-				DATE/TIME ANALYZED:04/03/90 10:34						QC BATCH NUMBER:102121
DETECTION LIMIT:		UNITS:pCi/L		METHOD REFERENCE :						TECHNICIAN:PL
PARAMETER:Gross Alpha, diss., LLD				DATE/TIME ANALYZED:04/03/90 10:42						QC BATCH NUMBER:102021
DETECTION LIMIT:		UNITS:pCi/L		METHOD REFERENCE :						TECHNICIAN:PLC
PARAMETER:Gross Beta, dissolved				DATE/TIME ANALYZED:04/03/90 10:49						QC BATCH NUMBER:102021
DETECTION LIMIT:		UNITS:pCi/L		METHOD REFERENCE :900.0 (4)						TECHNICIAN:PLC
DUPLICATE	prep	900835-4	4.3	5.2	18.95					
DUPLICATE	prep	900827-7	60	65	8					
DUPLICATE	prep	900853-6	269	253	6.13					
DUPLICATE	prep	900862-7	138	146	5.63					
DUPLICATE	prep	900862-14	101	104	2.93					
DUPLICATE	prep	900652-1	86	74	15					
DUPLICATE	prep	900652-10	278	269	3.29					
DUPLICATE	prep	900766-12	2010	2210	9.48					

APPROVED BY: _____

420 West 1st Street
Casper, WY 82601
(307) 235-5741

NC = Not Calculable due to values lower than the detection limit

Quality Control Acceptance Criteria:

Blanks.....: Analyzed Value less than or equal to the Detection Limit
Reference Standards: 100 +/- 10 Percent Recovery
Duplicates.....: 20% Relative Percent Difference, or +/- the Detection Limit
Spikes.....: 100 +/- 25 Percent Recovery

(1) EPA 600/4-79-020, Methods for Chemical Analytis of Water and Wastes, March 1983
(2) EPA SW-846, Test Methods for Evaluating Solid Waste, Third Edition, November 1986
(3) Standard Methods for the Examination of Water and Wastewater, 16th Edition, 1985
(4) EPA 600/4-80-032, Prescribed Procedures for Measurement of Radioactivity in Drinking Water August 1980
(5) Federal Register, Friday, October 26, 1984 (40 CFR Part 136)
(6) EPA 600/8-78-017, Microbiological Methods for Monitoring the Environment, December 1978

NOTE - Data reported in QA report may differ from values on data page due to dilution of sample into analytical ranges.

Western Atlas International
A Lovelace Company

CORE LABORATORIES

QUALITY ASSURANCE REPORT
04/03/90

JOB NUMBER: 900837 CUSTOMER: STAR VALLEY RANCH ASSOC. ATTN:

ANALYSIS				DUPLICATES		REFERENCE STANDARDS		MATRIX SPIKES		
ANALYSIS TYPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or (|A-B|)	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY
PARAMETER:Gross Alpha, dissolved				DATE/TIME ANALYZED:04/03/90 10:28						QC BATCH NUMBER:102021
DETECTION LIMIT:		UNITS:pCi/L		METHOD REFERENCE :900.0 (4)						TECHNICIAN:PL
DUPLICATE	prep	900835-4	1.4	1.4	0					
DUPLICATE	prep	900827-7	0	0	0					
DUPLICATE	prep	900853-6	63	63	0					
DUPLICATE	prep	900862-7	163	154	5.63					
DUPLICATE	prep	900862-14	18.2	27.3	40					
DUPLICATE	prep	900652-1	19	18	5.41					
DUPLICATE	prep	900652-10	55	57	3.57					
DUPLICATE	prep	900766-12	8965	9033	0.98					
PARAMETER:Gross Alpha, diss.,error, +/-				DATE/TIME ANALYZED:04/03/90 10:34						QC BATCH NUMBER:102021
DETECTION LIMIT:		UNITS:pCi/L		METHOD REFERENCE :						TECHNICIAN:PL
PARAMETER:Gross Alpha, diss.,MDLD				DATE/TIME ANALYZED:04/03/90 10:42						QC BATCH NUMBER:102021
DETECTION LIMIT:		UNITS:pCi/L		METHOD REFERENCE :						TECHNICIAN:PL
PARAMETER:Gross Beta, dissolved				DATE/TIME ANALYZED:04/03/90 10:49						QC BATCH NUMBER:102021
DETECTION LIMIT:		UNITS:pCi/L		METHOD REFERENCE :900.0 (4)						TECHNICIAN:PL
DUPLICATE	prep	900835-4	4.3	5.2	18.95					
DUPLICATE	prep	900827-7	60	65	8					
DUPLICATE	prep	900853-6	269	253	6.13					
DUPLICATE	prep	900862-7	138	146	5.63					
DUPLICATE	prep	900862-14	131	104	0.93					
DUPLICATE	prep	900652-1	86	74	15					
DUPLICATE	prep	900652-10	278	269	3.29					
DUPLICATE	prep	900766-12	2010	2010	9.40					

APPROVED BY: _____

620 West 1st Street
Casper, WY 82601
(307) 235-5741

NC = Not Calculable due to values lower than the detection limit

Quality Control Acceptance Criteria:
- Blanks: Analyzed Value less than or equal to the Detection Limit
- Reference Standards: 100 +/- 10 Percent Recovery
- Duplicates: 20% Relative Percent Difference, or +/- the Detection Limit
- Spikes: 100 +/- 25 Percent Recovery

(4) EPA 600/4-79-020, Methods for Chemical Analysis of Water and Wastes, March 1983
(5) EPA SW-846 Test Methods for Evaluating Solid Waste, Third Edition, November 1986

CORE LABORATORIES

LABORATORY TESTS RESULTS
04/03/90

JOB NUMBER: 900837 CUSTOMER: STAR VALLEY RANCH ASSOC. ATTN:

SAMPLE NUMBER: 1 DATE RECEIVED: 03/22/90 TIME RECEIVED: 15:51 SAMPLE DATE: 03/19/90 SAMPLE TIME: 0[illegible]:30

PROJECT: RADIONUCLIDES SAMPLE: PRATER CANYON REM: ZEROAVG BOX

SAMPLE NUMBER: 2 DATE RECEIVED: 03/22/90 TIME RECEIVED: 15:51 SAMPLE DATE: 03/19/90 SAMPLE TIME: 00:00

PROJECT: RADIONUCLIDES SAMPLE: GREEN CANYON REM: SETTING HOUSES

SAMPLE NUMBER: 3

SAMPLE NUMBER: 4

TEST DESCRIPTION	SAMPLE 1	SAMPLE 2	SAMPLE 3	SAMPLE 4		UNITS OF MEASURE
Gross Alpha, dissolved	3.8	0.9				pCi/l
Gross Alpha, diss., error, +/-	2.2	1.7				pCi/l
Gross Alpha, diss., LLD	0.4	0.4				pCi/l
Gross Beta, dissolved	5.3	3.5				pCi/l
Gross Beta, diss., error, +/-	1.7	1.6				pCi/l
Gross Beta, diss., LLD	0.3	0.4				pCi/l

Western Atlas International

CORE LABORATORIES

LABORATORY TESTS RESULTS
04/03/90

JOB NUMBER: 900837 CUSTOMER: STAR VALLEY RANCH ASSOC. ATTN:

SAMPLE NUMBER: 1 DATE RECEIVED: 03/22/90 TIME RECEIVED: 15:51 SAMPLE DATE: 03/19/90 SAMPLE TIME: 00:00

PROJECT: RADIONUCLIDES SAMPLE: PRATER CANYON REM: ZERCAVG 60X

SAMPLE NUMBER: 2 DATE RECEIVED: 03/22/90 TIME RECEIVED: 15:51 SAMPLE DATE: 03/19/90 SAMPLE TIME: 00:00

PROJECT: RADIONUCLIDES SAMPLE: GREEN CANYON REM: SETTAING HOUSES

SAMPLE NUMBER: 3

SAMPLE NUMBER: 4

TEST DESCRIPTION	SAMPLE 1	SAMPLE 2	SAMPLE 3	SAMPLE 4		UNITS OF MEASURE
Gross Alpha, dissolved	3.8	0.9				pCi/l
Gross Alpha, diss., error, +/-	2.2	1.7				pCi/l
Gross Alpha, diss., LLD	0.4	0.4				pCi/l
Gross Beta, dissolved	5.3	3.5				pCi/l
Gross Beta, diss., error, +/-	1.7	1.6				pCi/l
Gross Beta, diss., LLD	0.3	0.4				pCi/l

APPROVED BY:

420 West 1st Street
Casper, WY 82601
(307) 235-57-

PARTICULATE ANALYSES
1990-1996

Sanitary Survey

PWS Name: Star Valley Ranch

Microscopic Particulate Analysis (MPA)

Analysis Request Chain of Custody

Sample Information:

PWS 5600287

System Name: Star Valley Ranch

Address: Box 1011 Thayne, Wy. 83127
Harold Whitefoot, Director
Bart Barge, Operator

Phone Number: (307) 883-2760

Sampler Name: Mike Sposit

Address: Midwest Assistance Program Inc.
Box 600
Green River, Wyoming 82935

Phone: (307) 875-4200

Sample ID: 960613-1 Green Canyon

Date/Time Start: 06/13/96 : 1030

Meter Reading: 49730

Date/Time Stop: 06/14/96 : 07:30

Meter Reading: 51060

Total Sample Time: 21 Hrs.

1.05 gpm

Total Gallons Sampled: 1330

Field Measurements:

Water Temp: 9.0 °C pH _____ Conductivity: 258 µ mhos Turbidity: 0.08 NTU's

Sample exposed to disinfectant? Yes ___ No X Sample DeChlorinated? Yes ___ No X

Residual Chlorine Tested -0- mg/l

This sample is:

Raw Surfacewater ___ Filtered Surfacewater ___ Infiltration System: ___

Name of lake /stream/river: _____

Groundwater:

Spring X Infiltration Gallery: ___ Artesian Well: ___ Drilled Well: ___

Well Depth: _____ ft Distance from lake/stream/river: _____ ft

Evaluation of MPA Sample time risk period is: Low [ ] Moderate [X] High [ ]

Notes:

Bill Jolley
Wyoming State Veterinary Lab 1174 Snowy Range Rd. Laramie, Wyoming 82070 (307)742-6638

MPA SOURCE WATER IDENTIFICATION

WYOMING STATE VETERINARY LAB
Accession # [illegible]
PWS # [illegible]

Date(s) sampled 6/4/96
Date received 6/7/96
Date cut/washed 6/18/96
Date examined 6/25/96

Analyst Jolley

Processing Information:

Total volume filtered 1330 gal.
Time required 2½ hrs.
Total filter sediment collected 400 ul
uL sediment/100 gal 30
Percoll®/sucrose floatation pellet volume 30 uL
Percoll®/sucrose floatation packed sediment 370 uL
uL floatation pellet volume/100 gallons filtered 2.25 uL

Floatation Parameters:

X Percoll®-sucrose gradient
__ sucrose gradient
__ potassium citrate City/utility
__ $ZnSO_4$
__ Other

Copies to:
Mike Sogin (Mike will forward appropriate copies)
__

MPA CLASSIFICATION AND QUANTITATION OF PARTICULATES

Dilution 2X Microscopy BF and DIC Magnification 100X to 1000X Vol final pellet 30 uL

Primary Particulates	Slide 1	Slide 2	Slide 3	Slide 4	Slide 5	Slide 6	Total	#/100 gallon	Risk factor
Giardia	- 3 slides (30 ul of sediment) were examined -						3		
Coccidia							0		
Diatoms							0		
Other Algae							0		
Insect larvae							0		
Rotifers							0		
Plant Debris									
Secondary Particulates									
Large Amorphous debris							TNTC		
Fine Amorphous debris							TNTC		
Minerals									
Plant pollen							0		
Nematodes							101	8	
Crustacia							0		
Amoeba							0		
Ciliate Flagellates							0		
Other									

COMMENTS AND/OR CONCLUSIONS

Filter surface and winding profile were white to core. Concentrated sediment was gray, sandy/sedimentary, and settled rapidly on percoll-sucrose column without centrifugation.

A few diatom skeletons, Nitschia mainly, were seen.

Large amorphous debris was largely silica, but a few fragments of old plant stems, roots, etc. were also seen. Largest particles were around 100 um long/wide.

Fine amorphous debris was almost exclusively silicaceous grit.

Nematode subadults (larvae/juveniles) outnumbered adults about 3:2.

Analyst Jolley

MPA SOURCE WATER IDENTIFICATION

Sample from: PWS 5600287

Lab# WSVL
Project Code X-6278
Account#
Date(s) sampled 7/8/94
Date received 7/12/94
Date cut/washed 7/12/94

City/utility Green Canyon
Address PO Box 159
Thayne, WY 83127
Phone
System __ public __ comm __ non-comm __ other

Sampler(s) Jeff Van DeBerg
Agency Star Valley Ranch Assoc
Address PO Box 159
Phone 883-2669

Water source location
Sample taken from
Water source ID as: __ spring __ dug well __ drilled well
If well: depth ft

Meter reading: before after
Total volume filtered
__ infil galley __ artesian well
__ horizontal well __ other
Distance from river/stream/lake ft

Field Measurements:	(Date)	Turb (NTU)	pH	Cond.	T. Chlo.	F. Chlo.
Visit one						
Visit two						

Other MB Analysis:	(Date)	TC/100 mL	FC/100 mL	HPC/mL
Visit one				

Processing Information:

Total volume filtered 1013 Time required 20.34 hr.
Total filter sediment collected 250 ul
uL sediment/100 gal 24.7
Percoll®/sucrose floatation pellet volume 20 uL
Percoll®/sucrose floatation packed sediment 80 uL
uL floatation pellet volume/100 gallons filtered 4.94 uL

Floatation Parameters:

X Percoll®/sucrose gradient
__ sucrose gradient
__ potassium citrate
X $ZnSO_4$
X Other ZnSO4 flotation was performed on percol-sucrose final pellet.

Analyst Jolley Magnification 100x to 500x Vol final pellet 20 uL

Primary Particulates	slide 1*	slide 2**	slide 3	slide 4	slide 5	slide 6	slide 7	slide 8	slide 9	slide 10	Total	#/100 gallon	Risk Factor
Giardia	0	0											
Coccidia	0	0											
Diatoms	8	4									12	2.96	6 low
Other Algae	38	11									49	12.1	4 low
Insect/larvae	0	0											
Rotifers	0	0											
Plant Debris	0	0											
Secondary Particulates													
Large amorphous debris	150+	TNTC									TNTC		
Fine amorphous debris	TNTC	TNTC									TNTC		
Minerals	0	0											
Plant pollen	3	3									6		
Nematodes	7	3									10		
Crustacia	0	0											
Amoeba	0	0											
Ciliate/ Flagellates	0	0											
Other	45	65									110		

* Sediment from ZnSO4 flotation.
** Sediment from final pellet remaining from ZnSO4 flotation.
TNTC Too numerous to count.

COMMENTS AND/OR CONCLUSIONS

Filter surface was light brown; visual sediment penetration was about 1/2 inch.

Smear and stain for Cryptosporidium was negative.

Diatoms included Nitschia and/or Navicula, Cymbella and a few Fragillaria.

Other algae included Sphaerocystis and Closterium.

Large AD consisted of filter fiber and plant filament fragments, sediment particles and clumps.

Fine AD was sedimentary grit and flocculent, greenish brown debris that floated on the slide mount.

Pollen was probably pine or spruce, judging from the size and 3 lobed morphologic characteristics.

Nematodes were a mixture of larval and young adult or juvenile stages, some of which had oral stylets, characteristic of plant-parasitic species.

Other prominent microparticulates were fungal spore casings, some of which were empty, some of which retained spores about 3 or 4 um diameter; these spores stained blue with the Ziehl-Nielson, allowing differentiation between them and Cryptosporidium.

Analyst Jolley

ANALYSIS FOR WATERBORNE PARTICULATES

Invoice 90183

5/25/90

CH Diagnostic and Consulting Service, Inc.
2012 Derby Court, Fort Collins, Colorado 80526
Charles P. Hibler PhD, President Telephone (303) 223-9549

.mer 90231
Region VIII
.th St., Ste. 500 8WM-DW
CO 80202

Laboratory Information

Fed. Ex.; 5/25/90; 1010 Hrs.;
Polypropylene; Excellent;
Sample read by: Charles P. Hibler

e Identification: Star Valley Ranch, Prater Canyon, PWS ID#5600287*
Start 5/22/90; 1545 Date/Stop 5/23/90; 0745 Sampler: M.S. Abell
es: 964.70 Filter Color: White Sediment: None
ne Amorphous Debris: Rare silica (1-5 µ diameter)
rge Amorphous Debris: 0
gae: 0
iatoms: 0
ant Debris: 0
iardia: 0
yptosporidium: Not checked
ree-Living Nematodes: Rare eggs & larvae
llen: 0
Free-Living Amoeba: 0
ee-Living Ciliates: 0
Free-Living Flagellates: 0
Crustaceans: 0
Arthropods: 0
Other: 0
mments: *(7ºC; 0.05 NTU)
This water is quite clean.

ANALYSIS FOR WATERBORNE PARTICULATES

Invoice 90183

5/25/90

CH Diagnostic and Consulting Service, Inc.
2012 Derby Court, Fort Collins, Colorado 80526
Charles P. Hibler PhD, President Telephone (303) 223-9549

stomer 90231
PA Region VIII
18th St., Ste. 500 8WM-DW
ver, CO 80202

Laboratory Information

Fed. Ex.; 5/25/90; 1010 Hrs.;
Polypropylene; Excellent;
Sample read by: Charles P. Hibler

nple Identification: Star Valley Ranch; Green Canyon, PWS ID*5600287*
.e/Start 5/22/90; 1510 Date/Stop 5/23/90; 1455 Sampler: M.S. Abell
lons: 1007.6 Filter Color: White Sediment: None
Fine Amorphous Debris: Rare silica (1-2 µ diameter)
Large Amorphous Debris: 0
Algae: 0
Diatoms: 0
Plant Debris: Rare
Giardia: 0
Cryptosporidium: Not checked
Free-Living Nematodes: 0
Pollen: 0
Free-Living Amoeba: 0
Free-Living Ciliates: 0
Free-Living Flagellates: 0
Crustaceans: 0
Arthropods: 0
Other: 0

nments: *6ºC; ~0.2NTU. The small amount of plant debris (rodent fecal detritus) indicates some rodent access to the system (probably a tunneling species).

1984
TEMPLETON, LINKE, AND ASSOCIATES
REPORT

Star Valley Ranch Association
Review of Water System and Documents
and Recommendations Regarding Association Acceptance

September, 1984

Templeton, Linke and Associates

Authorization.

At the invitation of Grover Nielsen and Vern Sloxham, Templeton, Linke and Associates submitted a proposal for studying the water system which had been constructed to deliver culinary water to the approximate 2,000 lots and appurtenant features in the Star Valley Ranch Complex near Thayne, Wyoming. This proposal was accepted verbally by Grover Nielsen on September 3, 1984, and on September 5th 6th and 7th, contacts were made with Mr. Charles King who is the engineer in charge of developing plans and specifications obtaining water rights from the State Engineer's office in Cheyenne, Wyoming, in meeting the requirements of the Department of Environmental Quality in Cheyenne and in preparing reports an other documentation as needed for obtaining the permits required by the Lincoln County Planning and Zoning Commission.

On September 10th, John Beck was briefed on the water system by Grover Nielsen at the association headquarters at the Star Valley Ranch. Following that, Mr. Beck toured the sources of supply and the distribution system with Harold Stewart, the developer, and returned on September 13th with notes describing his observations and findings. During the week of September 17th the assembled data with requirements of the various regulatory agencies was assembled and digested with the objective of preparing this report for presentation to the association's board on September 29, 1984.

Many of the findings given in this report are the result of interviews, study of comprehensive detailed engineering reports prepared to obtain regulatory agency approval, maps showing the proposed improvements, specifications for the project, and field observations. The field observations did not include excavating to observe the condition, size or type of pipelines.

Description of System.

The description of the system is included in adequate form in the engineering reports prepared by Charles King in 1978, 1982, and amended in September, 1984. Copies of these reports and appendices are included. In all of the reports. The property is described as containing 2,500 acres subdivided into 1977 lots with two large buildings for headquarters, a 9-hole golf course, an 18-hole golf course, two summer pools, and tennis courts. Present estimates show approximately 170 homes built or under construction which shows development at a rate of 20 or less per year. Page 14 of the 1978 report shows that Prater Canyon Springs were measured and had a flow of 390 gallons per minute, with this flow being expected to increase in the spring and decrease in the winter, and predicts the flow during the period of high occupancy (summer) to be 390 gallons per minute. The demand for water for culinary purposes has been figured in several ways, and seems to to agree with the state and county requirements for water demand by mobile home parks which may be similar to the demand in this type of installation of essentially 350 gallons per day per dwelling.

The report on page 15 shows the culinary demand to be 508 gallons per minute. This demand must be considered as a mean throughout the day. The peak demand as shown on page 12 of the Lincoln County Planning and Zoning Requirements show a peak demand of 2,119 gallons per minute. Neither of these figures include the requirement for watering the nine-hole golf course or the eighteen-hole golf course, or watering of home sites.

We have estimated the acreage to be watered in the nine-hole golf course to be twenty-five acres, and that these twenty-five acres would require an average flow of 200,000 gallons during a hot summer day, or 150 gallons per minute as an average, or 300 gallons per minute presuming the course would be watered during a twelve hour period. These figures would double for the eighteen hole course to be an average flow of 300 gallons per minute and a peak flow of 600 gallons per minute. This would make the estimated 24-hour demand 508 plus 150 plus 300, or 950 gallons per minute during the summer period with a peak requirement which the pipeline system would be required to deliver of approximately 3,000 gallons per minute. The difference between the average flow and the peak flow would be made up by releasing water

stored in the reservoirs at night for use during the day time. In order to accomplish this according to our estimates, there would be required the 600,000 gallons of storage proposed by the engineering report for culinary use and an additional 500,000 gallons to provide for irrigation of the golf courses on a twelve hour basis.

The King report uses a factor between the average flow and peak flow at 3; we have used 4. This applied to the culinary use. In either case the flow and storage requirements are close enough to show the culinary system to be adequate but not large enough to provide golf course water.

It was noted from the report that the design data contained no provision for collecting or distributing irrigation water to the golf course. We believe it is necessary to note at this time that many homes located in the open country have lawns and other landscaping requiring watering. This area is quite extensive and when fully develooed would add materially to the demand on the culinary water system.

Water Sources.

There are three sources for water described in the engineering report and two of them have been partially developed and are in use at the present time.

Prater Canyon Source.

Information presented in the 1984 engineering report showed the Prater Canyon source described as UW13319, was producing 825 gallons per minute. Because of that test, it was determined the water rights should be enlarged from 300 gallons per minute to 900 gallons per minute and the area to be served by this source to be increased. Measurements made in August, 1984 by Mr. King showed the spring source to be 660 gallons per minute and that an estimated 300 gallons per minute was lost around the collection system.

Our observation at this source confirms the fact that some of the water is diverted into the pipeline and that other water is present in the area; however, it may not be located so that it could be captured and used in the culinary system. More accurate and continuous measurements of this water should be made. Measurements made in 1984 are the result of two consecutive, very wet years, whereas the earlier readings of approximately 390 gallons per minute, may more nearly reflect the flows in the Prater water source in an average year. Although the application for water from Prater Canyon is set at 900 gallons per minute there is no certainty that this amount can be produced continuously in wet, average, or dry years, but that this is the maximum that can be produced. The collection system in the Prater Canyon appears adequate to provide a safe source of culinary water; however, we do not believe it can be depended on to provide the 900 gallons per minute being spoken of in the report, but that it should be looked at to only provide 300 to 400 gallons per minute.

The water not collected from springs in that vicinity at the present time for culinary purposes, could be collected in a manner suitable for irrigation water and used in the irrigation system for watering the golf course.

Green Canyon Source.

Green Canyon system supply is made available through permit No. 28143 on the Wyoming State Engineers office. It is stated in the design report that it is capable of producing 1,000 gallons per minute. The application is for 999 gallons per minute. There were no other statements of the quantity of

water available from this source through actual measurements. It is therefore our opinion that until shown differently, it cannot be counted on to provide much more than 400 gallons per minute for culinary purposes during a dry period. A separate pipe line divides the supply from Green Canyon for use on the golf course irrigation and for culinary purposes. We were told by Mr. Stewart that there are no cross connections between the culinary water system and the irrigation system.

Storage should be provided in Green Canyon in the amount of 400,000 gallons as recommended by the developer, and culinary water should not be used for watering the golf courses. A series of measurements should be made to confirm the 1000 gallon per minute measurement appearing in the report.

Well Supply.

The well drilled in Cedar Canyon is described in the appendix to the engineering report authorized under permit No. UW37449. The drillers log shows the well to be 340 feet deep to be cased to 258 feet, the bottom 82 feet is reported being lime stone. There is no information regarding test pumping except the statement in the amended report stating the well was tested to deliver 400 gallons per minute. This well should be retested or existing test data provided to confirm the yield, draw down and quality of water. In evaluating the three sources of water it appears the well source would be relatively expensive because of the need for pumping from the static water level in the well the hundred plus feet to the ground surface. I am advised there is no three-phase power available on the ranch thus further complicating a development of a well supply.

Collection System.

The collection system in the Prater source consist of buried corrugated metal pipe as collection boxes with approved type covers encased in concrete, thus allowing the water to enter the collection box. The collection system in Green Canyon consists of two 10-inch pipes properly covered with gravel and impervious material to convey the water to a collection box with approved type cover. The drawings show the collection system to be buried ten feet in the ground.This type of collection devices are approved for use and should provide uncontaminated water to the system provided adequate policing is

done upstream from the collection point to prevent animal or other pollution from contaminating the water source.

TRANSMISSION SYSTEMS.

The pipe between the collection system and the reservoir in Prater Canyon and in the loop road is reported to be 6-inch diameter with 1/8-inch wall thickness uncoated used steel pipe with victolic couplings. The specification which was prepared by Mr. King calls for the pipe system to be PVC pipe meeting the requirements of AWWA C900. It is our belief that the steel pipe is far inferior to the PVC pipe specified and should not be used in the system. This pipe may be suitable for use in conveying irrigation water from the collection area to the golf course reservoir; however, we would anticipate it will require much maintenance and repairs and provide sources for contamination of the system in the next few years if it is not doing so presently. The velocity of water through this pipe is higher than considered desirable in a culinary system. The pipe is on an extremely steep grade which may account for the dissolved air in the system being released to water users in the system. When designing the replacement of this pipe we believe an 8-inch pipe should be considered.

Green Canyon pipeline from collection system to distribution system, know as Stewart Pipe. This pipeline is an 8-inch diameter PVC pipe with rubber gasket joints and reported to be in sound condition. There are three zero pressure boxes to reduce the pressure generated by the steep grading on this line and the high velocities generated in the pipe.

Storage Reservoir.

A 185,000 gallon concrete storage reservoir in Prater Canyon from observation of the surface appears to be well constructed; however, the concrete members comprising the roof should be covered with at least 3-inches of concrete and a waterproofing surface placed over them in lieu of the earth cover which is in place now. In order to provide the proper cover for this reservoir it would be necessary to remove the earth and replace it after the concrete has cured, and the waterproof membrane in place. The concrete walls are reported to be in poor condition because of the quality of concrete. This should be further checked and repaired if necessary. The valving to the reservoir should be changed in order to prevent the possibility for creating excessive pressure in the inlet pipe. The attached sketch shows the recommended valving for this reservoir.

We have not seen any plans for the irrigation reservoirs or for the reservoir to be installed in the Green Canyon system.

Distribution System.

Water from Prater Canyon supplies water to the following areas:

Prater Canyon Estates No. 4, Plat Numbers 1, 2, 3, 15 and 20.

Prater Canyon Estates, Plat Numbers 7 and 8, parts of 6 and 10. The upper portion of the golf course is irrigated by Prater Canyon water, Star Valley Ranch Recreation Vehicle Park, and golf course and Plat No. 5. There is reported a low pressure on the higher holes at the nine hole course; this should be corrected.

The following valve boxes were not located.

Plat No.	Number of Valve Boxes	Location
1	2	Evergreen Drive & Spruce Drive
2	2	Dogwood Drive & Birch Drive
2	1	Birch Circle
3	2	Mahogany Way
3	2	Choke Cherry Drive & Pine Drive
3	1	Choke Cherry Circle
3	2	Choke Cherry Drive & Aspen Way
3	2	Aspen Way & Cottonwood Drive
3	2	Aspen Way & Pine Drive
3	2	Cottonwood Drive & Cottonwood Cir.
3	1	Choke Cherry Drive & Elder Place
3	1	Mahogany Way & Aspen Way
20	1	Elkhorn Circle
20	1	Cheyenne Circle
8	1	Cedar Drive - Redwood Circle
8	2	Redwood Road & Redwood Circle
7	2	Redwood Road & Blackwood Drive
7	1	Redwood Road & Vista East Drive
7	1	Blackwood Dirve & Vista East Dr.
7	1	Cedar Drive & Vista West Drive
5	2	White Pine Drive & Oak Drive
6	1	Oak Drive & White Pine Drive
10	2	Sugar Loaf Drive & Vista West Dr.
10	2	Sugar Load Drive & Vista West Dr.

Plat No.	Number of Valve Boxes	Location
10	1	Sugar Loaf Circle
10	1	Vista West Circle
5	2	Barberry Drive & Scrub Oak Drive
5	3	Tumbleweed Drive & Holly Drive
5	1	Tumbleweed Drive & Lilac Drive
5	2	Sage Way and Lilac Drive
5	1	North end Holly Drive
5	1	North end Barberry Drive

Water from Green Canyon supplies water to the following areas:
Plat Numbers portions 6, 10, 9 12, 13, 14, 16 17, 18 and 21.

The following valve boxes were not located in the above referenced plats.

Plat No.	Number of Valve Boxes	Location
11	2	Wainut Drive & Alpine Way
11	1	Vista Drive & Vista East Drive
16	1	Eastwood Way & Solitude Drive
16	2	Along Cedar Creek Drive

All valves and valve boxes should be located , referenced and operated.

Blowoffs should be installed on dead ends.

Pressure reducing stations should be provided with bypasses and pressure relief valves as shown on the plans.

Pipe sizes within the system appear adequate on the plans to serve the culinary demand. It should be certified by the developer that the installation is shown on "as built" plans to be provided.

RV Park, New Golf Course and Addition 60 Lots Proposed on 80 Acres Obtained from the Forest Service.

It is recommended these expansions to the water system be serviced by a separate system with a separate source in order to avoid diluting the present facilities to the point that they are incapable of providing proper service to the existing 2,000 lots in the Star Valley complex. This is especially true of the RV park and attending golf course which may require all of the water developed in Green Canyon during a low water year. Inasmuch as the lower portion of the ranch it may be appropriate to service the golf course from water developed further down the canyon and to drill one or more wells to service the trailer complex. The 80-acre addition may be adequately serviced from Prater Canyon system but no data has been available to confirm this.

Recommendations:

The following is an executive type summary of deficiencies requiring correction or other action before acceptance by the association.

✓ 1) Permanent flow measuring totalizing meters should be installed to measure Prater Canyon and Green Canyon water to confirm the scant data presently available. This would include the water piped to the ranch and any overflow.

Check on valving

✓ 2) Disconnect the two 4-inch lines from the 6-inch line at Prater Canyon if this steel line is to be used for culinary water supply line. These 4-inch pipes do not collect water.

New pipe to Green

✓ 3) Replace 6-inch steel water supply line with PVC pipe meeting the requirements of AWWA C900. The steel line could be used for irrigation water supply.

✓ 4) Install pressure relief valves, air vacuum valves, blowoff valves, and change valving as shown on drawing for water supply from Prater Canyon to the reservoir.

✓ 5) Remove the soil on the top of the reservoir and cover with at least 3-inches of concrete and cover with a weather proofing membrane. The walls should be inspected and repaired if necessary. Replace earth cover according to reservoir design.

✓ 6) Drain, inspect, clean and disinfect the reservoir.

7) Identify and mark the control valves for the reservoir showing their functions and install a locking device to prevent tampering by unauthorized personnel.

8) Install by-passes as shown on drawings at all pressure regulating stations.

9) Install blow off valves for flushing purposes in all cul-de-sacs and dead ends.

10) Repair all leaks in water systems.

11) All valve boxes should be standard design with covers. Locate, mark and prove operable, all valves.

12) Prepare "as constructed" drawing showing the pipe and valve sizes, material of construction and location.

13) Install air release valves at high points where there are reverse grades in waterline.

14) Require certification from the developer that all valves, waterlines, and materials are as shown on the "as constructed" drawings furnished to Star Valley Association.

15) No cross-connection should be allowed between the irrigation water system and the culinary water system.

16) No irrigation of the golf courses should be allowed from the culinary water system.

17) Sprinkler head riser connections to the main line should be saddles with "U" bolts instead of plastic weld. Flexible connectors should be made between riser pipes and heads to avoid stress being placed on the main or riser.

18) Water rights stay with the land and do not require further action. It is recommended that extension of time be requested when "notice of proof" is received from the State Engineer, until the ranch is fully developed.

19) The Star Valley Ranch 2000± lots should be the primary users of the water supply. Surplus water could be supplied to the RV Park and the 9-hole golf course. All water delivered to the RV Park and golf course should be metered and there could be a charge levied. If it becomes necessary to use well water, the additional cost of pumping should be charged to the RV Park and golf course.

20) Develop and test pump the well to determine well characteristics, including draw down/yield curves and water quality.

✓ 21) Certification from Lincoln County officials that the improvements are in compliance with their standards or listing the defects in the improvements.

✓ 22) Water lines, appurtenances, easements and reservoir sites should be deeded to the Association.

dsk: TLA44

LIST OF DEQ PERMITS

CONSTRUCTION PERMITS
STAR VALLEY RANCH DEVELOPMENTS
June 19, 1995

Permit #	Name	Location of plans and specs
70-064	Star Valley Ranch- Leisure Valley	Missing
71-022	SVR/LVI Water System Master Plan	Cheyenne
75-209	SVR Subdivision	Lander
77-233	SVR Water System Development	Cheyenne
78-202	SVR Water System Extension	Cheyenne
78-684	SVR	Lander
82-207	SVR	Lander
82-528	SVR RV Park	Missing
84-457	SVR Water System	Cheyenne
85-227	SVR RV Park	Missing
86-108	SVR RV Park	Missing
86-242	Relocation Prater Canyon Supply Line	Cheyenne
86-243	Green canyon to Prater Canyon	Cheyenne
86-244	SVR Flow Metering Stations	Cheyenne
86-255	SVR	Missing
86-259	Green Canyon Reservoir	Cheyenne
86-391	Cascade Spring Improvements(revised)	Cheyenne
87-116	SVR Water System Line Replacement	Cheyenne
87-165	SVR Water System Improvements	Cheyenne
88 067	SVR Water System Improvements	Cheyenne
89-313	SVR Water System	Cheyenne
89-462	Green Canyon Spring Improvements	Cheyenne
92-292	SVR RV Park	Cheyenne

92-306	SVR RV Park	Cheyenne
92-344	North Muddy String Line Upgrade	Cheyenne
92-399	SVR North Airstrip	Cheyenne
93-106	SVR North Airstrip Well #1	Cheyenne
94-235	SVR RV Park Well House	Cheyenne

LRR/mad 52667.LTR

HYDRAULIC MODELING OUTPUT
AND
SYSTEM DIAGRAMS

Star Valley Ranch - Water System | 1996 EXISTING SYSTEM & DEMAND | 1
Project 96014.03 | CURRENT VALVE CONDITIONS AND PRV PRESSURES
1996 Existing System - 23% Build-Out | PVC C = 130 | Steel C = 110
File: svra2.XLS - Waterworks for Excel

PIPE TABLE

	INPUT					OUTPUT			INPUT	
Pipe	UpNode	DnNode	Length	Diameter	Roughness	Flow	Velocity	HeadLoss	Status	Description
			ft	in		US gpm	ft/sec	ft		
2	3	4	450	2	130	7.67	0.78	0.89		
4	5	4	800	2	130	-5.87	-0.60	0.70		
6	16	8	1380	3	130	-4.07	0.18	0.11		
8	10	8	550	2	130	1.80	0.18	0.07		
10	12	10	300	2	130	14.87	1.52	1.96		
12	10	2	350	2	130	11.27	1.15	1.37		
14	14	12	450	3	130	16.67	0.76	0.51		
16	17	16	700	3	130	25.87	1.17	1.75		
18	18	14	400	4	130	18.47	0.47	0.13		
20	20	18	450	4	130	47.74	1.22	0.87		
22	24	16	1700	4	130	-27.94	-0.71	1.23		
24	24	20	600	4	130	0.00	0.00	0.00	C	Valve Closed
26	22	20	575	3	130	51.87	2.35	5.29		
28	23	26	1300	3	130	25.73	1.17	3.26		
30	26	24	650	4	130	-23.81	-0.61	0.35		
32	27	32	500	4	130	30.48	0.78	0.42		
34	38	28	350	3	130	-4.83	-0.22	0.04		
36	30	28	1000	4	130	16.03	0.41	0.26		
38	32	30	650	3	130	19.57	0.84	1.17		
40	34	32	400	2	130	-9.37	-0.96	1.31		
42	38	34	1300	2	130	-2.65	-0.27	0.35		
44	36	34	1100	2	130	-4.18	-0.43	0.69		
46	38	36	400	2	130	4.94	0.50	0.34		
48	40	38	350	2	130	-10.16	-1.04	1.13		
50	42	40	600	2	130	-7.62	-0.78	1.14		
52	46	42	400	2	130	-2.54	-0.26	0.10		
54	44	42	250	2	130	-2.54	-0.26	0.06		
56	48	36	700	3	130	0.58	0.16	0.05		
58	50	48	300	4	130	-2.54	-0.08	0.00		
60	48	28	1000	3	130	-8.66	-0.39	0.33		
62	54	26	800	6	130	-12.39	-0.14	0.02		
64	56	54	400	2	130	-4.13	-0.42	0.24		
66	54	52	600	6	130	4.13	0.05	0.00		
68	60	22	500	4	110	86.86	2.19	3.92		
70	60	58	240	4	110	2.48	0.06	0.00		
72	62	60	495	6	110	90.82	1.03	0.60		
74	64	62	625	4	110	-4.96	-0.13	0.02		
76	66	64	300	4	110	-2.48	-0.06	0.00		
78	70	64	1200	4	110	0.00	0.00	0.00	C	Valve Closed
80	70	68	450	4	110	0.00	0.00	0.00	C	Valve Closed
82	68	62	900	6	110	98.26	1.12	1.26		
84	72	68	820	6	110	100.74	1.14	1.20		
86	72	70	1520	4	110	2.48	0.06	0.02		
88	96	72	1850	6	130	105.70	1.20	2.17		
90	76	74	1000	3	130	3.30	0.15	0.06		
92	78	78	300	4	130	8.60	0.17	0.01		
94	80	78	500	3	130	9.90	0.45	0.21		
96	82	80	950	3	130	5.71	0.26	0.15		
98	92	80	1100	2	130	7.49	0.77	2.02		
100	84	82	350	3	130	1.47	0.07	0.00		
102	86	84	1100	2	130	4.77	0.49	0.88		
104	88	86	550	2	130	8.07	0.82	1.18		
106	90	88	200	3	130	18.91	0.86	0.28		
108	92	90	550	3	130	-14.09	-0.64	0.45		
110	94	92	750	3	130	-3.30	-0.15	0.04		
112	88	82	1100	2	130	7.53	0.77	2.05		
114	96	90	20	4	130	36.30	0.93	294.57		PRV5 -114 - N. Forest

116	98	96	600	6	130	143.38	1.63	1.24		
118	100	98	700	4	130	24.94	0.64	0.41		
120	102	100	1620	4	130	26.32	0.67	1.04		
122	104	102	700	4	130	27.70	0.71	0.50		
124	106	98	1420	6	130	119.82	1.36	2.10		
126	106	104	200	4	130	29.08	0.74	0.16		
128	108	106	220	6	130	150.28	1.71	0.50		
130	109	108	850	6	110	150.28	1.71	2.61		
132	111	110	450	6	130	731.52	8.30	19.00		
134	114	112	1600	6	130	-274.60	-3.12	12.56		
136	116	112	800	6	130	276.07	3.13	5.56		
138	118	116	400	6	110	298.53	3.39	4.38		
140	120	118	1130	6	110	300.00	3.40	12.48		
142	122	116	380	4	130	-20.99	-0.54	0.16		
144	126	122	375	4	130	-1.47	-0.04	0.00		
146	128	122	1200	4	130	-18.05	-0.46	0.38		
148	128	124	600	4	130	1.47	0.04	0.00		
150	130	128	150	4	130	-8.12	-0.21	0.01		
152	146	130	1050	4	130	0.34	0.01	0.00		
154	134	132	1300	4	130	1.47	0.04	0.00		
156	134	110	1475	6	130	-579.77	-6.58	40.49		
158	136	134	400	6	130	-569.84	-6.47	10.64		
160	142	136	430	6	110	-551.28	-6.26	14.65		Valve Open
162	142	140	250	6	130	532.68	6.05	5.87		
164	140	130	710	6	110	0.00	0.00	0.00	C	Valve Broken Closed
166	144	140	440	6	110	-524.22	-5.95	13.66		
168	146	144	800	2	130	0.00	0.00	0.00	C	Valve Broken Closed
170	148	148	1000	2	130	3.80	0.90	2.48		
172	145	150	500	6	130	509.16	5.78	10.79		
174	149	150	300	2	130	40.00	4.09	12.28		
176	137	138	650	2	130	5.06	0.52	0.58		
178	143	192	2150	4	130	5.06	0.13	0.07		
180	162	150	660	6	110	-544.11	-6.17	21.95		
182	164	162	310	6	110	-533.99	-6.06	9.96		
184	162	160	720	2	130	5.06	0.52	0.64		
186	154	152	800	4	130	5.06	0.13	0.02		
188	154	148	1100	4	130	62.32	1.59	3.50		
190	156	154	200	4	130	72.44	1.85	0.84		
192	158	156	350	4	130	77.50	1.98	1.67		
194	168	158	1000	4	130	82.56	2.11	5.35		
196	168	166	100	6	130	0.00	0.00	0.00	C	LCV #2 Assumed Closed
198	166	170	400	8	130	-28.04	-0.18	0.01		
200	174	172	1700	6	130	207.25	2.35	6.95		
202	172	168	300	6	130	84.21	0.96	0.23		
204	173	176	700	6	110	114.24	1.30	0.46		
206	178	176	700	4	130	-7.15	-0.18	0.04		
208	180	176	750	6	110	-99.94	-1.13	1.08		
210	184	170	1500	8	130	29.69	0.19	0.04		
212	164	185	1425	6	110	528.93	6.00	44.97		
214	188	186	450	2	130	5.06	0.52	0.40		
216	190	188	750	4	130	6.71	0.17	0.04		
218	198	190	1100	2	130	9.80	1.00	3.33		
220	196	184	600	8	130	-477.78	-3.05	2.84		
222	198	196	410	8	130	-472.83	-3.02	1.90		
224	182	180	800	8	130	-92.79	-0.59	0.14		
226	194	182	830	6	110	-87.84	-1.00	0.94		
228	280	194	1080	6	110	-82.89	-0.94	1.10		
230	200	198	585	8	130	-307.70	-1.96	1.22		
232	202	200	585	8	130	-268.54	-1.71	0.95		
234	204	202	700	8	130	-240.11	-1.53	0.93		
236	208	204	200	4	130	-32.52	-0.83	0.19		
238	208	190	1875	4	130	5.06	0.10	0.04		
240	214	212	1200	4	130	-8.46	-0.22	0.09		
242	216	212	700	4	130	-1.33	-0.03	0.00		
244	218	216	900	4	130	7.13	0.18	0.05		
246	218	210	600	4	130	-15.59	-0.40	0.15		
248	212	210	600	4	130	-18.25	-0.47	0.20		
250	210	206	500	4	130	-42.30	-1.08	0.78		
252	206	204	500	8	130	-197.10	-1.26	0.46		

254	222	206	150	8	130	-154.80	-0.99	0.09	
256	224	222	150	6	130	0.00	0.00	0.00	
258	209	220	1250	1	130	10.00	4.09	114.84	
260	223	226	950	6	110	154.80	1.76	3.08	
262	228	226	3500	6	110	-154.80	-1.76	11.35	
264	228	230	150	6	110	125.00	1.42	126.46	PRV15 - 264
266	232	230	350	6	130	-125.00	-1.42	0.56	
268	234	232	100	6	110	0.00	0.00	0.00	
270	228	236	2400	6	110	19.80	0.22	212.53	PRV16 - 270 - Barberry
272	238	236	370	6	110	-6.73	-0.08	0.00	
274	240	236	375	6	130	-11.27	-0.13	0.01	
276	244	238	975	4	130	-4.93	-0.13	0.03	
278	242	240	750	4	130	-5.09	-0.13	0.02	
280	258	240	1050	4	130	-4.38	-0.11	0.02	
282	248	244	340	4	130	-6.85	-0.17	0.02	
284	248	246	525	4	130	-3.37	-0.09	0.01	
286	244	242	370	4	130	-1.92	-0.05	0.00	
288	258	242	525	4	130	-1.37	-0.03	0.00	
290	254	248	1850	4	130	-1.68	-0.04	0.01	
292	252	248	1050	4	130	-0.66	-0.02	0.00	
294	250	248	870	4	130	-0.91	-0.02	0.00	
296	252	250	310	4	130	0.89	0.02	0.00	
298	254	252	310	4	130	2.03	0.05	0.00	
300	256	254	310	4	130	2.15	0.05	0.00	
302	258	256	1205	4	130	3.95	0.10	0.02	
304	262	260	335	6	130	-3.45	-0.11	0.00	
306	264	262	475	6	130	-6.50	-0.07	0.00	
308	266	264	640	6	130	-3.97	-0.05	0.00	
310	268	266	700	4	130	-1.55	-0.04	0.00	
312	270	268	900	4	130	-0.23	-0.01	0.00	
314	272	270	400	4	130	1.09	0.03	0.00	
316	274	272	420	4	130	1.31	0.03	0.00	
318	276	274	590	4	130	1.42	0.04	0.00	
320	278	276	770	4	130	1.11	0.03	0.00	
322	278	280	900	4	130	-2.43	-0.06	0.01	
324	278	262	1050	4	130	-1.63	-0.04	0.00	
326	274	264	1125	4	130	-1.21	-0.03	0.00	
328	272	266	975	4	130	-1.10	-0.03	0.00	
330	302	204	2600	4	130	-2.03	-0.05	0.01	
332	300	202	1980	4	130	-19.97	-0.51	0.77	
334	298	200	1560	4	130	-34.21	-0.87	1.63	
336	302	300	590	4	130	-16.56	-0.42	0.17	
338	300	298	520	4	130	-12.36	-0.32	0.08	
340	298	298	300	4	130	16.90	0.43	0.09	
342	304	300	900	4	130	-6.68	-0.17	0.05	
344	308	302	1875	4	130	-9.52	-0.24	0.17	
346	304	298	760	4	130	-7.00	-0.18	0.04	
348	298	294	750	4	130	4.95	0.13	0.02	
350	308	308	620	4	130	-22.49	-0.57	0.30	
352	308	290	840	4	130	-39.47	-1.01	1.15	
354	292	290	840	8	130	143.23	0.91	0.43	
356	292	198	1920	8	110	-148.18	-0.95	1.41	
358	286	280	1275	4	110	-18.16	-0.46	0.56	
360	286	282	900	4	110	7.98	0.20	0.09	
362	282	280	1380	6	110	-54.55	-0.62	0.65	
364	284	282	525	4	110	-52.35	-1.34	1.65	
366	285	288	1090	4	110	31.99	0.82	1.37	
368	290	288	500	8	130	92.21	0.59	0.11	
370	314	288	1590	8	130	-114.02	-0.73	0.53	
372	312	306	1350	4	130	-7.56	-0.19	0.09	
374	310	308	540	4	130	-22.93	-0.59	0.27	
376	312	310	450	4	130	34.67	0.89	0.48	
378	314	312	450	4	130	38.66	0.99	0.59	
380	310	324	900	6	130	48.52	0.55	66.34	PRV 18 - 380 - Hardman
382	316	314	1125	6	110	-65.36	-0.74	0.74	
384	318	316	1050	4	130	-8.49	-0.22	0.08	
386	317	320	270	6	130	39.89	0.45	0.05	
388	322	320	835	6	130	-31.40	-0.36	0.15	
390	324	322	1520	4	130	0.00	0.00	0.00	C Valve Closed

392	326	324	1650	6	130	-40.03	-0.45	0.32		
394	326	322	1356	4	130	-22.91	-0.58	0.88		
396	328	322	800	4	130	0.00	0.00	0.00	C	Valve Closed
398	330	328	2550	4	130	4.10	0.10	0.05		
400	330	328	2250	4	130	4.39	0.11	0.05		
402	332	330	2015	4	130	16.74	0.43	0.56		
404	334	332	1200	6	130	36.76	0.42	0.20		
406	336	334	2060	4	130	-9.68	-0.25	0.21		
408	336	332	450	6	130	-11.77	-0.13	0.01		
410	336	260	550	6	130	13.20	0.15	0.01		
412	306	304	690	4	130	-2.13	-0.05	0.00		
414	334	326	900	6	130	-54.69	-0.62	0.31		
133	114	111	1600	6	130	732.99	8.32	67.81		
135	112	111	20	6	130	0.00	0.00	0.00	C	
1	2	3	450	2	130	9.47	0.97	165.70		PRV1 - 1 - McGuinnes
15	18	17	30	3	130	27.47	1.25	169.63		PRV2 - 15 - Spruce Dr.
27	22	23	50	3	130	29.86	1.36	175.85		PRV3 - 27 - Kunz
31	26	27	50	6	130	33.02	0.37	132.05		PRV4 - 31
129	110	109	50	3	110	150.28	1.71	0.15		PRV6 - 129 - E. Forest
177	142	143	50	4	130	10.12	0.26	0.07		PRV7 - 177 - Vista West
175	136	137	50	2	130	10.12	1.03	0.16		PRV8 - 175 - Cedar Dr.
173	148	149	50	2	130	45.06	4.60	224.61		PRV9 - 173 - Redwood
171	144	145	500	6	130	514.22	5.84	33.93		PRV10 - 171 - Vista East Up
203	172	173	50	6	110	121.39	1.38	205.36		PRV11 - 203 - Lower Green
211	185	187	25	6	110	521.78	5.92	0.77		PRV12 - 211 - Vista East LC
257	208	209	50	2	130	20.00	2.04	70.38		PRV13 - 257
259	222	223	50	6	110	154.80	1.76	91.56		PRV14 - 259 - Vista
365	284	285	50	4	130	42.17	1.08	123.99		PRV17 - 365 - Canyon Pines
385	316	317	50	6	130	48.38	0.55	66.12		PRV19 - 385 - Middle Branch
213	187	184	100	6	110	514.63	5.84	3.00		Closed or Green Fills from Prat

NODE TABLE

	INPUT		OUTPUT		INPUT				
Node	Elevation	Demand	Pressure	HGL	XCoord	YCoord	Status	Description	Node	Pumps
	ft	US gpm	psi	ft						
2	6533.00	1.80	68.98	6692.34				Plat 1 - Zone 1		
4	6443.00	1.80	35.82	6525.75				Plat 1 - Zone 2		
6	6373.00	1.80	65.82	6525.05				Plat 1 - Zone 2		
8	6478.00	1.80	93.35	6693.64				Plat 1 - Zone 1		
10	6478.00	1.80	93.38	6693.71				Plat 1 - Zone 1		
12	6478.00	1.80	94.23	6695.68				Plat 1 - Zone 1		
14	6473.00	1.80	96.62	6696.18				Plat 1 - Zone 1		
16	6373.00	1.80	65.77	6524.94				Plat 1 - Zone 2		
18	6413.00	1.80	122.65	6696.32				Plat 1 - Zone 1		
20	6416.00	4.13	121.73	6697.19				Plat 2 - Zone 1		
22	6454.00	4.13	107.57	6702.48				Plat 2 - Zone 1		
24	6343.00	4.13	78.23	6523.71				Plat 2 - Zone 2		
26	6300.00	4.13	96.69	6523.36				Plat 2 - Zone 2		
28	6275.00	2.54	49.55	6389.46				Plat 3 - Zone 3		
30	6298.00	2.54	39.71	6389.72				Plat 3 - Zone 3		
32	6208.00	2.54	79.17	6390.89				Plat 3 - Zone 3		
34	6204.00	2.54	80.42	6389.77				Plat 3 - Zone 3		
36	6203.00	2.54	80.56	6389.08				Plat 3 - Zone 3		
38	6238.00	2.54	65.55	6389.42				Plat 3 - Zone 3		
40	6165.00	2.54	100.85	6387.96				Plat 3 - Zone 3		
42	6146.00	2.54	104.25	6386.81				Plat 3 - Zone 3		
44	6128.00	2.54	112.01	6386.75				Plat 3 - Zone 3		
46	6153.00	2.54	101.18	6386.71				Plat 3 - Zone 3		
48	6205.00	2.54	79.71	6389.13				Plat 3 - Zone 3		
50	6218.00	2.54	74.08	6389.13				Plat 3 - Zone 3		
52	6233.00	4.13	125.89	6523.34				Plat 2 - Zone 2		
54	6280.00	4.13	105.34	6523.34				Plat 2 - Zone 2		
56	6318.00	4.13	88.79	6523.10				Plat 2 - Zone 2		
58	6542.00	2.48	71.17	6706.40				Plat 15 - Zone 1		
60	6520.00	2.48	80.69	6706.40				Plat 15 - Zone 1		
62	6496.00	2.48	91.77	6707.00				Plat 15 - Zone 1		
64	6562.00	2.48	62.76	6706.98				Plat 15 - Zone 1		
66	6606.00	2.48	43.71	6706.97				Plat 15 - Zone 1		
68	6425.00	2.48	122.62	6708.25				Plat 15 - Zone 1		
70	6450.00	2.48	112.31	6709.44				Plat 15 - Zone 1		
72	6339.00	2.48	160.37	6709.45				Plat 15 - Zone 1		
74	6313.00	3.30	43.85	6414.29				Plat 20 - Zone 4		
76	6239.00	3.30	75.91	6414.35				Plat 20 - Zone 4		
78	6222.00	3.30	83.27	6414.36				Plat 20 - Zone 4		
80	6239.00	3.30	76.01	6414.58				Plat 20 - Zone 4		
82	6237.00	3.30	76.94	6414.72				Plat 20 - Zone 4		
84	6243.00	3.30	74.34	6414.73				Plat 20 - Zone 4		
86	6313.00	3.30	44.42	6415.61				Plat 20 - Zone 4		
88	6313.00	3.30	44.92	6416.77				Plat 20 - Zone 4		
90	6280.00	3.30	59.33	6417.06				PRV5 -114 - N. Forest - Plat 20 -Zone 4		
92	6313.00	3.30	44.85	6416.60				Plat 20 - Zone 4		
94	6313.00	3.30	44.83	6416.56				Plat 20 - Zone 4		
96	6300.00	1.38	178.19	6711.63				Plat 22 - Zone 1		
98	6356.00	1.38	164.92	6712.87				Plat 22 - Zone 1		
100	6360.00	1.38	152.93	6713.27				Plat 22 - Zone 1		
102	6480.00	1.38	101.44	6714.32				Plat 22 - Zone 1		
104	6470.00	1.38	105.98	6714.81				Plat 22 - Zone 1		
106	6450.00	1.38	114.71	6714.97				Plat 22 - Zone 1		
108	6400.00	0.00	136.57	6715.47				Trans from Prater Tank - Zone 5		
110	6529.00	1.47	81.92	6718.23				Plat 8 - Zone 5		
112	6555.00	1.47	113.68	6817.60				Plat 8 - Zone 5		
114	6800.00	0.00	2.18	6805.04				Prater Tank - 185000 gal		

116	6637.00	1.47	80.59	6823.16			Plat 8 - Zone 5
118	6672.00	1.47	67.33	6827.54			Plat 8 - Zone 5
120	6850.00	-300.00	-4.32	6840.02			Prater Zeroing Box
122	6707.00	1.47	50.22	6823.00			Plat 8 - Zone 5
124	6627.00	1.47	84.68	6822.61			Plat 8 - Zone 5
126	6717.00	1.47	45.89	6823.00			Plat 8 - Zone 5
128	6635.00	8.46	81.22	6822.62			Plat 7 - Zone 5
130	6640.00	8.46	79.05	6822.60			Plat 7 - Zone 5
132	6800.00	1.47	33.65	6677.73			Plat 8 - Zone 5
134	6540.00	8.46	59.63	6677.74			Plat 7 - Zone 5
136	6510.00	8.46	68.01	6667.10			Plat 7 - Zone 5
138	6452.00	5.06	92.80	6666.36			Plat 6 - Zone 6
140	6561.00	8.46	37.05	6646.58			Plat 7 - Zone 5
142	6538.00	8.46	49.55	6652.45			Plat 7 - Zone 5
144	6545.00	10.00	38.06	6632.92			SVRA Club House & Pool - Zone 5
146	6585.00	8.46	102.86	6822.60			Plat 7 - Zone 5
148	6500.00	8.46	140.73	6825.08			Plat 7 - Zone 5
150	6500.00	5.06	38.18	6588.20			Plat 6 - Zone 6
152	6450.00	5.06	163.88	6828.56			Plat 6 -Zone5
154	6505.00	5.06	140.08	6828.58			Plat 6 -Zone5
156	6545.00	5.06	123.13	6829.42			Plat 6 -Zone5
158	6505.00	5.06	141.18	6831.09			Plat 6 -Zone5
160	6495.00	5.06	30.57	6565.61			Plat 6 - Zone 6
162	6450.00	5.06	50.32	6568.25			Plat 6 - Zone 6
164	6429.00	5.06	55.10	6558.29			Plat 6 - Zone 6
166	6500.00	0.00	3.25	6507.50			Green Tank - 400000 gal - Zone 7
168	6480.00	1.65	154.30	8838.44			Plat 11 - Zone 5
170	6460.00	1.65	20.57	6507.51			Plat 11 - Zone 7
172	6460.00	1.65	163.06	6838.67			Plat 11 - Zone 5
174	6635.00	0.00	90.31	8843.62			Green PRV - 90psi - Zone 5
176	6400.00	7.15	100.34	6631.78			Plat 9 - Zone 8
178	6420.00	7.15	91.66	6631.74			Plat 9 - Zone 8
180	6325.00	7.15	132.34	6630.70			Plat 9 - Zone 8
182	6325.00	4.95	132.28	6630.67			Plat 12 - Zone 8
184	6325.00	7.15	79.03	6507.55			Plat 9 - Zone 7
186	6370.00	5.06	55.86	6499.05			Plat 6 - Zone 7
188	6315.00	1.65	79.85	6499.45			Plat 11 - Zone 7
190	6285.00	7.15	92.85	6499.49			Plat 9 - Zone 7
192	6380.00	5.06	117.88	6652.31			Plat 6 - Zone 6
194	6375.00	4.95	110.23	6629.62			Plat 12 - Zone 8
196	6325.00	4.95	77.80	6504.72			Plat 12 - Zone 7
198	6305.00	7.15	85.63	6502.81			Plat 9 - Zone 7
200	6275.00	4.95	98.09	6501.59			Plat 12 - Zone 7
202	6260.00	8.46	108.50	6500.84			Plat 10 - Zone 7
204	6220.00	8.46	121.09	6499.71			Plat 10 - Zone 7
206	6205.00	0.00	127.38	6499.26			Trans to Cedar Creek Dr. - Zone 7
208	6210.00	8.46	125.34	6499.52			Plat 10 - Zone 7
210	6220.00	8.46	120.55	6498.48			Plat 10 - Zone 7
212	6260.00	8.46	103.15	6498.28			Plat 10 - Zone 7
214	6300.00	8.46	85.80	6498.19			Plat 10 - Zone 7
216	6250.00	8.46	107.48	6498.28			Plat 10 - Zone 7
218	6210.00	8.46	124.82	6498.33			Plat 10 - Zone 7
220	6180.00	10.00	58.14	6314.30			LVI Facilities - Zone 9
222	6200.00	0.00	129.51	6499.17			Trans to Cedar Creek Dr. - Zone 7
224	6200.00	0.00	129.51	6499.17			SVRA Well #1 - Zone 7
226	6170.00	0.00	101.53	6404.53			Trans to Cedar Creek Dr. - Zone 10
228	6100.00	10.00	126.92	6393.17			Mary' Rest. and Sale's Office - Zone 10
230	6105.00	0.00	70.01	6266.72			PRV15 - 264 Trans to RV Park - Zone 12
232	6115.00	125.00	65.43	6286.15			RV Park - Zone 12
234	6112.00	0.00	66.73	6266.15			LVI Well #1 - Zone 12
236	6042.00	1.80	80.02	6180.65			PRV16 - 270 - Barberry - Plat 5 - Zone 13
238	6042.00	1.80	80.02	6180.84			Plat 5 - Zone 13
240	6049.00	1.80	56.99	6180.84			Plat 5 - Zone 13
242	6041.00	1.80	60.44	6180.82			Plat 5 - Zone 13
244	6034.00	0.00	63.47	6180.82			Plat 5 - Zone 13
246	6029.00	1.80	65.83	6180.80			Plat 5 - Zone 13
248	6027.00	1.80	66.49	6180.59			Plat 5 - Zone 13
250	6025.00	1.80	67.35	6180.59			Plat 5 - Zone 13
252	6033.00	1.80	63.89	6180.59			Plat 5 - Zone 13

254	6042.00	1.80	60.00	6180.59	Plat 5 - Zone 13
256	6048.00	1.80	57.40	6180.59	Plat 5 - Zone 13
258	6053.00	1.80	55.25	6180.62	Plat 5 - Zone 13
260	6200.00	1.32	100.46	6432.06	Plat 21 - Zone 11
262	6200.00	1.32	100.46	6432.06	Plat 21 - Zone 11
264	6192.00	1.32	103.92	6432.06	Plat 21 - Zone 11
266	6183.00	1.32	107.82	6432.06	Plat 21 - Zone 11
268	6168.00	1.32	114.31	6432.05	Plat 21 - Zone 11
270	6151.00	1.32	121.67	6432.05	Plat 21 - Zone 11
272	6156.00	1.32	119.50	6432.05	Plat 21 - Zone 11
274	6165.00	1.32	115.61	6432.05	Plat 21 - Zone 11
276	6173.00	1.32	112.15	6432.06	Plat 21 - Zone 11
278	6183.00	1.32	107.82	6432.06	Plat 21 - Zone 11
280	6400.00	10.18	98.93	6628.52	Plat 13 - Zone 8
282	6360.00	10.18	115.96	6627.87	Plat 13 - Zone 8
284	6340.00	10.18	123.91	6626.23	Plat 13 - Zone 8
286	6320.00	10.18	133.32	6627.96	Plat 13 - Zone 8
288	6308.00	10.18	83.49	6500.86	Plat 13 - Zone 7
290	6320.00	11.55	78.34	6500.97	Plat 14 - Zone 7
292	6325.00	4.95	76.36	6501.40	Plat 12 - Zone 7
294	6300.00	4.95	86.52	6499.85	Plat 12 - Zone 7
296	6280.00	4.95	95.18	6499.87	Plat 12 - Zone 7
298	6280.00	4.95	95.22	6499.96	Plat 12 - Zone 7
300	6250.00	9.08	108.17	6499.87	Plat 16 - Zone 7
302	6220.00	9.08	121.08	6499.70	Plat 16 - Zone 7
304	6260.00	11.55	103.82	6499.83	Plat 14 - Zone 7
306	6265.00	11.55	101.66	6499.83	Plat 14 - Zone 7
308	6240.00	9.08	112.35	6499.53	Plat 16 - Zone 7
310	6230.00	9.08	116.56	6499.26	Plat 16 - Zone 7
312	6240.00	11.55	112.44	6499.74	Plat 14 - Zone 7
314	6203.00	10.00	128.72	6500.33	Silo Recreation Center - Zone 7
316	6272.00	8.49	98.53	6499.59	Plat 17 - Zone 7
318	6300.00	8.49	86.37	6499.51	Plat 17 - Zone 7
320	6280.00	8.49	66.42	6433.42	Plat 17 - Zone 11
322	6262.00	8.49	74.14	6433.27	Plat 17 - Zone 11
324	6228.00	8.49	88.71	6432.92	PRV 18 - 380 - Hardman - Plat 17 - Zone 11
326	6226.00	8.25	89.44	6432.60	Plat 18 - Zone 11
328	6285.00	8.49	63.41	6431.47	Plat 17 - Zone 11
330	6255.00	8.25	76.42	6431.53	Plat 18 - Zone 11
332	6228.00	8.25	88.36	6432.09	Plat 18 - Zone 11
334	6225.00	8.25	89.73	6432.29	Plat 18 - Zone 11
336	6220.00	8.25	91.81	6432.08	Plat 18 - Zone 11
111	6555.00	1.47	78.89	6737.23	Plat 8 - Zone 5
3	6493.00	1.80	14.56	6526.84	PRV1 - 1 - McGuinnes - Plat 1 - Zone 2
17	6413.00	1.80	49.21	6526.68	PRV2 - 15 - Spruce Dr. - Plat 1 - Zone 2
23	6454.00	4.13	31.44	6528.82	PRV3 - 27 - Kunz - Plat 2 - Zone 2
27	6300.00	2.54	39.53	6391.31	PRV4 - 31 - Plat 3 - Zone 3
109	6529.00	0.00	81.85	6718.07	PRV6 - 129 - E. Forest - Trans to Plat 22 - Zone 1
143	6538.00	5.06	49.51	6852.38	PRV7 - 177 - Vista West - Plat 6 - Zone 6
137	6510.00	5.06	67.94	6666.94	PRV8 - 175 - Cedar Dr. - Plat 6 - Zone 6
149	6500.00	5.06	43.50	6600.48	PRV9 - 173 - Redwood - Plat 6 - Zone 6
145	6480.00	5.06	51.51	6598.99	PRV10 - 171 - Vista East (Upper) - Plat 6 - Zone 6
173	6460.00	7.15	74.16	6631.32	PRV11 - 203 - Lower Green - Plat 9 - Zone 8
185	6325.00	7.15	80.66	6511.32	Plat 9 - Zone 6
209	6210.00	10.00	94.87	6429.14	PRV13 - 257 - Maint. & LVI 1" Service - Zone 9
223	6200.00	0.00	89.37	6407.61	PRV14 - 259 - Vista - Trans to Cedar Cr. Dr. - Zone
285	6340.00	10.18	70.23	6502.24	PRV17 - 365 - Canyon Pines - Plat 13 - Zone 7
317	6272.00	8.49	89.90	6433.47	PRV19 - 385 - Middle Branch - Plat 17 - Zone 11
187	6325.00	7.15	80.33	6510.55	PRV12 - 211 - Vista East (Lower) - Plat 9 - Zone 6

FIXED GRADE SOURCES TABLE

	INPUT		OUTPUT			INPUT
Node	Top Of Water	stimate	Actual	Inflow	Status	Description
	ft			US gpm		
166	6507.50	0.30	-0.04	28.04		Green Tank - 400000 gal
114	6806.00	0.30	0.72	-458.39		Prater Tank - 185000 gal
174	6843.00	0.3	0.33	-207.25		Upper Green PRV - 90 psi

REDUCING (PRV) TABLE

		INPUT			OUTPUT			INPUT	
Pipe	Source	Pressure	OpenK	CKV	PRVLoss	KVState	Status	Description	
		psi	ft		ft				
203	174	74.00	50.00	Yes	205.25	Open		PRV11 - Lower Green	
365	174	69.30	20.00	Yes	123.91	Open		PRV17 - Canyon Pine	
380	166	88.83	20.00	Yes	66.09	Open		PRV18 - Hardman	
385	188	70.00	20.00	Yes	66.11	Open		PRV19 - Middle BR.	
259	188	90.00	20.00	Yes	91.40	Open		PRV14 - Vista	
129	114	95.00	0.00	Yes	0.00	Open		PRV6 - E. Forest	
264	166	70.00	50.00	Yes	126.13	Open		PRV15 - RV Park	
270	166	60.00	100.00	Yes	212.35	Open		PRV16 - Barberry	
114	114	60.00	100.00	Yes	294.55	Open		PRV5 - N. Forest	
27	114	31.90	50.00	Yes	175.69	Open		PRV3 - Kunz	
15	114	49.70	50.00	Yes	169.55	Open		PRV2 - Spruce Dr.	
1	114	15.00	50.00	Yes	184.42	Open		PRV1 - McGuinnes	
31	114	40.00	50.00	Yes	132.05	Open		PRV4 - Plat 3	
257	166	95.00	0.00	Yes	69.82	Open		PRV13 - Maint.	
177	114	60.00	0.00	Yes	0.07	Open		PRV7 - Vista West	
175	114	75.00	0.00	Yes	0.00	Open		PRV8 - Cedar Dr.	
173	114	43.30	50.00	Yes	222.05	Open		PRV9 - Redwood	
171	114	52.00	0.00	Yes	22.94	Open		PRV10 - Vista E. (Upp	
								PRV12 - Vista E. (Low	

	Star Valley Ranch - Water System					1996 EXISTING SYSTEM & DEMAND			1A		
	Project 96014.03					ALL PRVs SET AT CURRENT PRESSURES					
	1996 Existing System - 23% Build-Out					PVC C = 130 Steel C = 110					
	File: svra3.XLS - Waterworks for Excel					Open All Possible Gate Valves					
						PRV 12 Replaced With Closed Gate Valve					
					PIPE TABLE						
			INPUT				OUTPUT			INPUT	
	Pipe	UpNode	DnNode	Length	Diameter	Roughness	Flow	Velocity	HeadLoss	Status	Description
				ft	in		US gpm	ft/sec	ft		
	2	3	4	450	2	130	7.71	0.79	0.87		
	4	5	4	600	2	130	-5.91	-0.60	0.71		
	6	16	6	1380	3	130	-4.11	-0.19	0.12		
	8	10	8	550	2	130	1.80	0.18	0.07		
	10	12	10	300	2	130	14.91	1.52	1.97		
	12	10	2	350	2	130	11.31	1.16	1.38		
	14	14	12	450	3	130	16.71	0.76	0.51		
	16	17	16	700	3	130	25.64	1.16	1.75		
	18	18	14	400	4	130	18.51	0.47	0.13		
	20	20	18	450	4	130	47.75	1.22	0.87		
	22	24	16	1700	4	130	-27.95	-0.71	1.23		
	24	24	20	600	4	130	0.00	0.00	0.00	C	Valve Closed (Required)
	26	22	20	575	3	130	51.88	2.36	5.29		
	28	23	26	1300	3	130	25.72	1.17	3.26		
	30	26	24	650	4	130	-23.82	-0.61	0.35		
	32	27	32	500	4	130	30.48	0.78	0.42		
	34	38	28	350	3	130	-4.83	-0.22	0.04		
	36	30	28	1000	4	130	16.03	0.41	0.26		
	38	32	30	850	3	130	18.57	0.84	1.17		
	40	34	32	400	2	130	-9.37	-0.96	1.11		
	42	38	34	1300	2	130	-2.65	-0.27	0.35		
	44	36	34	1100	2	130	-4.18	-0.43	0.89		
	46	38	36	400	2	130	4.94	0.50	0.34		
	48	40	36	350	2	130	-10.16	-1.04	1.13		
	50	42	40	800	2	130	-7.62	-0.78	1.14		
	52	46	42	600	2	130	-2.54	-0.26	0.10		
	54	44	42	250	2	130	-2.54	-0.26	0.08		
	56	48	36	700	3	130	3.58	0.16	0.05		
	58	50	48	300	4	130	-2.54	-0.06	0.00		
	60	48	28	1000	3	130	-8.66	-0.39	0.33		
	62	54	26	800	6	130	-12.39	-0.14	0.02		
	64	56	54	400	2	130	-4.13	-0.42	0.24		
	66	54	52	600	6	130	4.13	0.05	0.00		
	68	60	22	500	4	110	85.86	2.19	3.92		
	70	60	58	240	4	110	2.48	0.06	0.00		
	72	62	60	495	6	110	90.82	1.03	0.60		
	74	64	62	525	4	110	15.28	0.39	0.17		
	76	66	64	300	4	110	-2.48	-0.06	0.00		
	78	70	64	1200	4	110	20.24	0.52	0.65		Valve Closed
	80	70	88	450	4	110	-2.25	-0.06	0.00		Valve Closed
	82	68	62	900	6	110	78.02	0.89	0.82		
	84	72	68	820	6	110	82.75	0.94	0.83		
	86	72	70	1520	4	110	20.47	0.52	0.84		
	88	96	72	1850	6	130	105.70	1.20	2.17		
	90	78	74	1000	3	130	3.30	0.15	0.06		
	92	78	76	300	4	130	6.80	0.17	0.01		
	94	80	78	500	3	130	9.90	0.45	0.21		
	96	82	80	950	3	130	5.71	0.26	0.15		
	98	92	80	1100	2	130	7.49	0.77	2.02		
	100	84	82	350	3	130	1.47	0.07	0.00		
	102	86	84	1100	2	130	4.77	0.49	0.88		
	104	88	86	550	2	130	8.07	0.82	1.16		
	106	90	88	200	3	130	18.91	0.86	0.28		
	108	92	90	550	3	130	-14.09	-0.64	0.45		
	110	94	92	750	3	130	-3.30	-0.15	0.04		
	112	88	82	1100	2	130	7.53	0.77	2.06		
	114	96	90	20	4	130	36.30	0.93	323.29		PRVS -114 - N. Forest

116	98	96	600	6	130	143.38	1.63	1.24		
118	100	98	700	4	130	24.94	0.64	0.41		
120	102	100	1620	4	130	26.32	0.67	1.04		
122	104	102	700	4	130	27.70	0.71	0.50		
124	106	98	1420	6	130	119.82	1.36	2.10		
126	106	104	200	4	130	29.08	0.74	0.16		
128	108	108	220	6	130	150.28	1.71	0.50		
130	109	108	850	6	110	150.28	1.71	2.61		
132	111	110	450	6	130	151.97	1.72	1.04		
134	114	112	1600	6	130	-195.19	-2.22	5.85		
136	116	112	800	6	130	196.66	2.23	2.97		
138	118	118	400	6	110	298.53	3.39	4.38		
140	120	118	1130	8	110	300.00	3.40	12.48		
142	122	116	380	4	130	-100.41	-2.58	2.92		
144	126	122	375	4	130	-1.47	-0.04	0.00		
146	128	122	1200	4	130	-97.47	-2.49	8.74		
148	128	124	600	4	130	1.47	0.04	0.00		
150	130	128	150	4	130	-87.54	-2.24	0.89		
152	146	130	1050	4	130	14.83	0.38	0.23		
154	134	132	1300	4	130	1.47	0.04	0.00		
156	134	110	1475	6	130	-0.22	0.00	0.00		
158	136	134	400	6	130	9.71	0.11	0.01		
160	142	136	430	6	110	28.29	0.32	0.06		Valve Open
162	142	140	250	6	130	-46.87	-0.53	0.07		
164	140	130	710	6	110	-93.90	-1.07	0.91		Valve Broken Closed
166	144	140	440	8	110	-38.57	-0.44	0.11		
168	146	144	800	2	130	6.87	0.70	3.26		Valve Broken Closed
170	148	146	1000	2	130	30.16	3.08	24.26		
172	145	150	500	6	130	30.39	0.34	0.25		
174	149	150	300	2	130	4.15	0.42	0.18		
176	137	138	660	2	130	5.06	0.52	0.58		
178	143	192	2150	4	130	5.06	0.13	0.07		
180	162	150	680	6	110	-29.48	-0.33	0.10		
182	164	162	310	8	110	-19.36	-0.22	0.02		
184	162	160	720	2	130	5.06	0.52	0.64		
186	154	152	800	4	130	5.06	0.13	0.02		
188	154	148	1100	4	130	47.84	1.22	2.14		
190	156	154	200	4	130	57.96	1.48	0.55		
192	158	156	350	4	130	63.02	1.61	1.14		
194	168	158	1000	4	130	68.08	1.74	3.75		
196	168	166	100	6	130	0.00	0.00	0.00	C	LCV #2 Assumed Closed
198	166	170	400	8	130	448.28	2.86	1.68		
200	174	172	1700	6	130	231.06	2.62	8.50		
202	172	168	300	6	130	69.73	0.79	0.16		
204	173	176	700	6	110	152.54	1.73	2.21		
206	178	176	700	4	130	-7.15	-0.18	0.04		
208	180	176	750	6	110	-138.24	-1.57	1.97		
210	184	170	1500	8	130	-446.83	-2.85	6.26		
212	164	185	1425	6	110	14.30	0.16	0.06		
214	188	186	450	2	130	5.06	0.52	0.40		
216	190	188	750	4	130	6.71	0.17	0.04		
218	198	190	1100	2	130	9.41	0.96	3.09		
220	196	184	600	8	130	-439.48	-2.81	2.43		
222	198	196	410	8	130	-434.53	-2.77	1.63		
224	182	180	600	8	130	-131.09	-0.84	0.26		
226	194	182	830	8	110	-126.14	-1.43	1.84		
228	280	194	1080	6	110	-121.19	-1.38	2.23		
230	200	198	585	8	130	-291.93	-1.86	1.11		
232	202	200	585	8	130	-256.30	-1.64	0.87		
234	204	202	700	8	130	-231.34	-1.48	0.86		
236	208	204	200	4	130	-32.91	-0.84	0.20		
238	208	190	1875	4	130	4.45	0.11	0.04		
240	214	212	1200	4	130	-8.46	-0.22	0.09		
242	216	212	700	4	130	-1.33	-0.03	0.00		
244	218	216	900	4	130	7.13	0.18	0.05		
246	218	210	600	4	130	-15.59	-0.40	0.15		
248	212	210	600	4	130	-18.25	-0.47	0.20		
250	210	206	500	4	130	-42.30	-1.08	0.78		
252	208	204	500	8	130	-197.10	-1.26	0.46		

254	222	206	150	8	130	-154.80	-0.99	0.09	
256	224	222	150	6	130	0.00	0.00	0.00	
258	209	220	1250	1	130	10.00	4.09	114.84	
260	223	226	950	6	110	154.80	1.76	3.08	
262	228	226	3500	6	110	-154.80	-1.76	11.35	
264	228	230	150	6	110	125.00	1.42	126.89	PRV15 - 264
266	232	230	350	6	130	-125.00	-1.42	0.56	
268	234	232	100	8	110	0.00	0.00	0.00	
270	228	236	2400	6	110	19.80	0.22	212.76	PRV16 - 270 - Barberry
272	238	236	370	6	110	-6.73	-0.08	0.00	
274	240	236	375	6	130	-11.27	-0.13	0.01	
276	244	238	975	4	130	-4.93	-0.13	0.03	
278	242	240	750	4	130	-5.09	-0.13	0.02	
280	258	240	1050	4	130	-4.38	-0.11	0.02	
282	246	244	340	4	130	-6.85	-0.17	0.02	
284	248	248	525	4	130	-3.37	-0.09	0.01	
286	244	242	370	4	130	-1.92	-0.05	0.00	
288	258	242	525	4	130	-1.37	-0.03	0.00	
290	254	246	1650	4	130	-1.88	-0.04	0.01	
292	252	248	1050	4	130	-0.86	-0.02	0.00	
294	250	248	870	4	130	-0.91	-0.02	0.00	
296	252	250	310	4	130	0.89	0.02	0.00	
298	254	252	310	4	130	2.03	0.05	0.00	
300	256	254	310	4	130	2.15	0.05	0.00	
302	258	256	1205	4	130	3.95	0.10	0.02	
304	262	260	335	6	130	-9.45	-0.11	0.00	
306	264	262	475	6	130	-6.50	-0.07	0.00	
308	266	264	640	6	130	-3.97	-0.05	0.00	
310	268	266	700	4	130	-1.55	-0.04	0.00	
312	270	268	900	4	130	-0.23	-0.01	0.00	
314	272	270	400	4	130	1.09	0.03	0.00	
316	274	272	420	4	130	1.31	0.03	0.00	
318	276	274	590	4	130	1.42	0.04	0.00	
320	278	276	770	4	130	1.11	0.03	0.00	
322	278	260	900	4	130	-2.43	-0.06	0.01	
324	276	262	1050	4	130	-1.63	-0.04	0.00	
326	274	264	1125	4	130	-1.21	-0.03	0.00	
328	272	266	975	4	130	-1.10	-0.03	0.00	
330	302	204	2600	4	130	7.13	0.18	0.15	
332	300	202	1980	4	130	-16.50	-0.42	0.54	
334	298	200	1560	4	130	-30.68	-0.78	1.34	
336	302	300	590	4	130	-17.42	-0.44	0.18	
338	300	298	520	4	130	-11.63	-0.30	0.07	
340	298	296	300	4	130	14.10	0.36	0.06	
342	304	300	900	4	130	-1.83	-0.04	0.00	
344	308	302	1875	4	130	-1.21	-0.03	0.00	
346	304	296	750	4	130	-4.20	-0.11	0.02	
348	296	294	750	4	130	4.95	0.13	0.02	
350	308	306	620	4	130	-18.31	-0.47	0.20	
352	306	290	840	4	130	-39.28	-1.00	1.14	
354	292	290	840	8	130	121.10	0.77	0.31	
356	292	198	1920	8	110	-126.05	-0.80	1.05	
358	286	280	1275	4	110	-26.49	-0.68	1.13	
360	286	282	900	4	110	18.31	0.42	0.33	
362	282	280	1380	8	110	-84.52	-0.96	1.46	
364	284	282	525	4	110	-90.66	-2.31	4.55	
366	285	288	1090	4	110	70.29	1.79	5.90	
368	290	288	500	8	130	70.27	0.45	0.07	
370	314	288	1590	8	130	-130.38	-0.83	0.68	
372	312	306	1350	4	130	-3.69	-0.09	0.02	
374	310	308	540	4	130	-10.45	-0.27	0.06	
376	312	310	450	4	130	23.98	0.81	0.24	
378	314	312	450	4	130	31.85	0.81	0.41	
380	310	324	900	6	130	25.35	0.29	59.84	PRV 18 - 380 - Hardman
382	316	314	1125	6	110	-88.53	-1.00	1.30	
384	318	316	1050	4	130	-8.49	-0.22	0.08	
386	317	320	270	6	130	63.08	0.72	0.12	
388	322	320	835	6	130	-54.57	-0.62	0.30	
390	324	322	1520	4	130	-9.42	-0.24	0.15	Valve Closed

392	326	324	1650	6	130	-26.28	-0.30	0.16		
394	326	322	1356	4	130	-14.60	-0.37	0.29		
396	328	322	800	4	130	-22.06	-0.56	0.28		Valve Closed
398	330	328	2550	4	130	-6.55	-0.17	0.13		
400	330	328	2250	4	130	-7.01	-0.18	0.13		
402	332	330	2015	4	130	-5.32	-0.14	0.07		
404	334	332	1200	6	130	18.86	0.21	0.06		
406	336	334	2060	4	130	-5.53	-0.14	0.07		
408	336	332	450	6	130	-15.92	-0.18	0.02		
410	336	260	550	6	130	13.20	0.15	0.01		
412	306	304	690	4	130	5.72	0.15	0.03		
414	334	326	900	6	130	-32.63	-0.37	0.12		
133	114	111	1600	6	130	153.44	1.74	3.75		
135	112	111	20	6	130	0.00	0.00	0.00	C	Prater Tank Bypass
1	2	3	450	2	130	9.51	0.97	196.57		PRV1 - 1 - McGuinnes
15	18	17	30	3	130	27.44	1.25	199.52		PRV2 - 15 - Spruce Dr.
27	22	23	50	3	130	29.85	1.35	205.74		PRV3 - 27 - Kunz
31	26	27	50	6	130	33.02	0.37	132.06		PRV4 - 31
129	110	109	50	6	110	150.28	1.71	53.08		PRV6 - 129 - E. Forest
177	142	143	50	4	130	10.12	0.26	147.95		PRV7 - 177 - Vista West
175	136	137	50	2	130	10.12	1.03	118.22		PRV8 - 175 - Cedar Dr.
173	148	149	50	2	130	9.21	0.94	226.38		PRV9 - 173 - Redwood
171	144	145	500	6	130	35.45	0.40	201.29		PRV10 - 171 - Vista East (Uo
203	172	173	50	6	110	159.69	1.81	203.81		PRV11 - 203 - Lower Green
211	185	187	25	6	110	7.15	0.08	0.00		PRV12 - 211 - Vista East (Lo
257	208	209	50	2	130	20.00	2.04	63.33		PRV13 - 257
259	222	223	50	6	110	154.80	1.76	84.51		PRV14 - 259 - Vista
365	284	285	50	4	130	80.47	2.05	118.32		PRV17 - 365 - Canyon Pines
385	316	317	50	6	130	71.55	0.81	58.63		PRV19 - 385 - Middle Branch
213	187	184	100	6	110	0.00	0.00	0.00	C	Closed or Green Fills from Prat

NODE TABLE

	INPUT		OUTPUT			INPUT				
Node	Elevation	Demand	Pressure	HGL	XCoord	YCoord	Status	Description	Node	Pumps
	ft	US gpm	psi	ft						
2	6533.00	1.80	82.39	6723.31				Plat 1 - Zone 1		
4	8443.00	1.80	36.31	6526.87				Plat 1 - Zone 2		
6	6373.00	1.80	66.30	6526.16				Plat 1 - Zone 2		
8	6478.00	1.80	106.76	6724.62				Plat 1 - Zone 1		
10	6478.00	1.80	106.79	6724.69				Plat 1 - Zone 1		
12	6478.00	1.80	107.65	6726.67				Plat 1 - Zone 1		
14	6473.00	1.80	110.03	6727.17				Plat 1 - Zone 1		
16	6373.00	1.80	66.25	6526.04				Plat 1 - Zone 2		
18	6413.00	1.80	136.06	6727.31				Plat 1 - Zone 1		
20	6416.00	4.13	135.14	6728.18				Plat 2 - Zone 1		
22	6454.00	4.13	120.98	6733.47				Plat 2 - Zone 1		
24	6343.00	4.13	78.71	6524.82				Plat 2 - Zone 2		
26	6300.00	4.13	97.17	6524.47				Plat 2 - Zone 2		
28	6275.00	2.54	50.03	6390.57				Plat 3 - Zone 3		
30	6298.00	2.54	40.18	6390.82				Plat 3 - Zone 3		
32	6208.00	2.54	79.65	6391.99				Plat 3 - Zone 3		
34	6204.00	2.54	80.90	6390.88				Plat 3 - Zone 3		
36	6203.00	2.54	81.03	6390.19				Plat 3 - Zone 3		
38	6238.00	2.54	66.03	6390.53				Plat 3 - Zone 3		
40	6155.00	2.54	101.32	6389.06				Plat 3 - Zone 3		
42	6148.00	2.54	104.73	6387.92				Plat 3 - Zone 3		
44	6128.00	2.54	112.49	6387.85				Plat 3 - Zone 3		
46	6153.00	2.54	101.85	6387.82				Plat 3 - Zone 3		
48	6205.00	2.54	80.19	6390.23				Plat 3 - Zone 3		
50	6218.00	2.54	74.56	6390.23				Plat 3 - Zone 3		
52	6233.00	4.13	126.17	6524.45				Plat 2 - Zone 2		
54	6280.00	4.13	105.82	6524.45				Plat 2 - Zone 2		
56	6318.00	4.13	89.27	6524.21				Plat 2 - Zone 2		
58	6642.00	2.48	84.58	6737.39				Plat 15 - Zone 1		
60	6520.00	2.48	94.11	6737.39				Plat 15 - Zone 1		
62	6495.00	2.48	105.19	6737.99				Plat 15 - Zone 1		
64	6662.00	2.48	76.26	6738.16				Plat 15 - Zone 1		
66	6606.00	2.48	57.21	6738.15				Plat 15 - Zone 1		
68	6425.00	2.48	135.85	6738.81				Plat 15 - Zone 1		
70	6450.00	2.48	125.02	6738.81				Plat 15 - Zone 1		
72	6339.00	2.48	173.44	6739.64				Plat 15 - Zone 1		
74	8313.00	3.30	44.49	6415.77				Plat 20 - Zone 4		
76	6239.00	3.30	76.55	6415.82				Plat 20 - Zone 4		
78	6222.00	3.30	83.91	6415.84				Plat 20 - Zone 4		
80	6239.00	3.30	76.65	6416.05				Plat 20 - Zone 4		
82	6237.00	3.30	77.58	6416.20				Plat 20 - Zone 4		
84	6243.00	3.30	74.98	6416.20				Plat 20 - Zone 4		
86	6313.00	3.30	45.06	6417.08				Plat 20 - Zone 4		
88	6313.00	3.30	45.56	6418.24				Plat 20 - Zone 4		
90	6280.00	3.30	59.97	6418.53				PRV5 -114 - N. Forest - Plat 20 -Zone 4		
92	6313.00	3.30	45.49	6418.08				Plat 20 - Zone 4		
94	6313.00	3.30	45.47	6418.03				Plat 20 - Zone 4		
96	6300.00	1.38	191.26	6741.82				Plat 22 - Zone 1		
98	6366.00	1.38	167.99	6743.06				Plat 22 - Zone 1		
100	6360.00	1.38	166.00	6743.48				Plat 22 - Zone 1		
102	6480.00	1.38	114.51	6744.51				Plat 22 - Zone 1		
104	6470.00	1.38	119.05	6745.00				Plat 22 - Zone 1		
106	6450.00	1.38	127.77	6745.16				Plat 22 - Zone 1		
108	6400.00	0.00	149.63	6745.65				Trans from Prater Tank - Zone 5		
110	8529.00	1.47	117.90	6801.34				Plat 8 - Zone 5		
112	6555.00	1.47	111.24	6811.97				Plat 8 - Zone 5		
114	6800.00	0.00	2.65	6806.12				Prater Tank - 185000 gal		

116	6637.00	1.47	77.03	6814.94			Plat 8 - Zone 5
118	6672.00	1.47	63.77	6819.32			Plat 8 - Zone 5
120	6850.00	-300.00	-7.88	6831.79			Prater Zeroing Box
122	6707.00	1.47	45.46	6812.02			Plat 8 - Zone 5
124	6627.00	1.47	76.31	6803.28			Plat 8 - Zone 5
126	6717.00	1.47	41.13	6812.02			Plat 8 - Zone 5
128	6635.00	8.46	72.85	6803.28			Plat 7 - Zone 5
130	6640.00	8.46	70.30	6802.39			Plat 7 - Zone 5
132	6600.00	1.47	87.16	6801.34			Plat 8 - Zone 5
134	6540.00	8.46	113.14	6801.34			Plat 7 - Zone 5
136	6510.00	8.46	126.13	6801.35			Plat 7 - Zone 5
138	6452.00	5.06	99.81	6682.55			Plat 6 - Zone 6
140	6561.00	8.46	104.10	6801.47			Plat 7 - Zone 5
142	6538.00	8.46	114.03	6801.41			Plat 7 - Zone 5
144	6545.00	10.00	110.98	6801.36			SVRA Club House & Pool - Zone 5
146	6585.00	8.46	94.21	6802.62			Plat 7 - Zone 5
148	6500.00	8.46	141.51	6826.88			Plat 7 - Zone 5
150	6500.00	5.06	43.21	6599.82			Plat 6 - Zone 6
152	6450.00	5.06	164.07	6829.00			Plat 6 -Zone5
154	6505.00	5.06	140.27	6829.03			Plat 6 -Zone5
156	6545.00	5.06	123.20	6829.58			Plat 6 -Zone5
158	6505.00	5.06	141.00	6830.72			Plat 6 -Zone5
160	6495.00	5.06	45.06	6599.08			Plat 6 - Zone 6
162	6450.00	5.06	84.81	6599.72			Plat 6 - Zone 6
164	6429.00	5.06	73.90	6599.70			Plat 6 - Zone 6
166	6500.00	0.00	3.25	6507.50			Green Tank - 400000 gal - Zone 7
168	6480.00	1.65	153.45	6834.47			Plat 11 - Zone 5
170	6460.00	1.65	19.84	6505.82			Plat 11 - Zone 7
172	6460.00	1.65	162.18	6834.63			Plat 11 - Zone 5
174	6635.00	0.00	90.10	6843.12			Green PRV - 90psi - Zone 5
176	6400.00	7.15	98.97	6628.61			Plat 9 - Zone 8
178	6420.00	7.15	90.29	6628.57			Plat 9 - Zone 8
180	6325.00	7.15	130.58	6626.64			Plat 9 - Zone 8
182	6325.00	4.95	130.47	6626.38			Plat 12 - Zone 8
184	6325.00	7.15	75.57	6499.56			Plat 9 - Zone 7
186	6370.00	5.06	52.81	6491.98			Plat 6 - Zone 7
188	6315.00	1.65	76.79	6492.38			Plat 11 - Zone 7
190	6285.00	7.15	89.79	6492.42			Plat 9 - Zone 7
192	6380.00	5.06	118.35	6653.40			Plat 6 - Zone 6
194	6375.00	4.95	108.03	6624.54			Plat 12 - Zone 8
196	6325.00	4.95	74.52	6497.13			Plat 12 - Zone 7
198	6305.00	7.15	82.47	6495.51			Plat 9 - Zone 7
200	6275.00	4.95	94.98	6494.40			Plat 12 - Zone 7
202	6250.00	8.46	105.42	6493.53			Plat 10 - Zone 7
204	6220.00	8.46	118.04	6492.66			Plat 10 - Zone 7
206	6205.00	0.00	124.33	6492.20			Trans to Cedar Creek Dr. - Zone 7
208	6210.00	8.46	122.28	6492.47			Plat 10 - Zone 7
210	6220.00	8.46	117.50	6491.43			Plat 10 - Zone 7
212	6260.00	8.46	100.10	6491.23			Plat 10 - Zone 7
214	6300.00	8.46	82.74	6491.14			Plat 10 - Zone 7
216	6250.00	8.46	104.43	6491.23			Plat 10 - Zone 7
218	6210.00	8.46	121.77	6491.28			Plat 10 - Zone 7
220	6180.00	10.00	58.14	6314.30			LVI Facilities - Zone 9
222	6200.00	0.00	126.46	6492.12			Trans to Cedar Creek Dr. - Zone 7
224	6200.00	0.00	126.46	6492.12			SVRA Well #1 - Zone 7
226	6170.00	0.00	101.53	6404.53			Trans to Cedar Creek Dr. - Zone 10
228	6100.00	10.00	126.92	6393.17			Mary' Rest. and Sale's Office - Zone 10
230	6105.00	0.00	69.91	6266.49			PRV15 - 264 Trans to RV Park - Zone 12
232	6115.00	125.00	65.34	6265.93			RV Park - Zone 12
234	6112.00	0.00	66.64	5265.93			LVI Well #1 ,- Zone 12
236	6042.00	1.80	59.92	6180.42			PRV16 - 270 - Barberry - Plat 5 - Zone 13
238	6042.00	1.80	59.92	6180.42			Plat 5 - Zone 13
240	6049.00	1.80	56.89	6180.41			Plat 5 - Zone 13
242	6041.00	1.80	60.34	6180.39			Plat 5 - Zone 13
244	6034.00	0.00	63.37	6180.39			Plat 5 - Zone 13
246	6029.00	1.80	65.53	6180.37			Plat 5 - Zone 13
248	6027.00	1.80	66.39	6180.36			Plat 5 - Zone 13
250	6025.00	1.80	67.26	6180.36			Plat 5 - Zone 13
252	6033.00	1.80	63.79	6180.36			Plat 5 - Zone 13

254	6042.00	1.80	59.90	6180.38			Plat 5 - Zone 13
256	6048.00	1.80	57.30	6180.37			Plat 5 - Zone 13
258	6053.00	1.80	55.15	6180.39			Plat 5 - Zone 13
260	6200.00	1.32	100.67	6432.55			Plat 21 - Zone 11
262	6200.00	1.32	100.67	6432.55			Plat 21 - Zone 11
264	6192.00	1.32	104.13	6432.55			Plat 21 - Zone 11
266	6183.00	1.32	108.03	6432.54			Plat 21 - Zone 11
268	6168.00	1.32	114.52	6432.54			Plat 21 - Zone 11
270	6151.00	1.32	121.88	6432.54			Plat 21 - Zone 11
272	6156.00	1.32	119.72	6432.54			Plat 21 - Zone 11
274	6165.00	1.32	115.82	6432.54			Plat 21 - Zone 11
276	6173.00	1.32	112.36	6432.54			Plat 21 - Zone 11
278	6183.00	1.32	108.03	6432.56			Plat 21 - Zone 11
280	6400.00	10.18	98.24	6622.31			Plat 13 - Zone 8
282	6360.00	10.18	112.93	6620.86			Plat 13 - Zone 8
284	6340.00	10.18	119.61	6616.30			Plat 13 - Zone 8
286	6320.00	10.18	130.38	6621.18			Plat 13 - Zone 8
288	6308.00	10.18	80.55	6494.08			Plat 13 - Zone 7
290	6320.00	11.55	75.39	6494.15			Plat 14 - Zone 7
292	6325.00	4.95	73.36	6494.46			Plat 12 - Zone 7
294	6300.00	4.95	83.54	6492.98			Plat 12 - Zone 7
296	6280.00	4.95	92.21	6493.00			Plat 12 - Zone 7
298	6280.00	4.95	92.23	6493.06			Plat 12 - Zone 7
300	6250.00	9.08	105.19	6492.99			Plat 16 - Zone 7
302	6220.00	9.08	118.10	6492.81			Plat 16 - Zone 7
304	6260.00	11.55	100.86	6492.98			Plat 14 - Zone 7
306	6265.00	11.55	98.71	6493.01			Plat 14 - Zone 7
308	6240.00	9.08	109.44	6492.81			Plat 16 - Zone 7
310	6230.00	9.08	113.74	6492.74			Plat 16 - Zone 7
312	6240.00	11.56	109.52	6492.99			Plat 14 - Zone 7
314	6203.00	10.00	125.72	6493.40			Silo Recreation Center - Zone 7
316	6272.00	8.49	95.28	6492.10			Plat 17 - Zone 7
318	6300.00	8.49	83.13	6492.02			Plat 17 - Zone 7
320	6280.00	8.49	66.39	6433.35			Plat 17 - Zone 11
322	6262.00	8.49	74.05	6433.05			Plat 17 - Zone 11
324	6228.00	8.49	88.70	6432.91			PRV 18 - 380 - Hardman - Plat 17 - Zone 11
326	6226.00	8.25	89.51	6432.76			Plat 18 - Zone 11
328	6285.00	8.49	83.97	6432.78			Plat 17 - Zone 11
330	6255.00	8.25	76.90	6432.66			Plat 18 - Zone 11
332	6228.00	8.25	88.58	6432.58			Plat 18 - Zone 11
334	6225.00	8.25	89.89	6432.84			Plat 18 - Zone 11
336	6220.00	8.25	92.02	6432.57			Plat 18 - Zone 11
111	6555.00	1.47	107.09	6802.38			Plat 8 - Zone 5
3	6493.00	1.80	15.04	6527.75			PRV1 - 1 - McGuinnes - Plat 1 - Zone 2
17	6413.00	1.80	49.89	6527.79			PRV2 - 15 - Spruce Dr. - Plat 1 - Zone 2
23	6464.00	4.13	31.92	6527.73			PRV3 - 27 - Kunz - Plat 2 - Zone 2
27	6300.00	2.54	40.01	6392.41			PRV4 - 31 - Plat 3 - Zone 3
109	6529.00	0.00	94.92	6748.26			PRV6 - 129 - E. Forest - Trans to Plat 22 - Zone 1
143	6538.00	5.06	49.98	6653.46			PRV7 - 177 - Vista West - Plat 6 - Zone 6
137	6510.00	5.06	74.95	6683.13			PRV8 - 175 - Cedar Dr. - Plat 6 - Zone 6
149	6500.00	5.06	43.29	6600.01			PRV9 - 173 - Redwood - Plat 6 - Zone 6
145	6480.00	5.06	51.98	6600.07			PRV10 - 171 - Vista East (Upper) - Plat 6 - Zone 6
173	6460.00	7.15	73.95	6630.82			PRV11 - 203 - Lower Green - Plat 9 - Zone 8
185	6325.00	7.15	118.89	6599.64			Plat 9 - Zone 6
209	6210.00	10.00	94.87	6428.14			PRV13 - 257 - Maint. & LVI I" Service - Zone 9
223	6200.00	0.00	89.87	6407.61			PRV14 - 259 - Vista - Trans to Cedar Cr. Dr. - Zone
285	6340.00	10.18	69.26	6499.98			PRV17 - 365 - Canyon Pines - Plat 13 - Zone 7
317	6272.00	8.49	69.90	6433.47			PRV19 - 385 - Middle Branch - Plat 17 - Zone 11
187	6325.00	7.15	118.89	6599.64			PRV12 - 211 - Vista East (Lower) - Plat 9 - Zone 6

FIXED GRADE SOURCES TABLE

	INPUT		OUTPUT			INPUT
Node	Top Of Water	stimate	Actual	Inflow	Status	Description
	ft			US gpm		
166	6507.50	0.30	0.70	-448.28		Green Tank - 400000 gal
114	6808.00	0.30	-0.07	41.75		Prater Tank - 185000 gal
174	6843.00	0.3	0.36	-231.06		Upper Green PRV - 90 psi

REDUCING (PRV) TABLE

		INPUT			OUTPUT			INPUT
Pipe	Source	Pressure	OpenK	CKV	PRVLoss	KVState	Status	Description
		psi/ft			ft			
203	174	74.00	50.00	Yes	203.63	Open		PRV11 - Lower Green
365	174	69.30	20.00	Yes	116.07	Open		PRV17 - Canyon Pine
380	166	88.83	20.00	Yes	59.76	Open		PRV18 - Hardman
385	166	70.00	20.00	Yes	58.60	Open		PRV19 - Middle BR.
259	166	90.00	20.00	Yes	84.35	Open		PRV14 - Vista
129	114	95.00	20.00	Yes	52.92	Open		PRV6 - E. Forest
264	166	70.00	50.00	Yes	126.36	Open		PRV15 - RV Park
270	166	60.00	100.00	Yes	212.58	Open		PRV16 - Barberry
114	114	60.00	100.00	Yes	323.27	Open		PRV5 - N. Forest
27	114	31.90	50.00	Yes	205.58	Open		PRV3 - Kunz
15	114	49.70	50.00	Yes	199.43	Open		PRV2 - Spruce Dr.
1	114	15.00	50.00	Yes	194.28	Open		PRV1 - McGuinnes
31	114	40.00	50.00	Yes	132.05	Open		PRV4 - Plat 3
257	166	95.00	0.00	Yes	62.76	Open		PRV13 - Maint.
177	114	50.00	20.00	Yes	147.94	Open		PRV7 - Vista West
175	114	75.00	50.00	Yes	118.06	Open		PRV8 - Cedar Dr.
173	114	43.30	50.00	Yes	226.74	Open		PRV9 - Redwood
171	114	52.00	50.00	Yes	201.21	Open		PRV10 - Vista E. (Upp
								PRV12 - Vista E. (Low

Star Valley Ranch - Water System | 1996 EXISTING SYSTEM & DEMAND | 2
Project 96014.03 | SOME PRVs SET AT REVISED PRESSURES
1996 Existing System - 23% Build-Out | PVC C = 130 | Steel C = 110
File: svra4.XLS - Waterworks for Excel | Open All Possible Gate Valves
PRV12 Replaced With Closed Gate Valve

PIPE TABLE

	INPUT					OUTPUT			INPUT	
Pipe	UpNode	DnNode	Length	Diameter	Roughness	Flow	Velocity	HeadLoss	Status	Description
			ft	in		US gpm	ft/sec	ft		
2	3	4	450	2	130	7.70	0.79	0.88		
4	6	4	600	2	130	-5.90	-0.60	0.71		
6	16	6	1380	3	130	-4.10	-0.19	0.12		
8	10	8	550	2	130	1.80	0.18	0.07		
10	12	10	300	2	130	14.90	1.52	1.97		
12	10	2	350	2	130	11.30	1.15	1.38		
14	14	12	450	3	130	16.70	0.76	0.51		
16	17	16	700	3	130	25.65	1.16	1.75		
18	18	14	400	4	130	18.50	0.47	0.13		
20	20	18	450	4	130	47.75	1.22	0.87		
22	24	16	1700	4	130	-27.95	-0.71	1.23		
24	24	20	600	4	130	0.00	0.00	0.00	C	Valve Closed (Required)
26	22	20	575	3	130	51.88	2.36	5.29		
28	23	26	1300	3	130	25.72	1.17	3.26		
30	26	24	650	4	130	-23.82	-0.61	0.35		
32	27	32	500	4	130	30.48	0.78	0.42		
34	38	28	350	3	130	-4.83	-0.22	0.04		
36	30	28	1000	4	130	16.03	0.41	0.26		
38	32	30	850	3	130	18.57	0.84	1.17		
40	34	32	400	2	130	-9.37	-0.96	1.11		
42	38	34	1300	2	130	-2.85	-0.27	0.35		
44	36	34	1100	2	130	-4.18	-0.43	0.69		
46	38	38	400	2	130	4.94	0.50	0.34		
48	40	36	350	2	130	-10.16	-1.04	1.13		
50	42	40	600	2	130	-7.62	-0.78	1.14		
52	46	42	400	2	130	-2.54	-0.26	0.10		
54	44	42	250	2	130	-2.54	-0.26	0.06		
56	48	38	700	3	130	3.58	0.16	0.05		
58	50	48	300	4	130	-2.54	-0.06	0.00		
60	48	28	1000	3	130	-8.66	-0.39	0.33		
62	54	26	800	6	130	-12.39	-0.14	0.02		
64	56	54	400	2	130	-4.13	-0.42	0.24		
66	54	52	600	6	130	4.13	0.05	0.00		
68	80	22	500	4	110	85.86	2.19	3.92		
70	80	58	240	4	110	2.48	0.06	0.00		
72	62	60	495	6	110	90.82	1.03	0.60		
74	64	62	525	4	110	15.28	0.39	0.17		
76	66	64	300	4	110	-2.48	-0.06	0.00		
78	70	64	1200	4	110	20.24	0.52	0.65		Valve Closed
80	70	68	450	4	110	-2.25	-0.06	0.00		Valve Closed
82	68	62	900	6	110	78.02	0.89	0.82		
84	72	68	820	6	110	82.75	0.94	0.83		
86	72	70	1520	4	110	20.47	0.52	0.84		
88	96	72	1850	6	130	105.70	1.20	2.17		
90	76	74	1000	3	130	3.30	0.15	0.06		
92	78	76	300	4	130	8.60	0.17	0.01		
94	80	78	500	3	130	9.90	0.45	0.21		
96	82	80	960	3	130	5.71	0.26	0.15		
98	92	80	1100	2	130	7.49	0.77	2.02		
100	84	82	350	3	130	1.47	0.07	0.00		
102	86	84	1100	2	130	4.77	0.49	0.88		
104	88	86	550	2	130	8.07	0.82	1.16		
106	90	88	200	3	130	18.91	0.86	0.28		
108	92	90	550	3	130	-14.09	-0.64	0.45		
110	94	92	750	3	130	-3.30	-0.15	0.04		
112	88	82	1100	2	130	7.53	0.77	2.05		
114	96	90	20	4	130	36.30	0.93	272.54		PRV5 -114 - N. Forest

116	98	96	600	8	130	143.38	1.63	1.24		
118	100	98	700	4	130	24.94	0.64	0.41		
120	102	100	1620	4	130	26.32	0.67	1.04		
122	104	102	700	4	130	27.70	0.71	0.50		
124	106	98	1420	6	130	119.82	1.36	2.10		
126	106	104	200	4	130	29.08	0.74	0.16		
128	108	106	220	8	130	150.28	1.71	0.50		
130	109	108	850	6	110	150.28	1.71	2.61		
132	111	110	450	6	130	180.90	2.05	1.43		
134	114	112	1600	6	130	-187.59	-2.13	5.44		
136	116	112	800	6	130	189.06	2.15	2.76		
138	118	116	400	8	110	298.53	3.39	4.38		
140	120	118	1130	6	110	300.00	3.40	12.48		
142	122	116	380	4	130	-108.00	-2.76	3.35		
144	126	122	375	4	130	-1.47	-0.04	0.00		
146	128	122	1200	4	130	-105.06	-2.68	10.04		
148	128	124	600	4	130	1.47	0.04	0.00		
150	130	128	150	4	130	-95.13	-2.43	1.04		
152	146	130	1050	4	130	-17.34	-0.44	0.31		
154	134	132	1300	4	130	1.47	0.04	0.00		
156	134	110	1475	6	130	-29.15	-0.33	0.18		
158	136	134	400	6	130	-19.22	-0.22	0.02		
160	142	136	430	6	110	-0.64	-0.01	0.00		Valve Open
162	142	140	250	8	130	-17.94	-0.20	0.01		
164	140	130	710	6	110	-69.33	-0.79	0.52		Valve Broken Closed
166	144	140	440	6	110	-42.93	-0.49	0.13		
168	146	144	300	2	130	3.40	0.35	0.34		Valve Broken Closed
170	148	146	1000	2	130	-5.48	-0.56	1.03		
172	145	150	500	8	130	31.26	0.35	0.19		
174	149	150	300	2	130	3.28	0.33	0.12		
176	137	138	660	2	130	5.06	0.52	0.58		
178	143	192	2150	4	130	5.06	0.13	0.07		
180	162	150	680	6	110	-29.48	-0.33	0.10		
182	164	162	310	6	110	-19.36	-0.22	0.02		
184	162	160	720	2	130	5.06	0.52	0.64		
186	154	152	800	4	130	5.06	0.13	0.02		
188	154	148	1100	4	130	11.31	0.29	0.15		
190	156	154	200	4	130	21.43	0.55	0.09		
192	158	156	350	4	130	26.49	0.68	0.23		
194	168	158	1000	4	130	31.55	0.81	0.90		
196	168	166	100	8	130	0.00	0.00	0.00	C	LCV #2 Assumed Closed
198	166	170	400	8	130	448.38	2.86	1.68		
200	174	172	1700	8	130	194.44	2.21	6.17		
202	172	168	300	6	130	33.20	0.38	0.04		
204	173	176	700	6	110	152.44	1.73	2.21		
206	178	176	700	4	130	-7.15	-0.18	0.04		
208	180	178	750	6	110	-138.14	-1.57	1.97		
210	184	170	1500	8	130	-446.73	-2.85	6.26		
212	164	185	1425	6	110	14.30	0.16	0.06		
214	188	186	450	2	130	5.06	0.52	0.40		
216	190	188	750	4	130	6.71	0.17	0.04		
218	198	190	1100	2	130	9.52	0.97	3.15		
220	196	184	600	8	130	-439.58	-2.81	2.43		
222	198	196	410	8	130	-434.63	-2.77	1.63		
224	182	180	600	8	130	-130.99	-0.84	0.26		
226	194	182	830	6	110	-126.04	-1.43	1.84		
228	280	194	1080	6	110	-121.09	-1.37	2.22		
230	200	198	585	8	130	-296.42	-1.89	1.14		
232	202	200	585	8	130	-259.80	-1.66	0.89		
234	204	202	700	8	130	-233.79	-1.49	0.88		
236	208	204	200	4	130	-32.80	-0.84	0.19		
238	208	190	1875	4	130	4.34	0.11	0.04		
240	214	212	1200	4	130	-8.46	-0.22	0.09		
242	216	212	700	4	130	-1.33	-0.03	0.00		
244	218	216	900	4	130	7.13	0.18	0.05		
246	218	210	600	4	130	-15.59	-0.40	0.15		
248	212	210	600	4	130	-18.25	-0.47	0.20		
250	210	208	500	4	130	-42.30	-1.08	0.78		
252	206	204	500	8	130	-197.10	-1.26	0.46		

254	222	206	150	8	130	-154.80	-0.99	0.09	
256	224	222	150	6	130	0.00	0.00	0.00	
258	209	220	1250	1	130	10.00	4.09	114.84	
260	223	226	950	6	110	154.80	1.76	3.08	
262	228	226	3500	6	110	-154.80	-1.76	11.35	
264	228	230	150	8	110	125.00	1.42	57.47	PRV15 - 264
266	232	230	350	6	130	-125.00	-1.42	0.56	
268	234	232	100	6	110	0.00	0.00	0.00	
270	228	236	2400	6	110	19.80	0.22	143.54	PRV16 - 270 - Barberry
272	238	236	370	6	110	-6.73	-0.08	0.00	
274	240	236	375	8	130	-11.27	-0.13	0.01	
276	244	238	975	4	130	-4.93	-0.13	0.03	
278	242	240	750	4	130	-5.09	-0.13	0.02	
280	258	240	1050	4	130	-4.38	-0.11	0.02	
282	246	244	340	4	130	-6.88	-0.17	0.02	
284	248	246	525	4	130	-3.37	-0.09	0.01	
286	244	242	370	4	130	-1.92	-0.05	0.00	
288	258	242	525	4	130	-1.37	-0.03	0.00	
290	254	246	1650	4	130	-1.68	-0.04	0.01	
292	252	248	1050	4	130	-0.66	-0.02	0.00	
294	250	248	870	4	130	-0.91	-0.02	0.00	
296	252	250	310	4	130	0.89	0.02	0.00	
298	254	252	310	4	130	2.03	0.05	0.00	
300	256	254	310	4	130	2.15	0.05	0.00	
302	258	256	1205	4	130	3.95	0.10	0.02	
304	262	260	335	6	130	-9.46	-0.11	0.00	
306	264	262	475	6	130	-6.50	-0.07	0.00	
308	266	264	640	6	130	-3.97	-0.05	0.00	
310	268	266	700	4	130	-1.55	-0.04	0.00	
312	270	268	900	4	130	-0.23	-0.01	0.00	
314	272	270	400	4	130	1.09	0.03	0.00	
316	274	272	420	4	130	1.31	0.03	0.00	
318	276	274	590	4	130	1.42	0.04	0.00	
320	278	276	770	4	130	1.11	0.03	0.00	
322	278	260	900	4	130	-2.43	-0.06	0.01	
324	276	262	1050	4	130	-1.83	-0.04	0.00	
326	274	264	1125	4	130	-1.21	-0.03	0.00	
328	272	266	975	4	130	-1.10	-0.03	0.00	
330	302	204	2600	4	130	4.57	0.12	0.07	
332	300	202	1980	4	130	-17.55	-0.45	0.60	
334	298	200	1560	4	130	-31.67	-0.81	1.42	
336	302	300	590	4	130	-19.24	-0.49	0.21	
338	300	298	520	4	130	-12.21	-0.31	0.08	
340	298	296	300	4	130	14.50	0.37	0.06	
342	304	300	900	4	130	-1.44	-0.04	0.00	
344	308	302	1875	4	130	-5.59	-0.14	0.07	
346	304	296	780	4	130	-4.60	-0.12	0.02	
348	296	294	750	4	130	4.95	0.13	0.02	
350	308	306	620	4	130	-22.67	-0.58	0.30	
352	306	290	840	4	130	-43.04	-1.10	1.35	
354	292	290	840	8	130	116.69	0.74	0.29	
356	292	198	1920	8	110	-121.54	-0.78	0.98	
358	286	280	1275	4	110	-26.47	-0.68	1.13	
360	286	282	900	4	110	16.29	0.42	0.33	
362	282	280	1380	6	110	-84.44	-0.96	1.46	
364	284	282	525	4	110	-90.55	-2.31	4.54	
366	285	288	1090	4	110	70.19	1.79	5.89	
368	290	288	500	8	130	62.00	0.40	0.05	
370	314	288	1590	8	130	-122.01	-0.78	0.60	
372	312	306	1350	4	130	-3.31	-0.08	0.02	
374	310	308	540	4	130	-19.18	-0.49	0.19	
376	312	310	450	4	130	34.48	0.88	0.48	
378	314	312	450	4	130	42.71	1.09	0.71	
380	310	324	900	8	130	44.58	0.51	105.22	PRV 18 - 380 - Hardman
382	316	314	1125	6	110	-69.30	-0.79	0.82	
384	318	316	1050	4	130	-8.49	-0.22	0.08	
386	317	320	270	6	130	43.83	0.50	0.06	
388	322	320	835	6	130	-35.34	-0.40	0.15	
390	324	322	1520	4	130	4.42	0.11	0.04	Valve Closed

392	328	324	1650	6	130	-31.67	-0.36	0.21		
394	326	322	1356	4	130	-10.94	-0.28	0.17		
396	328	322	600	4	130	-20.34	-0.52	0.24		Valve Closed
398	330	328	2550	4	130	-5.72	-0.15	0.10		
400	330	328	2250	4	130	-6.12	-0.16	0.10		
402	332	330	2015	4	130	-3.60	-0.09	0.03		
404	334	332	1200	6	130	20.27	0.23	0.07		
406	336	334	2060	4	130	-5.83	-0.15	0.08		
408	336	332	450	6	130	-15.62	-0.18	0.02		
410	336	260	550	6	130	13.20	0.15	0.01		
412	306	304	890	4	130	5.50	0.14	0.02		
414	334	326	900	6	130	-34.35	-0.39	0.13		
133	114	111	1600	6	130	182.37	2.07	5.16		
135	112	111	20	6	130	0.00	0.00	0.00	C	Bypass Prater Tank
1	2	3	450	2	130	9.50	0.97	144.83		PRV1 - 1 - McGuinnes
15	18	17	30	3	130	27.45	1.25	148.78		PRV2 - 15 - Spruce Dr.
27	22	23	50	3	130	29.85	1.36	155.00		PRV3 - 27 - Kunz
31	26	27	50	6	130	33.02	0.37	132.05		PRV4 - 31
129	110	109	50	6	110	150.28	1.71	102.02		PRV6 - 129 - E. Forest
177	142	143	50	4	130	10.12	0.26	145.90		PRV7 - 177 - Vista West
175	136	137	50	2	130	10.12	1.03	116.23		PRV8 - 175 - Cedar Dr.
173	148	149	50	2	130	8.34	0.85	198.54		PRV9 - 173 - Redwood
171	144	145	500	6	130	36.32	0.41	199.16		PRV10 - 171 - Vista East Up
203	172	173	50	6	110	159.59	1.81	236.03		PRV11 - 203 - Lower Green
211	185	187	25	6	110	7.15	0.08	0.00		PRV12 - 211 - Vista East Lo
257	208	209	50	2	130	20.00	3.04	63.25		PRV13 - 257
259	222	223	50	6	110	154.80	1.76	153.64		PRV14 - 259 - Vista
365	284	285	50	4	130	80.37	2.05	49.45		PRV17 - 365 - Canyon Pines
385	316	317	50	6	130	52.32	0.59	105.42		PRV19 - 385 - Middle Branch
213	187	184	100	6	110	0.00	0.00	0.00	C	Closed or Green Fills from Prat

NODE TABLE

INPUT			OUTPUT		INPUT					
Node	Elevation	Demand	Pressure	HGL	XCoord	YCoord	Status	Description	Node	Pumps
	ft	US gpm	psi	ft						
2	6533.00	1.80	60.46	6672.65				Plat 1 - Zone 1		
4	6443.00	1.80	36.34	6526.96				Plat 1 - Zone 2		
6	6373.00	1.80	66.34	6526.24				Plat 1 - Zone 2		
8	6478.00	1.80	84.83	6673.96				Plat 1 - Zone 1		
10	6478.00	1.80	84.86	6674.03				Plat 1 - Zone 1		
12	6478.00	1.80	85.72	6676.00				Plat 1 - Zone 1		
14	6473.00	1.80	88.10	6676.51				Plat 1 - Zone 1		
16	6373.00	1.80	66.29	6526.12				Plat 1 - Zone 2		
18	6413.00	1.80	114.13	6676.65				Plat 1 - Zone 1		
20	6416.00	4.13	113.21	6677.52				Plat 2 - Zone 1		
22	6454.00	4.13	99.05	6682.81				Plat 2 - Zone 1		
24	6343.00	4.13	78.74	6524.90				Plat 2 - Zone 2		
26	6300.00	4.13	97.21	6524.55				Plat 2 - Zone 2		
28	6275.00	2.54	50.06	6390.65				Plat 3 - Zone 3		
30	6298.00	2.54	40.22	6390.91				Plat 3 - Zone 3		
32	6208.00	2.54	79.68	6392.07				Plat 3 - Zone 3		
34	6204.00	2.54	80.93	6390.96				Plat 3 - Zone 3		
36	6203.00	2.54	81.07	6390.27				Plat 3 - Zone 3		
38	6238.00	2.54	66.06	6390.61				Plat 3 - Zone 3		
40	6155.00	2.54	101.36	6389.14				Plat 3 - Zone 3		
42	6146.00	2.54	104.76	6388.00				Plat 3 - Zone 3		
44	6128.00	2.54	112.53	6387.94				Plat 3 - Zone 3		
46	6153.00	2.54	101.69	6387.90				Plat 3 - Zone 3		
48	6205.00	2.54	80.22	6390.31				Plat 3 - Zone 3		
50	6218.00	2.54	74.59	6390.31				Plat 3 - Zone 3		
52	6233.00	4.13	126.20	6524.53				Plat 2 - Zone 2		
54	6280.00	4.13	105.86	6524.53				Plat 2 - Zone 2		
56	6318.00	4.13	89.30	6524.29				Plat 2 - Zone 2		
58	6542.00	2.48	62.65	6686.73				Plat 15 - Zone 1		
60	6520.00	2.48	72.18	6686.73				Plat 15 - Zone 1		
62	6495.00	2.48	83.26	6687.33				Plat 15 - Zone 1		
64	6562.00	2.48	54.33	6687.50				Plat 15 - Zone 1		
66	6606.00	2.48	35.28	6687.49				Plat 15 - Zone 1		
68	6425.00	2.48	113.92	6688.15				Plat 15 - Zone 1		
70	6450.00	2.48	103.09	6688.14				Plat 15 - Zone 1		
72	6339.00	2.48	151.51	6688.98				Plat 15 - Zone 1		
74	6313.00	3.30	44.52	6415.85				Plat 20 - Zone 4		
76	6239.00	3.30	76.58	6415.91				Plat 20 - Zone 4		
78	6222.00	3.30	83.95	6415.92				Plat 20 - Zone 4		
80	6239.00	3.30	76.68	6416.14				Plat 20 - Zone 4		
82	6237.00	3.30	77.61	6416.28				Plat 20 - Zone 4		
84	6243.00	3.30	75.02	6416.29				Plat 20 - Zone 4		
86	6313.00	3.30	45.09	6417.17				Plat 20 - Zone 4		
88	6313.00	3.30	45.60	6418.33				Plat 20 - Zone 4		
90	6280.00	3.30	60.01	6418.61				PRV5 -114 - N. Forest - Plat 20 -Zone 4		
92	6313.00	3.30	45.52	6418.18				Plat 20 - Zone 4		
94	6313.00	3.30	45.51	6418.12				Plat 20 - Zone 4		
96	6300.00	1.38	169.33	6691.15				Plat 22 - Zone 1		
98	6355.00	1.38	146.06	6692.39				Plat 22 - Zone 1		
100	6360.00	1.38	144.07	6692.80				Plat 22 - Zone 1		
102	6480.00	1.38	92.37	6693.85				Plat 22 - Zone 1		
104	6470.00	1.38	97.12	6694.34				Plat 22 - Zone 1		
106	6450.00	1.38	105.84	6694.50				Plat 22 - Zone 1		
108	6400.00	0.00	127.70	6694.99				Trans from Prater Tank - Zone 5		
110	6529.00	1.47	117.15	6799.62				Plat 8 - Zone 5		
112	6555.00	1.47	111.10	6811.64				Plat 8 - Zone 5		
114	6800.00	0.00	2.69	6806.21				Prater Tank - 185000 gal		

116	6837.00	1.47	76.80	6814.40		Plat 8 Zone 5
118	6872.00	1.47	63.54	6818.78		Plat 8 - Zone 5
120	6850.00	-300.00	-8.11	6831.26		Prater Zeroing Box
122	6707.00	1.47	45.05	6811.06		Plat 8 - Zone 5
124	6827.00	1.47	75.33	6801.02		Plat 8 - Zone 5
126	6717.00	1.47	40.72	6811.06		Plat 8 - Zone 5
128	6635.00	8.46	71.87	6801.02		Plat 7 - Zone 5
130	6640.00	8.48	69.25	6799.97		Plat 7 - Zone 5
132	6600.00	1.47	88.35	6799.46		Plat 8 - Zone 5
134	6540.00	8.46	112.32	6799.46		Plat 7 - Zone 5
136	6510.00	8.46	125.30	6799.44		Plat 7 Zone 5
138	6452.00	5.06	99.84	6682.64		Plat 6 - Zone 6
140	6561.00	8.46	103.23	6799.45		Plat 7 - Zone 5
142	6538.00	8.46	113.18	6799.44		Plat 7 - Zone 5
144	6545.00	10.00	110.10	6799.32		SVRA Club House & Pool - Zone 9
146	6585.00	8.46	92.93	6799.66		Plat 7 - Zone 5
148	6500.00	8.46	129.28	6798.63		Plat 7 - Zone 5
150	6500.00	5.06	43.28	6599.97		Plat 6 - Zone 6
152	6450.00	5.06	150.98	6798.75		Plat 6 -Zone5
154	6505.00	5.06	127.18	6798.78		Plat 6 -Zone5
156	6545.00	5.06	109.90	6798.86		Plat 6 -Zone5
158	6505.00	5.06	127.31	6799.09		Plat 6 -Zone5
160	6495.00	5.06	45.12	6599.23		Plat 6 - Zone 6
162	6450.00	5.06	64.88	6599.87		Plat 6 - Zone 6
164	6429.00	5.06	73.96	6599.85		Plat 6 - Zone 6
166	6500.00	0.00	3.25	6507.50		Green Tank - 400000 gal - Zone 7
168	6480.00	1.65	138.53	6799.99		Plat 11 Zone 5
170	6460.00	1.65	19.84	6505.82		Plat 11 - Zone 7
172	6460.00	1.65	147.20	6800.04		Plat 11 - Zone 5
174	6835.00	0.00	74.12	6806.21		Green PRV - 90psi - Zone 5
176	6400.00	7.15	70.05	6561.80		Plat 9 - Zone 8
178	6420.00	7.15	61.37	6561.76		Plat 9 - Zone 8
180	6325.00	7.15	101.66	6559.83		Plat 9 - Zone 8
182	6325.00	4.95	101.55	6559.58		Plat 12 - Zone 8
184	6325.00	7.15	75.57	6499.56		Plat 9 - Zone 7
186	6370.00	5.06	52.77	6491.91		Plat 6 - Zone 7
188	6315.00	1.65	76.76	6492.31		Plat 11 - Zone 7
190	6285.00	7.15	89.76	6492.35		Plat 9 - Zone 7
192	6380.00	5.06	118.39	6653.48		Plat 6 - Zone 6
194	6375.00	4.95	79.11	6557.74		Plat 12 - Zone 8
196	6325.00	4.95	74.51	6497.13		Plat 12 - Zone 7
198	6305.00	7.15	82.47	6495.50		Plat 9 - Zone 7
200	6275.00	4.95	94.98	6494.36		Plat 12 - Zone 7
202	6250.00	8.46	105.40	6493.47		Plat 10 - Zone 7
204	6220.00	8.46	118.00	6492.59		Plat 10 - Zone 7
206	6205.00	0.00	124.30	6492.13		Trans to Cedar Creek Dr. - Zone 7
208	6210.00	8.46	122.25	6492.39		Plat 10 - Zone 7
210	6220.00	8.46	117.47	6491.35		Plat 10 - Zone 7
212	6260.00	8.46	100.07	6491.15		Plat 10 - Zone 7
214	6300.00	8.46	82.71	6491.06		Plat 10 - Zone 7
216	6250.00	8.46	104.40	6491.15		Plat 10 - Zone 7
218	6210.00	8.46	121.73	6491.20		Plat 10 - Zone 7
220	6180.00	10.00	58.14	6314.30		LVI Facilities - Zone 9
222	6200.00	0.00	126.42	6492.04		Trans to Cedar Creek Dr. - Zone 7
224	6200.00	0.00	126.42	6492.04		SVRA Well #1 - Zone 7
226	6170.00	0.00	71.57	6335.32		Trans to Cedar Creek Dr. - Zone 10
228	6100.00	10.00	96.96	6323.97		Mary' Rest. and Sale's Office - Zone 10
230	6105.00	0.00	69.92	6288.50		PRV15 - 264 Trans to RV Park - Zone 12
232	6115.00	125.00	65.34	6285.94		RV Park - Zone 12
234	6112.00	0.00	66.64	6265.94		LVI Well #1 ,- Zone 12
236	6042.00	1.80	59.93	6180.44		PRV16 - 270 - Barberry - Plat 5 - Zone 13
238	6042.00	1.80	59.93	6180.43		Plat 5 - Zone 13
240	6049.00	1.80	56.90	6180.43		Plat 5 - Zone 13
242	6041.00	1.80	60.35	6180.41		Plat 5 - Zone 13
244	6034.00	0.00	53.38	6180.40		Plat 5 - Zone 13
246	6029.00	1.80	55.54	6180.39		Plat 5 - Zone 13
248	6027.00	1.80	56.40	6180.38		Plat 5 - Zone 13
250	6025.00	1.80	57.26	6180.38		Plat 5 - Zone 13
252	6033.00	1.80	53.80	6180.38		Plat 5 - Zone 13

254	6042.00	1.80	59.90	6180.38		Plat 5 - Zone 13
256	6048.00	1.80	57.31	6180.38		Plat 5 - Zone 13
258	6053.00	1.80	55.15	6180.41		Plat 5 - Zone 13
260	6200.00	1.32	80.84	6386.73		Plat 21 - Zone 11
262	6200.00	1.32	80.83	6386.73		Plat 21 - Zone 11
264	6192.00	1.32	84.30	6386.72		Plat 21 - Zone 11
266	6183.00	1.32	88.19	6386.72		Plat 21 - Zone 11
268	6168.00	1.32	94.68	6386.72		Plat 21 - Zone 11
270	6151.00	1.32	102.04	6386.72		Plat 21 - Zone 11
272	6156.00	1.32	99.88	6386.72		Plat 21 - Zone 11
274	6165.00	1.32	96.98	6386.72		Plat 21 - Zone 11
276	6173.00	1.32	92.52	6386.72		Plat 21 - Zone 11
278	6183.00	1.32	88.19	6386.72		Plat 21 - Zone 11
280	6400.00	10.18	67.32	6555.51		Plat 13 - Zone 8
282	6360.00	10.18	84.01	6554.06		Plat 13 - Zone 8
284	6340.00	10.18	90.70	6549.51		Plat 13 - Zone 8
286	6320.00	10.18	101.46	6554.38		Plat 13 - Zone 8
288	6308.00	10.18	80.60	6494.18		Plat 13 - Zone 7
290	6320.00	11.55	75.43	6494.23		Plat 14 - Zone 7
292	6325.00	4.95	73.39	6494.52		Plat 12 - Zone 7
294	6300.00	4.95	83.49	6492.86		Plat 12 - Zone 7
296	6280.00	4.95	92.16	6492.88		Plat 12 - Zone 7
298	6280.00	4.95	92.18	6492.94		Plat 12 - Zone 7
300	6250.00	9.08	105.14	6492.86		Plat 16 - Zone 7
302	6220.00	9.08	118.03	6492.65		Plat 16 - Zone 7
304	6260.00	11.55	100.81	6492.86		Plat 14 - Zone 7
306	6265.00	11.55	98.65	6492.89		Plat 14 - Zone 7
308	6240.00	9.08	109.34	6492.58		Plat 16 - Zone 7
310	6230.00	9.08	113.59	6492.39		Plat 16 - Zone 7
312	6240.00	11.55	109.47	6492.97		Plat 14 - Zone 7
314	6203.00	10.00	125.79	6493.58		Silo Recreation Center - Zone 7
316	6272.00	8.49	95.56	6492.75		Plat 17 - Zone 7
318	6300.00	8.49	83.41	6492.67		Plat 17 - Zone 7
320	6280.00	8.49	46.44	6387.27		Plat 17 - Zone 11
322	6282.00	8.49	54.17	6387.13		Plat 17 - Zone 11
324	6228.00	8.49	68.90	6387.17		PRV 18 - 380 - Hardman - Plat 17 - Zone 11
326	6226.00	8.25	69.68	6386.98		Plat 18 - Zone 11
328	6285.00	8.49	44.11	6386.89		Plat 17 - Zone 11
330	6255.00	8.25	57.05	6386.79		Plat 18 - Zone 11
332	6228.00	8.25	68.73	6386.76		Plat 18 - Zone 11
334	6225.00	8.25	70.05	6386.83		Plat 18 - Zone 11
336	6220.00	8.25	72.18	6386.74		Plat 18 - Zone 11
111	6555.00	1.47	106.52	6801.05		Plat 8 - Zone 5
3	6493.00	1.80	15.08	6527.83		PRV1 - 1 - McGuinnes - Plat 1 - Zone 2
17	6413.00	1.80	49.73	6527.87		PRV2 - 15 - Spruce Dr. - Plat 1 - Zone 2
23	6454.00	4.13	31.95	8527.81		PRV3 - 27 - Kunz - Plat 2 - Zone 2
27	6300.00	2.54	40.04	6392.49		PRV4 - 31 - Plat 3 - Zone 3
109	6529.00	0.00	72.99	6697.80		PRV6 - 129 - E. Forest - Trans to Plat 22 - Zone 1
143	6638.00	5.06	50.02	6853.55		PRV7 - 177 - Vista West - Plat 6 - Zone 6
137	6510.00	5.06	74.98	6683.21		PRV8 - 175 - Cedar Dr. - Plat 6 - Zone 6
149	6500.00	5.06	43.33	6600.09		PRV9 - 173 - Redwood - Plat 6 - Zone 6
145	6480.00	5.06	52.02	6600.16		PRV10 - 171 - Vista East (Upper) - Plat 6 - Zone 6
173	6460.00	7.15	45.03	6664.01		PRV11 - 203 - Lower Green - Plat 9 - Zone 8
185	6326.00	7.15	118.96	6599.79		Plat 9 - Zone 6
209	6210.00	10.00	94.87	6429.14		PRV13 - 257 - Maint. & LVI 1" Service - Zone 9
223	6200.00	0.00	59.92	6338.40		PRV14 - 259 - Vista - Trans to Cedar Cr. Dr. - Zone
285	6340.00	10.18	69.29	6500.06		PRV17 - 385 - Canyon Pines - Plat 13 - Zone 7
317	6272.00	8.49	49.93	6387.34		PRV19 - 385 - Middle Branch - Plat 17 - Zone 11
187	6325.00	7.15	118.96	6599.79		PRV12 - 211 - Vista East (Lower) - Plat 9 - Zone 6

FIXED GRADE SOURCES TABLE

INPUT			OUTPUT			INPUT
Node	Top Of Water	stimate	Actual	Inflow	Status	Description
	ft			US gpm		
166	6507.50	0.30	0.70	-448.38		Green Tank - 400000 gal
114	6806.00	0.30	-0.01	5.22		Prater Tank - 185000 gal
174	6806.00	0.30	0.30	-194.44		Upper Green PRV - 74 psi

REDUCING (PRV) TABLE

		INPUT			OUTPUT		INPUT		
Pipe	Source	Pressure	OpenK	CKV	PRVLoss	PRVState	Status	Description	Node
		psi/ft			ft				
203	174	45.00	50.00	Yes	235.85	Open		PRV11 - Lower Green	
365	174	69.30	20.00	Yes	49.19	Open		PRV17 - Canyon Pines	
380	166	89.00	20.00	Yes	105.01	Open		PRV18 - Hardman	
385	166	50.00	20.00	Yes	105.40	Open		PRV19 - Middle BR.	
259	166	80.00	20.00	Yes	153.47	Open		PRV14 - Vista	
129	114	73.00	20.00	Yes	101.87	Open		PRV6 - E. Forest	
264	166	70.00	50.00	Yes	97.14	Open		PRV15 - RV Park	
270	166	60.00	100.00	Yes	243.38	Open		PRV16 - Barberry	
114	114	60.00	100.00	Yes	272.52	Open		PRV5 - N. Forest	
27	114	31.90	50.00	Yes	154.83	Open		PRV3 - Kunz	
15	114	49.70	50.00	Yes	148.69	Open		PRV2 - Spruce Dr.	
1	114	15.00	50.00	Yes	143.54	Open		PRV1 - McGuinnes	
31	114	40.00	50.00	Yes	132.05	Open		PRV4 - Plat 3	
257	166	95.00	0.00	Yes	62.68	Open		PRV13 - Maint.	
177	114	50.00	20.00	Yes	145.89	Open		PRV7 - Vista West	
175	114	75.00	50.00	Yes	116.07	Open		PRV8 - Cedar Dr	
173	114	43.30	50.00	Yes	198.43	Open		PRV9 - Redwood	
271	114	52.00	50.00	Yes	199.08	Open		PRV10 - Vista E. (Upper)	
								PRV12 - Vista E. (Lower)	

Star Valley Ranch - Water System
Project 96014.03
50% Build-Out
File: svra5.XLS - Waterworks for Excel

50% BUILD-OUT ON EXISTING SYSTEM 3
SOME PRVs SET AT REVISED PRESSURES
PVC C = 130 Steel C = 110
Open All Possible Gate Valves
PRV12 Replaced With Closed Gate Valve

PIPE TABLE

INPUT						OUTPUT			INPUT	
Pipe	UpNode	OnNode	Length	Diameter	Roughness	Flow	Velocity	HeadLoss	Status	Description
			ft	in		US gpm	ft/sec	ft		
2	3	4	450	2	130	18.42	1.88	4.38		
4	6	4	600	2	130	-11.97	-1.22	2.63		
6	16	5	1380	3	130	-5.52	-0.25	0.20		
8	10	8	550	2	130	6.45	0.66	0.77		
10	12	10	300	2	130	44.22	4.52	14.78		
12	10	2	350	2	130	31.32	3.20	9.10		
14	14	12	450	3	130	50.67	2.30	3.96		
16	17	18	700	3	130	68.67	3.12	10.82		
18	18	14	400	4	130	57.12	1.46	1.08		
20	20	18	450	4	130	138.69	3.54	6.30		
22	24	16	1700	4	130	-67.74	-1.73	6.31		
24	24	20	600	4	130	0.00	0.00	0.00	C	Valve Closed (Required)
26	22	20	575	3	130	144.98	8.58	35.45		
28	23	26	1300	3	130	66.80	3.03	19.09		
30	26	24	550	4	130	-61.45	-1.57	2.01		
32	27	32	500	4	130	95.16	2.43	3.48		
34	38	28	350	3	130	-15.08	-0.68	0.33		
36	30	28	1000	4	130	50.04	1.28	2.12		
38	32	30	850	3	130	57.97	2.63	9.60		
40	34	32	400	2	130	-29.26	-2.99	9.17		
42	38	34	1300	2	130	-8.27	-0.84	2.87		
44	36	34	1100	2	130	-13.06	-1.33	5.67		
46	38	36	400	2	130	15.41	1.57	2.80		
48	40	36	350	2	130	-31.72	-3.24	9.32		
50	42	40	600	2	130	-23.79	-2.43	9.38		
52	46	42	400	2	130	-7.93	-0.81	0.82		
54	44	42	250	2	130	-7.93	-0.81	0.51		
56	48	36	700	3	130	11.18	0.51	0.37		
58	50	48	300	4	130	-7.93	-0.20	0.02		
60	48	28	1000	3	130	-27.04	-1.23	2.75		
62	54	26	800	6	130	-18.87	-0.21	0.04		
64	56	54	400	2	130	-8.29	-0.84	0.53		
66	54	52	600	6	130	6.29	0.07	0.00		
68	60	22	500	4	110	224.36	5.73	23.23		
70	60	58	240	4	110	8.15	0.21	0.02		
72	62	60	495	6	110	240.66	2.73	3.63		
74	64	62	525	4	110	38.85	0.99	0.95		
76	66	64	300	4	110	-8.15	-0.21	0.03		
78	70	64	1200	4	110	55.15	1.41	4.15		Valve Closed
80	70	68	450	4	110	-7.44	-0.19	0.04		Valve Closed
82	68	62	900	6	110	209.96	2.38	5.13		
84	72	68	820	6	110	225.56	2.56	5.34		
86	72	70	1520	4	110	55.85	1.43	5.38		
88	96	72	1850	6	130	289.56	3.29	14.04		
90	76	74	1000	3	130	7.88	0.36	0.28		
92	78	76	300	4	130	15.76	0.40	0.07		
94	80	78	500	3	130	23.64	1.07	1.07		
96	82	80	950	3	130	13.63	0.62	0.74		
98	92	80	1100	2	130	17.89	1.83	10.14		
100	84	82	350	3	130	3.52	0.16	0.02		
102	86	84	1100	2	130	11.40	1.16	4.40		
104	88	86	560	2	130	19.28	1.97	5.83		
106	90	88	200	3	130	45.15	2.05	1.42		
108	92	90	550	3	130	-33.65	-1.53	2.27		
110	94	92	750	3	130	-7.88	-0.36	0.21		
112	88	82	1100	2	130	17.99	1.84	10.25		
114	96	90	20	4	130	86.68	2.21	235.37		PRV5 -114 - N. Forest

116	98	96	600	6	130	385.59	4.38	7.74		
118	100	98	700	4	130	62.88	1.60	2.25		
120	102	100	1620	4	130	72.01	1.84	6.73		
122	104	102	700	4	130	81.36	2.08	3.65		
124	106	98	1420	6	130	332.28	3.77	13.91		
126	106	104	200	4	130	80.71	2.32	1.27		
128	108	106	220	6	130	432.34	4.91	3.51		
130	109	108	850	6	110	432.34	4.91	18.47		
132	111	110	450	6	130	439.84	4.99	7.41		
134	114	112	1600	6	130	-101.33	-1.15	1.74		
136	116	112	800	6	130	107.38	1.22	0.97		
138	118	116	400	8	110	293.95	3.34	4.25		
140	120	118	1130	6	110	300.00	3.40	12.48		
142	122	116	380	4	130	-180.52	-4.61	8.66		
144	126	122	375	4	130	-6.05	-0.15	0.02		
146	128	122	1200	4	130	-168.42	-4.30	24.05		
148	128	124	600	4	130	6.05	0.15	0.03		
150	130	128	150	4	130	-150.30	-3.84	2.34		
152	146	130	1050	4	130	-7.29	-0.19	0.06		
154	134	132	1300	4	130	6.05	0.15	0.06		
156	134	110	1475	6	130	-1.45	-0.02	0.00		
158	136	134	400	6	130	16.67	0.19	0.02		
160	142	136	430	6	110	43.26	0.49	0.13		Valve Open
162	142	140	250	6	130	-69.85	-0.79	0.14		
164	140	130	710	6	110	-130.94	-1.48	1.69		Valve Broken Closed
166	144	140	440	6	110	-49.02	-0.56	0.17		
168	146	144	800	2	130	8.34	0.85	1.80		Valve Broken Closed
170	148	146	1000	2	130	13.12	1.34	5.20		
172	145	150	500	6	130	40.10	0.46	0.50		
174	149	150	300	2	130	6.54	0.67	0.43		
176	137	138	650	2	130	7.26	0.74	1.13		
178	143	192	2150	4	130	7.26	0.19	0.13		
180	162	150	660	6	110	-39.38	-0.45	0.17		
182	164	162	310	6	110	24.86	0.28	0.03		
184	162	160	720	2	130	7.26	0.74	1.25		
186	154	152	800	4	130	7.26	0.19	0.05		
188	154	148	1100	4	130	36.99	1.00	1.47		
190	156	154	200	4	130	53.51	1.37	0.48		
192	158	158	360	4	130	60.77	1.55	1.06		
194	168	158	1000	4	130	68.03	1.74	3.74		
196	168	166	100	6	130	0.00	0.00	0.00	C	LCV #2 Assumed Closed
198	166	170	400	8	130	810.28	5.17	5.03		
200	174	172	1700	6	130	370.79	4.21	20.40		
202	172	168	300	6	130	71.54	0.81	0.17		
204	173	176	700	6	110	286.94	3.28	7.12		
206	178	176	700	4	130	-8.80	-0.22	0.06		
208	180	176	750	6	110	-269.34	-3.06	6.78		
210	184	170	1500	8	130	-805.77	-5.15	18.70		
212	164	185	1425	6	110	17.60	0.20	0.08		
214	188	186	450	2	130	7.26	0.74	0.78		
216	190	188	750	4	130	10.77	0.28	0.09		
218	198	190	1100	2	130	16.26	1.66	8.50		
220	196	184	900	8	130	-797.97	5.09	7.33		
222	198	196	410	8	130	-767.24	-5.03	4.89		
224	182	180	600	8	130	-260.54	-1.66	0.92		
226	194	182	830	6	110	-249.81	-2.83	6.53		
228	280	194	1080	6	110	-239.08	-2.71	7.83		
230	200	198	585	8	130	-532.78	-3.40	3.38		
232	202	200	585	8	130	-454.55	-2.90	2.52		
234	204	202	700	8	130	-399.20	-2.55	2.37		
236	208	204	200	4	130	-33.82	-0.86	0.20		
238	208	190	1875	4	130	3.31	0.08	0.03		
240	214	212	1200	4	130	-10.31	-0.26	0.14		
242	216	212	700	4	130	-1.63	-0.04	0.00		
244	218	216	900	4	130	8.68	0.22	0.07		
246	218	210	600	4	130	-18.99	-0.49	0.21		
248	212	210	800	4	130	-22.25	-0.57	0.28		
250	210	206	500	4	130	-51.55	-1.32	1.12		
252	206	204	500	8	130	-330.18	-2.11	1.19		

254	222	206	150	8	130	-278.61	-1.78	0.26	
256	224	222	150	8	130	0.00	0.00	0.00	
258	209	220	1250	1	130	10.00	4.09	114.84	
260	223	226	950	8	110	278.61	3.16	9.16	
262	228	226	3500	6	110	-278.61	-3.16	33.70	
264	228	230	150	6	110	125.00	1.42	28.95	PRV15 - 264
268	232	230	350	6	130	-125.00	-1.42	0.56	
268	234	232	100	6	110	0.00	0.00	0.00	
270	228	236	2400	6	110	143.61	1.63	116.02	PRV16 - 270 - Barberry
272	238	236	370	6	110	-49.46	-0.56	0.15	
274	240	236	375	8	130	-82.07	-0.93	0.28	
276	244	238	975	4	130	-37.38	-0.95	1.20	
278	242	240	750	4	130	-37.86	-0.97	0.95	
290	258	240	1050	4	130	-32.12	-0.82	0.98	
282	246	244	340	4	130	-45.23	-1.16	0.60	
284	248	246	525	4	130	-22.24	-0.57	0.25	
286	244	242	370	4	130	-18.58	-0.47	0.13	
288	258	242	525	4	130	-7.20	-0.18	0.03	
290	254	246	1650	4	130	-10.91	-0.28	0.21	
292	252	248	1050	4	130	-4.19	-0.11	0.02	
294	250	248	870	4	130	-5.97	-0.15	0.04	
296	252	250	310	4	130	6.11	0.16	0.01	
298	254	252	310	4	130	14.00	0.38	0.06	
300	256	254	310	4	130	15.17	0.39	0.07	
302	258	256	1205	4	130	27.25	0.70	0.83	
304	262	260	335	6	130	-67.39	-0.76	0.17	
306	264	262	475	6	130	-46.36	-0.53	0.12	
308	266	264	640	6	130	-28.29	-0.32	0.07	
310	268	266	700	4	130	-11.04	-0.28	0.09	
312	270	268	900	4	130	-1.83	-0.04	0.00	
314	272	270	400	4	130	7.78	0.20	0.03	
316	274	272	420	4	130	9.35	0.24	0.04	
318	278	274	590	4	130	10.10	0.26	0.06	
320	278	276	770	4	130	7.89	0.20	0.05	
322	278	280	900	4	130	-17.30	-0.44	0.27	
324	276	282	1050	4	130	-11.63	-0.30	0.15	
326	274	284	1125	4	130	-8.65	-0.22	0.09	
328	272	286	975	4	130	-7.84	-0.20	0.07	
330	302	204	2600	4	130	-25.12	-0.64	1.54	
332	300	202	1980	4	130	-45.04	-1.16	3.45	
334	298	200	1580	4	130	-67.50	-1.72	5.75	
336	302	300	590	4	130	-29.10	-0.74	0.46	
338	300	298	520	4	130	-20.99	-0.54	0.22	
340	298	296	300	4	130	35.78	0.91	0.34	
342	304	300	900	4	130	-17.75	-0.45	0.28	
344	308	302	1875	4	130	-35.04	-0.89	2.05	
346	304	296	760	4	130	-14.32	-0.37	0.16	
348	296	294	750	4	130	10.73	0.27	0.09	
350	308	306	620	4	130	-64.38	-1.64	2.09	
352	306	290	840	4	130	-93.47	-2.39	5.68	
354	292	290	840	8	130	218.67	1.40	0.93	
356	292	198	1920	8	110	-229.40	-1.48	3.18	
358	286	280	1275	4	110	-51.83	-1.32	3.93	
360	286	282	900	4	110	39.87	1.02	1.71	
362	282	280	1380	6	110	-175.29	-1.99	5.63	
364	284	282	525	4	110	-203.20	-5.19	20.30	
366	285	288	1090	6	110	179.28	4.58	33.42	
368	290	288	500	8	130	107.05	0.68	0.15	
370	314	288	1590	8	130	-274.36	-1.75	2.89	
372	312	308	1350	4	130	-24.86	-0.63	0.78	
374	310	308	540	4	130	-80.24	-2.05	2.74	
376	312	310	460	4	130	109.34	2.79	4.05	
378	314	312	450	4	130	102.63	2.62	3.60	
380	310	324	900	6	130	170.39	1.93	69.78	PRV 18 - 380 - Hardman
382	316	314	1125	6	110	-161.74	-1.84	3.96	
384	318	316	1050	4	130	-15.44	-0.39	0.25	
386	317	320	270	6	130	115.42	1.31	0.37	
388	322	320	835	6	130	-99.98	-1.13	0.65	
390	324	322	1520	4	130	24.39	0.62	0.85	Valve Closed

392	326	324	1650	6	130	-130.56	-1.48	2.87		
394	326	322	1356	4	130	-41.32	-1.06	2.01		
396	328	322	600	4	130	-67.60	-1.73	2.22		Valve Closed
398	330	328	2550	4	130	-25.20	-0.64	1.52		
400	330	328	2250	4	130	-26.96	-0.69	1.52		
402	332	330	2015	4	130	-26.17	-0.67	1.28		
404	334	332	1200	6	130	91.84	1.04	1.09		
406	336	334	2060	4	130	-28.06	-0.72	1.50		
408	336	332	450	6	130	-92.03	-1.04	0.41		
410	336	260	550	6	130	94.10	1.07	0.52		
412	306	304	590	4	130	-13.92	-0.36	0.14		
414	334	326	900	6	130	-345.90	-1.66	1.92		
133	114	111	1600	6	130	445.89	5.05	27.01		
135	112	111	20	6	130	0.00	0.00	0.00	C	Bypass Prater Tank
1	2	3	450	2	130	24.87	2.54	7.64		PRV1 - 1 - McGuinnes
15	18	17	30	3	130	75.12	3.41	32.95		PRV2 - 15 - Spruce Dr.
27	22	23	50	3	130	73.09	3.32	74.76		PRV3 - 27 - Kunz
31	26	27	50	8	130	103.09	1.17	116.23		PRV4 - 31
129	110	109	50	6	110	432.34	4.91	74.19		PRV6 - 129 - E. Forest
177	142	143	50	4	130	14.52	0.37	118.39		PRV7 - 177 - Vista West
175	136	137	50	2	130	14.52	1.48	88.58		PRV8 - 175 - Cedar Dr.
173	148	149	50	2	130	13.80	1.41	178.81		PRV9 - 173 - Redwood
171	144	145	500	6	130	47.36	0.54	171.74		PRV10 - 171 - Vista East (Up
203	172	173	50	8	110	295.74	3.38	221.80		PRV11 - 203 - Lower Green
211	185	187	25	6	110	3.80	0.10	0.00		PRV12 - 211 - Vista East (Lo
257	208	209	50	2	130	20.00	2.04	33.93		PRV13 - 257
259	222	223	50	6	110	279.61	3.16	123.42		PRV14 - 259 - Vista
365	284	285	50	4	130	191.24	4.88	8.80		PRV17 - 365 - Canyon Pines
385	316	317	50	6	130	130.88	1.49	73.31		PRV19 - 385 - Middle Branch
213	187	184	100	6	110	0.00	0.00	0.00	C	Closed or Green Fills from Prat

NODE TABLE

	INPUT		OUTPUT		INPUT				
Node	Elevation	Demand	Pressure	HGL	XCoord	YCoord	Status	Description	Node Pumps
	ft	US gpm	psi	ft					
2	6533.00	6.45	-0.18	6532.57				Plat 1 - Zone 1	
4	6443.00	6.45	33.58	6520.56				Plat 1 - Zone 2	
6	6373.00	6.45	62.74	6517.93				Plat 1 - Zone 2	
8	6478.00	6.45	27.23	6540.91				Plat 1 - Zone 1	
10	6478.00	6.45	27.57	6541.68				Plat 1 - Zone 1	
12	6478.00	6.45	33.97	6556.46				Plat 1 - Zone 1	
14	6473.00	6.45	37.84	6560.42				Plat 1 - Zone 1	
16	6373.00	6.45	62.65	6517.73				Plat 1 - Zone 2	
18	6413.00	6.45	84.29	6561.50				Plat 1 - Zone 1	
20	6416.00	6.29	65.71	6567.80				Plat 2 - Zone 1	
22	6454.00	6.29	64.61	6603.25				Plat 2 - Zone 1	
24	6343.00	6.29	72.91	6511.42				Plat 2 - Zone 2	
26	6300.00	6.29	90.65	6509.40				Plat 2 - Zone 2	
28	6275.00	7.93	44.58	6377.98				Plat 3 - Zone 3	
30	6298.00	7.93	35.54	6380.09				Plat 3 - Zone 3	
32	6208.00	7.93	78.65	6389.69				Plat 3 - Zone 3	
34	6204.00	7.93	76.41	6380.52				Plat 3 - Zone 3	
36	6203.00	7.93	74.39	6374.85				Plat 3 - Zone 3	
38	6238.00	7.93	60.45	6377.65				Plat 3 - Zone 3	
40	6155.00	7.93	91.14	6365.53				Plat 3 - Zone 3	
42	6148.00	7.93	90.97	6356.15				Plat 3 - Zone 3	
44	6128.00	7.93	98.54	6355.64				Plat 3 - Zone 3	
46	6153.00	7.93	87.59	6355.33				Plat 3 - Zone 3	
48	6205.00	7.93	73.69	6375.23				Plat 3 - Zone 3	
50	6218.00	7.93	68.05	6375.20				Plat 3 - Zone 3	
52	6233.00	6.29	119.64	6509.36				Plat 2 - Zone 2	
54	6280.00	6.29	99.29	6509.36				Plat 2 - Zone 2	
56	6318.00	6.29	82.61	6508.83				Plat 2 - Zone 2	
58	6542.00	8.15	36.56	6626.45				Plat 15 - Zone 1	
60	6520.00	8.15	46.09	6626.48				Plat 15 - Zone 1	
62	6496.00	8.15	58.49	6630.11				Plat 15 - Zone 1	
64	6562.00	8.15	29.90	6631.06				Plat 15 - Zone 1	
66	6606.00	8.15	10.84	6631.03				Plat 15 - Zone 1	
68	6425.00	8.15	91.02	6635.25				Plat 15 - Zone 1	
70	6450.00	8.15	80.18	6635.21				Plat 15 - Zone 1	
72	6339.00	8.15	130.56	6640.59				Plat 15 - Zone 1	
74	6313.00	7.88	40.01	6405.42				Plat 20 - Zone 4	
76	6239.00	7.88	72.16	6405.70				Plat 20 - Zone 4	
78	6222.00	7.88	79.58	6405.78				Plat 20 - Zone 4	
80	6239.00	7.88	72.66	6406.85				Plat 20 - Zone 4	
82	6237.00	7.88	73.85	6407.58				Plat 20 - Zone 4	
84	6243.00	7.88	71.26	6407.61				Plat 20 - Zone 4	
86	6313.00	7.88	42.86	6412.01				Plat 20 - Zone 4	
88	6313.00	7.88	45.38	6417.84				Plat 20 - Zone 4	
90	6280.00	7.88	60.28	6419.26				PRV5 -114 - N. Forest - Plat 20 -Zone 4	
92	6313.00	7.88	45.02	6416.99				Plat 20 - Zone 4	
94	6313.00	7.88	44.93	6416.78				Plat 20 - Zone 4	
96	6300.00	9.35	153.52	6654.63				Plat 22 - Zone 1	
98	6355.00	9.35	133.06	6662.37				Plat 22 - Zone 1	
100	6360.00	9.35	131.87	6664.82				Plat 22 - Zone 1	
102	6480.00	9.35	82.84	6671.36				Plat 22 - Zone 1	
104	6470.00	9.35	88.74	6675.00				Plat 22 - Zone 1	
106	6450.00	9.35	97.95	6676.27				Plat 22 - Zone 1	
108	6400.00	0.00	121.12	6679.78				Trans from Prater Tank - Zone 5	
110	6529.00	6.05	105.38	6772.44				Plat 8 - Zone 5	
112	6555.00	6.05	109.78	6808.59				Plat 8 - Zone 5	
114	6800.00	0.00	2.97	6806.85				Prater Tank - 185000 gal	

116	6637.00	8.05	74.70	6809.56		Plat 8 - Zone 5
118	6672.00	8.05	61.39	6813.81		Plat 8 - Zone 5
120	6850.00	-300.00	-10.26	6826.29		Prater Zeroing Box
122	6707.00	8.05	40.65	6800.90		Plat 8 - Zone 5
124	6627.00	8.05	64.86	6776.82		Plat 8 - Zone 5
126	6717.00	8.05	36.31	6800.88		Plat 8 - Zone 5
128	6635.00	12.07	81.40	6776.84		Plat 7 - Zone 5
130	6640.00	12.07	58.18	6774.41		Plat 7 - Zone 5
132	6600.00	8.05	74.62	6772.38		Plat 8 - Zone 5
134	6540.00	12.07	100.62	6772.43		Plat 7 - Zone 5
136	6510.00	12.07	113.62	6772.45		Plat 7 - Zone 5
138	6452.00	7.26	99.88	6682.73		Plat 6 - Zone 6
140	6561.00	12.07	91.65	6772.72		Plat 7 - Zone 5
142	6538.00	12.07	101.55	6772.58		Plat 7 - Zone 5
144	6545.00	10.00	98.51	6772.55		SVRA Club House & Pool - Zone 5
146	6585.00	12.07	81.97	6774.34		Plat 7 - Zone 5
148	6500.00	12.07	121.01	6779.54		Plat 7 - Zone 5
150	6500.00	7.26	43.42	6600.31		Plat 6 - Zone 6
152	6450.00	7.26	143.27	6780.96		Plat 6 -Zone5
154	6505.00	7.26	119.48	6781.01		Plat 6 -Zone5
156	6545.00	7.26	102.38	6781.49		Plat 6 -Zone5
158	6505.00	7.26	120.15	6782.55		Plat 6 -Zone5
160	6495.00	7.26	44.97	6598.89		Plat 6 - Zone 6
162	6450.00	7.26	64.99	6600.14		Plat 6 - Zone 6
164	6429.00	7.26	74.07	6600.10		Plat 6 - Zone 6
166	6500.00	0.00	3.25	6507.50		Green Tank - 400000 gal - Zone 7
168	6480.00	3.51	132.59	6786.29		Plat 11 - Zone 5
170	6460.00	3.51	18.39	6502.47		Plat 11 - Zone 7
172	6460.00	3.51	141.33	6786.46		Plat 11 - Zone 5
174	6635.00	0.00	74.40	6806.86		Green PRV - 90psi - Zone 5
176	6400.00	8.80	68.20	6557.54		Plat 9 - Zone 8
178	6420.00	8.80	59.52	6557.49		Plat 9 - Zone 8
180	6325.00	8.80	97.73	6550.76		Plat 9 - Zone 8
182	6325.00	10.73	97.33	6549.84		Plat 12 - Zone 8
184	6325.00	8.80	68.73	6483.77		Plat 9 - Zone 7
186	6370.00	7.26	39.90	6462.17		Plat 6 - Zone 7
188	6315.00	3.51	84.05	6462.96		Plat 11 - Zone 7
190	6285.00	8.80	77.08	6463.05		Plat 9 - Zone 7
192	6380.00	7.26	118.64	6654.06		Plat 6 - Zone 6
194	6375.00	10.73	72.86	6543.31		Plat 12 - Zone 8
196	6325.00	10.73	65.56	6476.44		Plat 12 - Zone 7
198	6305.00	8.80	72.10	6471.55		Plat 9 - Zone 7
200	6275.00	10.73	83.62	6468.17		Plat 12 - Zone 7
202	6250.00	10.31	93.35	6465.65		Plat 10 - Zone 7
204	6220.00	10.31	105.32	6463.28		Plat 10 - Zone 7
206	6205.00	0.00	111.29	6462.08		Trans to Cedar Creek Dr. - Zone 7
208	6210.00	10.31	109.56	6463.07		Plat 10 - Zone 7
210	6220.00	10.31	104.31	6460.97		Plat 10 - Zone 7
212	6260.00	10.31	86.88	6460.68		Plat 10 - Zone 7
214	6300.00	10.31	69.50	6460.55		Plat 10 - Zone 7
216	6250.00	10.31	91.20	6460.68		Plat 10 - Zone 7
218	6210.00	10.31	108.55	6460.75		Plat 10 - Zone 7
220	6180.00	10.00	58.14	6314.30		LVI Facilities - Zone 9
222	6200.00	0.00	113.34	6461.82		Trans to Cedar Creek Dr. - Zone 7
224	6200.00	0.00	113.34	6461.82		SVRA Well #1 - Zone 7
226	6170.00	0.00	68.94	6329.26		Trans to Cedar Creek Dr. - Zone 10
228	6100.00	10.00	84.66	6295.56		Mary' Rest. and Sale's Office - Zone 10
230	6105.00	0.00	69.96	6266.61		PRV15 - 264 Trans to RV Park - Zone 12
232	6115.00	125.00	65.39	6266.04		RV Park - Zone 12
234	6112.00	0.00	66.69	6266.04		LVI Well #1 - Zone 12
236	6042.00	12.08	59.97	6180.54		PRV16 - 270 - Barberry - Plat 5 - Zone 13
238	6042.00	12.08	59.91	6180.39		Plat 5 - Zone 13
240	6049.00	12.08	56.82	6180.26		Plat 5 - Zone 13
242	6041.00	12.08	59.88	6179.31		Plat 5 - Zone 13
244	6034.00	10.73	62.85	6179.19		Plat 5 - Zone 13
246	6029.00	12.08	64.76	6178.59		Plat 5 - Zone 13
248	6027.00	12.08	65.52	6178.34		Plat 5 - Zone 13
250	6025.00	12.08	66.37	6178.31		Plat 5 - Zone 13
252	6033.00	12.08	62.91	6178.32		Plat 5 - Zone 13

254	6042.00	12.08	59.04	6178.38			Plat 5 - Zone 13	
256	6048.00	12.08	56.47	6178.38			Plat 5 - Zone 13	
258	6053.00	12.08	54.67	6179.28			Plat 5 - Zone 13	
260	6200.00	9.41	78.08	6380.36			Plat 21 - Zone 11	
262	6200.00	9.41	78.01	6380.19			Plat 21 - Zone 11	
264	6192.00	9.41	81.42	6380.07			Plat 21 - Zone 11	
266	6183.00	9.41	85.28	6380.01			Plat 21 - Zone 11	
268	6168.00	9.41	91.74	6379.92			Plat 21 - Zone 11	
270	6151.00	9.41	99.10	6379.91			Plat 21 - Zone 11	
272	6156.00	9.41	96.94	6379.94			Plat 21 - Zone 11	
274	6165.00	9.41	93.07	6379.98			Plat 21 - Zone 11	
276	6173.00	9.41	89.63	6380.04			Plat 21 - Zone 11	
278	6183.00	9.41	85.32	6380.10			Plat 21 - Zone 11	
280	6400.00	11.96	58.65	6535.48			Plat 13 - Zone 8	
282	6360.00	11.96	73.52	6629.84			Plat 13 - Zone 8	
284	6340.00	11.96	73.39	6509.52			Plat 13 - Zone 8	
286	6320.00	11.96	91.58	6531.53			Plat 13 - Zone 8	
288	6308.00	11.96	88.96	6467.29			Plat 13 - Zone 7	
290	6320.00	18.15	63.83	6467.44			Plat 14 - Zone 7	
292	6325.00	10.73	62.07	6468.37			Plat 12 - Zone 7	
294	6300.00	10.73	70.12	6461.98			Plat 12 - Zone 7	
296	6280.00	10.73	78.82	6462.08			Plat 12 - Zone 7	
298	6280.00	10.73	78.97	6462.42			Plat 12 - Zone 7	
300	6250.00	19.18	91.86	6462.20			Plat 18 - Zone 7	
302	6220.00	19.18	104.85	6461.74			Plat 18 - Zone 7	
304	6260.00	18.15	87.41	6481.92			Plat 14 - Zone 7	
306	6265.00	18.15	85.19	6461.78			Plat 14 - Zone 7	
308	6240.00	19.18	95.10	6459.69			Plat 18 - Zone 7	
310	6230.00	19.18	98.24	6456.94			Plat 18 - Zone 7	
312	6240.00	18.15	95.67	6461.00			Plat 14 - Zone 7	
314	6203.00	10.00	113.25	6464.60			Silo Recreation Center - Zone 7	
316	6272.00	15.44	81.66	6460.65			Plat 17 - Zone 7	
318	6300.00	15.44	69.43	6460.39			Plat 17 - Zone 7	
320	6280.00	15.44	48.30	6386.96			Plat 17 - Zone 11	
322	6262.00	15.44	53.82	6386.31			Plat 17 - Zone 11	
324	6228.00	15.44	68.90	6387.17			PRV 18 - 380 - Hardman - Plat 17 - Zone 11	
326	6226.00	25.99	88.53	6384.30			Plat 18 - Zone 11	
328	6285.00	15.44	42.90	6384.10			Plat 17 - Zone 11	
330	6255.00	25.99	55.23	6382.58			Plat 18 - Zone 11	
332	6228.00	25.99	68.36	6381.29			Plat 18 - Zone 11	
334	6225.00	25.99	68.13	6382.38			Plat 18 - Zone 11	
336	6220.00	25.99	69.85	6380.89			Plat 18 - Zone 11	
111	6555.00	6.05	97.33	6779.84			Plat 8 - Zone 5	
3	6493.00	6.45	13.93	6524.94			PRV1 - 1 - McGuinnes - Plat 1 - Zone 2	
17	6413.00	6.45	50.02	6528.55			PRV2 - 15 - Spruce Dr. - Plat 1 - Zone 2	
23	6454.00	6.29	32.25	6528.49			PRV3 - 27 - Kunz - Plat 2 - Zone 2	
27	6300.00	7.93	40.34	6393.17			PRV4 - 31 - Plat 3 - Zone 3	
109	6529.00	0.00	73.27	6698.25			PRV6 - 129 - E. Forest - Trans to Plat 22 - Zone 1	
143	6538.00	7.26	50.30	6654.19			PRV7 - 177 - Vista West - Plat 6 - Zone 8	
137	6510.00	7.26	75.26	6683.86			PRV8 - 175 - Cedar Dr. - Plat 6 - Zone 6	
149	6500.00	7.26	43.61	6600.74			PRV9 - 173 - Redwood - Plat 6 - Zone 6	
145	6480.00	7.26	52.30	6600.80			PRV10 - 171 - Vista East (Upper) - Plat 6 - Zone 6	
173	6460.00	8.80	45.31	6664.86			PRV11 - 203 - Lower Green - Plat 9 - Zone 8	
185	6325.00	8.80	119.06	6600.02			Plat 9 - Zone 6	
209	6210.00	10.00	94.87	6429.14			PRV13 - 257 - Maint. & LVI 1" Service - Zone 9	
223	6200.00	0.00	59.92	6338.40			PRV14 - 259 - Vista - Trans to Cedar Cr. Dr. - Zone	
285	6340.00	11.96	69.57	8500.72			PRV17 - 365 - Canyon Pines - Plat 13 - Zone 7	
317	6272.00	15.44	49.93	6387.34			PRV19 - 385 - Middle Branch - Plat 17 - Zone 11	
187	6325.00	8.80	119.08	6800.02			PRV12 - 211 - Vista East (Lower) - Plat 9 - Zone 6	

FIXED GRADE SOURCES TABLE

	INPUT		OUTPUT			INPUT
Node	Top Of Water	stimate	Actual	Inflow	Status	Description
	ft			US gpm		
166	6607.50	0.30	0.53	-810.28		Green Tank - 400000 gal
114	6806.00	0.30	0.23	-344.56		Prater Tank - 185000 gal
174	6806.00	0.30	0.24	-370.79		Upper Green PRV - 74 psi

REDUCING (PRV) TABLE

	INPUT				OUTPUT		INPUT		
Pipe	Source	Pressure	OpenK	CKV	PRVLoss	KVState	Status	Description	Node
		psi ft			ft				
203	174	46.00	50.00	Yes	221.26	Open		PRV11 - Lower Green	
365	174	69.30	0.00	Yes	7.58	Open		PRV17 - Canyon Pines	
380	166	69.00	20.00	Yes	67.22	Open		PRV18 - Hardman	
385	166	50.00	20.00	Yes	73.22	Open		PRV19 - Middle BR.	
259	166	60.00	20.00	Yes	122.94	Open		PRV14 - Vista	
129	114	73.00	20.00	Yes	73.10	Open		PRV6 - E. Forest	
264	166	70.00	0.00	Yes	28.62	Open		PRV15 - RV Park	
270	166	60.00	100.00	Yes	108.24	Open		PRV16 - Barberry	
114	114	60.00	100.00	Yes	235.25	Open		PRV5 - N. Forest	
27	114	31.90	50.00	Yes	73.89	Open		PRV3 - Kunz	
15	114	49.70	0.00	Yes	32.41	Open		PRV2 - Spruce Dr.	
1	114	15.00	0.00	Yes	0.00	Open		PRV1 - McGuinnes	
31	114	40.00	0.00	Yes	116.17	Open		PRV4 - Plat 3	
257	166	95.00	0.00	Yes	33.37	Open		PRV13 - Maint.	
177	114	50.00	20.00	Yes	118.38	Open		PRV7 - Vista West	
175	114	75.00	50.00	Yes	88.28	Open		PRV8 - Cedar Dr	
173	114	43.30	50.00	Yes	178.52	Open		PRV9 - Redwood	
171	114	52.00	50.00	Yes	171.61	Open		PRV10 - Vista E. (Upper)	
								PRV12 - Vista E. (Lower)	

	Star Valley Ranch - Water System					75% BUILD-OUT ON EXISTING SYSTEM			4		
	Project 96014.03					SOME PRVs SET AT REVISED PRESSURES					
	75% Build-Out					PVC C = 130 Steel C = 110					
	File: svra6.XLS - Waterworks for Excel					Open All Possible Gate Valves					
						PRV12 Replaced with Closed Gate Valve					

PIPE TABLE

	INPUT					OUTPUT			INPUT	
Pipe	UpNode	DnNode	Length	Diameter	Roughness	Flow	Velocity	HeadLoss	Status	Description
			ft	in		US gpm	ft/sec	ft		
2	3	4	450	2	130	0.08	0.01	0.00		
4	6	4	600	2	130	9.60	0.98	1.75		
6	18	6	1380	3	130	19.28	0.98	2.03		
8	10	8	550	2	130	9.68	0.99	1.63		
10	12	10	300	2	130	38.80	3.96	11.60		
12	10	2	350	2	130	19.44	1.99	3.76		
14	14	12	450	3	130	48.48	2.20	3.65		
16	17	18	700	3	130	87.19	3.96	16.83		
18	18	14	400	4	130	58.18	1.49	1.12		
20	20	18	450	4	130	164.71	4.21	8.66		
22	24	16	1700	4	130	-58.23	-1.49	4.77		
24	24	20	600	4	130	0.00	0.00	0.00	C	Valve Closed (Required)
26	22	20	575	3	130	174.15	7.91	49.78		
28	23	26	1300	3	130	143.67	6.52	78.82		
30	26	24	650	4	130	-48.78	-1.25	1.31		
32	27	32	500	4	130	142.80	3.65	7.38		
34	38	28	350	3	130	-22.62	-1.03	0.69		
36	30	28	1000	4	130	75.09	1.92	4.49		
38	32	30	850	3	130	86.99	3.95	20.35		
40	34	32	400	2	130	-43.91	-4.48	19.45		
42	38	34	1300	2	130	-12.40	-1.27	6.08		
44	36	34	1100	2	130	-19.60	-2.00	12.02		
46	38	36	400	2	130	23.13	2.36	5.93		
48	40	36	350	2	130	-47.60	-4.86	19.77		
50	42	40	600	2	130	-35.70	-3.65	19.89		
52	46	42	400	2	130	-11.90	-1.22	1.73		
54	44	42	250	2	130	-11.90	-1.22	1.08		
56	48	36	700	3	130	16.77	0.76	0.80		
58	50	48	300	4	130	-11.90	-0.30	0.04		
60	48	28	1000	3	130	-40.57	-1.84	5.83		
62	54	26	800	6	130	-28.32	-0.32	0.08		
64	56	54	400	2	130	-9.44	-0.96	1.13		
66	54	52	600	6	130	9.44	0.11	0.01		
68	60	22	500	4	110	336.70	8.60	49.28		
70	60	58	240	4	110	12.22	0.31	0.05		
72	62	60	495	6	110	361.14	4.10	7.71		
74	64	62	525	4	110	58.30	1.49	2.01		
76	66	64	300	4	110	-12.22	-0.31	0.06		
78	70	64	1200	4	110	82.74	2.11	8.79		Valve Closed
80	70	68	450	4	110	-11.16	-0.28	0.08		Valve Closed
82	68	62	900	6	110	315.06	3.58	10.88		
84	72	68	820	6	110	338.43	3.84	11.32		
86	72	70	1520	4	110	83.81	2.14	11.40		
88	96	72	1850	6	130	434.46	4.93	29.77		
90	76	74	1000	3	130	11.81	0.54	0.59		
92	78	76	300	4	130	23.62	0.60	0.16		
94	80	78	500	3	130	35.43	1.61	2.27		
96	82	80	950	3	130	20.43	0.93	1.56		
98	92	80	1100	2	130	26.81	2.74	21.46		
100	84	82	350	3	130	5.28	0.24	0.05		
102	86	84	1100	2	130	17.09	1.75	9.32		
104	88	86	550	2	130	28.90	2.95	12.33		
106	90	88	200	3	130	67.67	3.07	3.01		
108	92	90	550	3	130	-60.43	-2.29	4.80		
110	94	92	750	3	130	-11.81	-0.54	0.44		
112	88	82	1100	2	130	26.97	2.75	21.69		
114	96	90	20	4	130	129.91	3.32	188.56		PRV5 -114 - N. Forest

116	98	96	600	6	130	578.40	6.56	16.40		
118	100	98	700	4	130	93.99	2.40	4.77		
120	102	100	1820	4	130	108.02	2.76	14.27		
122	104	102	700	4	130	122.05	3.12	7.73		
124	106	98	1420	6	130	498.44	5.66	29.47		
126	106	104	200	4	130	136.08	3.47	2.70		
128	108	106	220	6	130	648.55	7.36	7.43		
130	109	108	850	6	110	648.55	7.38	39.13		
132	111	110	450	6	130	660.43	7.49	15.72		
134	114	112	1600	6	130	-11.98	-0.14	0.03		
136	116	112	800	6	130	21.08	0.24	0.05		
138	118	116	400	6	110	290.92	3.30	4.17		
140	120	118	1130	6	110	300.00	3.40	12.48		
142	122	116	380	4	130	-260.78	-6.66	17.12		
144	126	122	375	4	130	-9.08	-0.23	0.03		
146	128	122	1200	4	130	-242.62	-8.20	47.29		
148	128	124	800	4	130	9.08	0.23	0.05		
150	130	128	150	4	130	-215.44	-5.50	4.74		
152	146	130	1050	4	130	-6.27	-0.16	0.05		
154	134	132	1300	4	130	9.08	0.23	0.12		
156	134	110	1475	6	130	-2.80	-0.03	0.00		
158	136	134	400	6	130	24.38	0.28	0.03		
160	142	136	430	6	110	84.26	0.73	0.27		Valve Open
162	142	140	250	6	130	-104.14	-1.18	0.29		
164	140	130	710	6	110	-191.07	-2.17	3.40		Valve Broken Closed
166	144	140	440	6	110	-68.83	-0.78	0.32		
168	146	144	800	2	130	12.27	1.25	3.87		Valve Broken Closed
170	148	146	1000	2	130	24.10	2.46	16.02		
172	145	150	500	6	130	60.22	0.68	0.97		
174	149	150	300	2	130	9.74	1.00	0.90		
176	137	138	650	2	130	10.89	1.11	2.39		
178	143	192	2150	4	130	10.89	0.28	0.27		
180	152	150	660	6	110	-59.07	-0.67	0.36		
182	164	162	310	6	110	-37.29	-0.42	0.07		
184	162	160	720	2	130	10.89	1.11	2.85		
186	154	152	800	4	130	10.89	0.28	0.10		
188	154	148	1100	4	130	62.84	1.60	3.55		
190	156	154	200	4	130	84.62	2.16	1.12		
192	158	156	350	4	130	95.51	2.44	2.45		
194	168	158	1000	4	130	108.40	2.72	8.56		
196	168	166	100	8	130	0.00	0.00	0.00	C	LCV #2 Assumed Closed
198	166	170	400	8	130	-1181.60	-7.54	10.11		
200	174	172	1700	6	130	511.66	5.81	37.03		
202	172	168	300	8	130	111.66	1.27	0.39		
204	173	176	700	6	110	381.56	4.33	12.07		
206	178	176	700	4	130	-13.20	-0.34	0.13		
208	180	178	750	6	110	-355.15	-4.03	11.32		
210	184	170	1500	8	130	-1176.34	-7.51	37.60		
212	164	186	1425	6	110	26.40	0.30	0.17		
214	188	186	450	2	130	10.89	1.11	1.66		
216	190	188	750	4	130	18.15	0.41	0.20		
218	198	190	1100	2	130	22.32	2.28	15.28		
220	196	184	600	8	130	-1183.14	-7.43	14.73		
222	198	196	410	8	130	-1147.05	-7.32	9.81		
224	182	180	600	8	130	-341.95	-2.18	1.53		
226	194	182	830	8	110	-325.86	-3.70	10.68		
228	280	194	1080	6	110	-309.77	-3.52	12.65		
230	200	198	585	8	130	-742.95	-4.74	8.28		
232	202	200	585	8	130	-623.43	-3.98	4.53		
234	204	202	700	8	130	-534.47	-3.41	4.07		
236	208	204	200	4	130	-42.50	-1.09	0.31		
238	208	190	1875	4	130	7.03	0.18	0.10		
240	214	212	1200	4	130	-15.47	-0.40	0.29		
242	216	212	700	4	130	-2.44	-0.06	0.01		
244	218	216	900	4	130	13.03	0.33	0.16		
246	218	210	600	4	130	-28.50	-0.73	0.45		
248	212	210	600	4	130	-33.38	-0.85	0.60		
250	210	206	500	4	130	-77.35	-1.98	2.37		
252	208	204	500	8	130	-427.65	-2.73	1.92		

254	222	208	150	8	130	-350.30	-2.24	0.40	
256	224	222	150	6	130	0.00	0.00	0.00	
258	209	220	1250	1	130	10.00	4.09	114.84	
260	223	226	960	6	110	350.30	3.98	13.98	
262	228	226	3500	6	110	-350.30	-3.98	51.50	
264	228	230	150	8	110	125.00	1.42	6.46	PRV15 - 264
266	232	230	350	6	130	-125.00	-1.42	0.56	
268	234	232	100	6	110	0.00	0.00	0.00	
270	228	236	2400	6	110	215.30	2.44	92.53	PRV16 - 270 - Barberry
272	238	236	370	6	110	-74.16	-0.84	0.31	
274	240	236	375	6	130	-123.03	-1.40	0.58	
276	244	238	975	4	130	-56.05	-1.43	2.55	
278	242	240	750	4	130	-56.77	-1.45	2.01	
280	258	240	1050	4	130	-48.16	-1.23	2.07	
282	246	244	340	4	130	-67.81	-1.73	1.26	
284	248	246	525	4	130	-33.35	-0.85	0.52	
286	244	242	370	4	130	-27.86	-0.71	0.26	
288	258	242	525	4	130	-10.80	-0.28	0.07	
290	254	246	1650	4	130	-16.36	-0.42	0.44	
292	252	248	1050	4	130	-6.29	-0.16	0.05	
294	250	248	870	4	130	-8.95	-0.23	0.08	
296	252	250	310	4	130	9.16	0.23	0.03	
298	254	252	310	4	130	20.99	0.54	0.13	
300	256	254	310	4	130	22.74	0.58	0.15	
302	258	256	1205	4	130	40.85	1.04	1.75	
304	262	260	335	6	130	-101.05	-1.15	0.36	
306	264	262	475	6	130	-69.51	-0.79	0.26	
308	266	264	640	6	130	-42.43	-0.48	0.14	
310	268	266	700	4	130	-16.56	-0.42	0.19	
312	270	268	900	4	130	-2.45	-0.06	0.01	
314	272	270	400	4	130	11.66	0.30	0.06	
316	274	272	420	4	130	14.01	0.36	0.08	
318	276	274	590	4	130	15.15	0.39	0.14	
320	278	276	770	4	130	11.83	0.30	0.11	
322	278	260	900	4	130	-25.94	-0.66	0.56	
324	276	262	1050	4	130	-17.43	-0.45	0.32	
326	274	264	1125	4	130	-12.97	-0.33	0.20	
328	272	268	975	4	130	-11.76	-0.30	0.14	
330	302	204	2600	4	130	-48.84	-1.25	5.27	
332	300	202	1980	4	130	-73.49	-1.88	8.55	
334	298	200	1560	4	130	-103.43	-2.64	12.68	
336	302	300	590	4	130	-39.10	-1.00	0.79	
338	300	298	520	4	130	-28.74	-0.73	0.39	
340	298	296	300	4	130	58.80	1.50	0.85	
342	304	300	900	4	130	-34.36	-0.88	0.95	
344	308	302	1875	4	130	-59.17	-1.51	5.42	
346	304	296	760	4	130	-26.42	-0.67	0.49	
348	296	294	750	4	130	16.09	0.41	0.19	
350	308	306	620	4	130	-98.02	-2.50	4.56	
352	306	290	840	4	130	-134.30	-3.43	11.07	
354	292	290	840	8	130	352.50	2.25	2.26	
356	292	198	1920	8	110	-368.59	-2.35	7.65	
358	286	280	1275	4	110	-67.32	-1.72	6.37	
360	286	282	900	4	110	49.38	1.26	2.53	
362	282	280	1380	6	110	-224.51	-2.55	8.91	
364	284	282	525	4	110	-255.95	-6.54	31.12	
366	285	288	1090	4	110	220.07	5.62	48.85	
368	290	288	500	8	130	190.97	1.22	0.43	
370	314	288	1590	8	130	-393.10	-2.51	5.24	
372	312	306	1350	4	130	-42.60	-1.09	2.12	
374	310	308	540	4	130	-128.42	-3.28	6.55	
376	312	310	450	4	130	168.12	4.29	8.99	
378	314	312	450	4	130	152.74	3.90	7.53	
380	310	324	900	6	130	267.77	3.04	15.99	PRV 18 - 380 - Hardman
382	316	314	1125	6	110	-220.35	-2.61	7.62	
384	318	316	1050	4	130	-23.16	-0.59	0.53	
386	317	320	270	6	130	160.87	1.83	0.69	
388	322	320	835	6	130	-137.71	-1.56	2.01	
390	324	322	1520	4	130	43.94	1.12	2.53	Valve Closed

392	328	324	1650	6	130	-200.67	-2.28	6.35		
394	326	322	1356	4	130	-58.38	-1.49	3.82		
396	328	322	600	4	130	-100.11	-2.56	4.59		Valve Closed
398	330	328	2550	4	130	-37.17	-0.95	3.12		
400	330	328	2250	4	130	-39.77	-1.02	3.12		
402	332	330	2015	4	130	-37.97	-0.97	2.56		
404	334	332	1200	6	130	138.80	1.58	2.33		
406	336	334	2060	4	130	-42.30	-1.08	3.20		
408	336	332	450	6	130	-137.78	-1.56	0.86		
410	336	260	550	6	130	141.10	1.60	1.10		
412	306	304	690	4	130	-33.55	-0.86	0.70		
414	334	326	900	6	130	-220.08	-2.50	4.11		
133	114	111	1800	6	130	669.51	7.60	57.34		
135	112	111	20	6	130	0.00	0.00	0.00	C	Bycass Prater Tank
1	2	3	450	2	130	9.76	1.00	1.35		PRV1 - 1 - McGuinnes
15	18	17	30	3	130	96.87	4.40	0.88		PRV2 - 15 - Spruce Dr.
27	22	23	50	3	130	153.11	6.95	3.41		PRV3 - 27 - Kunz
31	26	27	50	6	130	154.70	1.76	21.38		PRV4 - 31
129	110	109	50	6	110	648.55	7.36	35.55		PRV6 - 129 - E. Forest
177	142	143	50	4	130	21.78	0.56	79.90		PRV7 - 177 - Vista West
175	136	137	50	2	130	21.78	2.22	49.96		PRV8 - 175 - Cedar Dr.
173	148	149	50	2	130	20.63	2.11	153.02		PRV9 - 173 - Redwood
171	144	145	500	6	130	71.11	0.81	133.26		PRV10 - 171 - Vista East (Up
203	172	173	50	6	110	394.75	4.48	205.17		PRV11 - 203 - Lower Green
211	185	187	25	6	110	13.20	0.15	0.00		PRV12 - 211 - Vista East (Lo
257	208	209	50	2	130	20.00	2.04	0.57		PRV13 - 257
259	222	223	50	6	110	350.30	3.98	79.66		PRV14 - 259 - Vista
365	284	285	50	4	130	238.01	6.08	1.90		PRV17 - 365 - Canyon Pines
385	316	317	50	8	130	184.03	2.09	24.72		PRV19 - 385 - Middle Branch
213	187	184	100	6	110	0.00	0.00	0.00	C	Closed or Green Fills from Prat

NODE TABLE

INPUT			OUTPUT		INPUT					
Node	Elevation	Demand	Pressure	HGL	XCoord	YCoord	Status	Description	Node	Pumps
	ft	US gpm	psi	ft						
2	6533.00	9.68	-49.98	6417.60				Plat 1 - Zone 1		
4	8443.00	9.68	-11.58	6416.24				Plat 1 - Zone 2		
6	6373.00	9.68	19.48	6417.99				Plat 1 - Zone 2		
8	6478.00	9.68	-25.22	6419.73				Plat 1 - Zone 1		
10	6478.00	9.68	-24.52	6421.36				Plat 1 - Zone 1		
12	6478.00	9.68	-19.50	6432.96				Plat 1 - Zone 1		
14	6473.00	9.68	-15.75	6436.61				Plat 1 - Zone 1		
16	6373.00	9.68	20.36	6420.02				Plat 1 - Zone 2		
18	6413.00	9.68	10.71	6437.73				Plat 1 - Zone 1		
20	6418.00	9.44	13.15	6446.39				Plat 2 - Zone 1		
22	6454.00	9.44	18.26	6496.17				Plat 2 - Zone 1		
24	6343.00	9.44	31.28	6415.25				Plat 2 - Zone 2		
26	6300.00	9.44	49.32	6413.94				Plat 2 - Zone 2		
28	6275.00	11.90	36.94	6360.33				Plat 3 - Zone 3		
30	6298.00	11.90	28.93	6364.82				Plat 3 - Zone 3		
32	6208.00	11.90	76.70	6385.17				Plat 3 - Zone 3		
34	6204.00	11.90	70.01	6365.72				Plat 3 - Zone 3		
36	6203.00	11.90	65.24	6353.70				Plat 3 - Zone 3		
38	6238.00	11.90	52.66	6359.63				Plat 3 - Zone 3		
40	6155.00	11.90	77.46	6333.93				Plat 3 - Zone 3		
42	6146.00	11.90	72.75	6314.04				Plat 3 - Zone 3		
44	6128.00	11.90	80.07	6312.96				Plat 3 - Zone 3		
46	6153.00	11.90	68.96	6312.31				Plat 3 - Zone 3		
48	6205.00	11.90	64.72	6354.50				Plat 3 - Zone 3		
50	6218.00	11.90	59.07	6354.45				Plat 3 - Zone 3		
52	6233.00	9.44	78.29	6413.85				Plat 2 - Zone 2		
54	6280.00	9.44	57.96	6413.86				Plat 2 - Zone 2		
56	6318.00	9.44	41.01	6412.73				Plat 2 - Zone 2		
58	6542.00	12.22	1.46	6545.38				Plat 15 - Zone 1		
60	6520.00	12.22	11.01	6545.43				Plat 15 - Zone 1		
62	6495.00	12.22	25.17	6553.13				Plat 15 - Zone 1		
64	6562.00	12.22	-2.97	6555.14				Plat 15 - Zone 1		
66	6606.00	12.22	-22.04	6555.08				Plat 15 - Zone 1		
68	6425.00	12.22	80.18	6564.01				Plat 15 - Zone 1		
70	6450.00	12.22	49.32	6563.93				Plat 15 - Zone 1		
72	6339.00	12.22	102.31	6575.33				Plat 15 - Zone 1		
74	6313.00	11.81	33.02	6389.27				Plat 20 - Zone 4		
76	6239.00	11.81	65.31	6389.86				Plat 20 - Zone 4		
78	6222.00	11.81	72.74	6390.02				Plat 20 - Zone 4		
80	6239.00	11.81	66.36	6392.29				Plat 20 - Zone 4		
82	6237.00	11.81	67.90	6393.84				Plat 20 - Zone 4		
84	6243.00	11.81	65.32	6393.89				Plat 20 - Zone 4		
86	6313.00	11.81	39.05	6403.21				Plat 20 - Zone 4		
88	6313.00	11.81	44.39	6415.53				Plat 20 - Zone 4		
90	6280.00	11.81	59.97	6418.54				PRV5 -114 - N. Forest - Plat 20 -Zone 4		
92	6313.00	11.81	43.61	6413.74				Plat 20 - Zone 4		
94	6313.00	11.81	43.42	6413.30				Plat 20 - Zone 4		
96	6300.00	14.03	132.08	6605.10				Plat 22 - Zone 1		
98	6355.00	14.03	115.37	6821.50				Plat 22 - Zone 1		
100	6360.00	14.03	115.27	6826.26				Plat 22 - Zone 1		
102	6480.00	14.03	69.49	6840.53				Plat 22 - Zone 1		
104	6470.00	14.03	77.17	6848.28				Plat 22 - Zone 1		
106	6450.00	14.03	87.00	6850.96				Plat 22 - Zone 1		
108	6400.00	0.00	111.86	6858.40				Trans from Prater Tank - Zone 5		
110	8529.00	9.08	88.34	6733.07				Plat 8 - Zone 5		
112	8555.00	9.08	108.73	6806.17				Plat 8 - Zone 5		
114	6800.00	0.00	2.66	6808.14				Prater Tank - 185000 gal		

116	6637.00	9.08	73.25	6806.22		Plat 8 - Zone 5
118	6672.00	9.08	59.91	6810.39		Plat 8 - Zone 5
120	6850.00	-300.00	-11.75	6822.87		Prater Zeroing Box
122	6707.00	9.08	35.54	6789.10		Plat 8 - Zone 5
124	6627.00	9.08	49.68	6741.75		Plat 8 - Zone 5
126	6717.00	9.08	31.20	6789.07		Plat 8 - Zone 5
128	6635.00	18.10	46.24	6741.81		Plat 7 - Zone 5
130	6640.00	18.10	42.02	6737.06		Plat 7 - Zone 5
132	6600.00	9.08	57.56	6732.96		Plat 8 - Zone 5
134	6540.00	18.10	83.58	6733.07		Plat 7 - Zone 5
136	6510.00	18.10	96.58	6733.10		Plat 7 - Zone 5
138	6452.00	10.89	99.03	6680.75		Plat 6 - Zone 6
140	6561.00	18.10	74.75	6733.66		Plat 7 - Zone 5
142	6538.00	18.10	84.58	6733.38		Plat 7 - Zone 5
144	6545.00	10.00	81.53	6733.34		SVRA Club House & Pool - Zone 5
146	6585.00	18.10	65.81	6737.02		Plat 7 - Zone 5
148	6500.00	18.10	109.54	6753.03		Plat 7 - Zone 5
150	6500.00	10.89	42.91	6599.12		Plat 6 - Zone 6
152	6450.00	10.89	132.68	6756.49		Plat 6 -Zone5
154	6505.00	10.89	108.91	6756.59		Plat 6 -Zone5
156	6545.00	10.89	92.08	6757.71		Plat 6 -Zone5
158	6505.00	10.89	110.46	6760.16		Plat 6 -Zone5
160	6495.00	10.89	43.77	6596.11		Plat 6 - Zone 6
162	6450.00	10.89	64.40	6598.76		Plat 6 - Zone 6
164	6429.00	10.89	73.46	6598.69		Plat 6 - Zone 6
166	6500.00	0.00	3.25	6507.50		Green Tank - 400000 gal - Zone 7
168	6480.00	5.26	124.99	6768.72		Plat 11 - Zone 5
170	6460.00	5.26	16.19	6497.39		Plat 11 - Zone 7
172	6460.00	5.26	133.82	6769.11		Plat 11 - Zone 5
174	6635.00	0.00	74.09	6806.14		Green PRV - 90osi - Zone 5
176	6400.00	13.20	65.75	6551.88		Plat 9 - Zone 8
178	6420.00	13.20	57.04	6551.75		Plat 9 - Zone 8
180	6325.00	13.20	93.32	6540.56		Plat 9 - Zone 8
182	6325.00	16.09	92.66	6539.03		Plat 12 - Zone 8
184	6325.00	13.20	58.35	6459.79		Plat 9 - Zone 7
186	6370.00	10.89	20.83	6418.12		Plat 6 - Zone 7
188	6315.00	5.26	45.36	6419.78		Plat 11 - Zone 7
190	6285.00	13.20	58.43	6419.97		Plat 9 - Zone 7
192	6380.00	10.89	118.27	6653.20		Plat 6 - Zone 6
194	6375.00	16.09	66.39	6528.35		Plat 12 - Zone 8
196	6325.00	16.09	51.97	6445.06		Plat 12 - Zone 7
198	6305.00	13.20	56.38	6435.25		Plat 9 - Zone 7
200	6275.00	16.09	66.66	6428.99		Plat 12 - Zone 7
202	6250.00	15.47	75.52	6424.46		Plat 10 - Zone 7
204	6220.00	15.47	86.75	6420.39		Plat 10 - Zone 7
206	6205.00	0.00	92.41	6418.46		Trans to Cedar Creek Dr. - Zone 7
208	6210.00	15.47	90.94	6420.08		Plat 10 - Zone 7
210	6220.00	15.47	84.89	6416.09		Plat 10 - Zone 7
212	6260.00	15.47	67.31	6415.49		Plat 10 - Zone 7
214	6300.00	15.47	49.87	6415.20		Plat 10 - Zone 7
216	6250.00	15.47	71.64	6415.49		Plat 10 - Zone 7
218	6210.00	15.47	89.02	6415.84		Plat 10 - Zone 7
220	6180.00	10.00	53.97	6304.67		LVI Facilities - Zone 9
222	6200.00	0.00	94.40	6418.07		Trans to Cedar Creek Dr. - Zone 7
224	6200.00	0.00	94.40	6418.07		SVRA Well #1 - Zone 7
226	6170.00	0.00	66.85	6324.43		Trans to Cedar Creek Dr. - Zone 10
228	6100.00	10.00	74.86	6272.93		Mary' Rest. and Sale's Office - Zone 10
230	6105.00	0.00	69.90	6268.47		PRV15 - 264 Trans to RV Park - Zone 12
232	6115.00	125.00	65.33	6265.91		RV Park - Zone 12
234	6112.00	0.00	66.63	6265.91		LVI Well #1 - Zone 12
236	6042.00	18.11	59.91	6180.40		PRV16 - 270 - Barberry - Plat 5 - Zone 13
238	6042.00	18.11	59.78	6180.09		Plat 5 - Zone 13
240	6049.00	18.11	56.63	6179.82		Plat 5 - Zone 13
242	6041.00	18.11	59.22	6177.81		Plat 5 - Zone 13
244	6034.00	18.09	62.14	6177.54		Plat 5 - Zone 13
246	6029.00	18.11	63.76	6176.28		Plat 5 - Zone 13
248	6027.00	18.11	64.40	6175.76		Plat 5 - Zone 13
250	6025.00	18.11	65.23	6175.68		Plat 5 - Zone 13
252	6033.00	18.11	61.78	6175.71		Plat 5 - Zone 13

254	6042.00	18.11	57.94	6175.84			Plat 5 - Zone 13
256	6048.00	18.11	55.41	6175.99			Plat 5 - Zone 13
258	6053.00	18.11	54.00	6177.74			Plat 5 - Zone 13
260	6200.00	14.11	74.63	6372.41			Plat 21 - Zone 11
262	6200.00	14.11	74.48	6372.04			Plat 21 - Zone 11
264	6192.00	14.11	77.83	6371.79			Plat 21 - Zone 11
266	6183.00	14.11	81.87	6371.65			Plat 21 - Zone 11
268	6168.00	14.11	88.08	6371.46			Plat 21 - Zone 11
270	6151.00	14.11	95.43	6371.45			Plat 21 - Zone 11
272	6156.00	14.11	93.29	6371.51			Plat 21 - Zone 11
274	6165.00	14.11	89.43	6371.59			Plat 21 - Zone 11
276	6173.00	14.11	86.03	6371.73			Plat 21 - Zone 11
278	6183.00	14.11	81.75	6371.84			Plat 21 - Zone 11
280	6400.00	17.94	50.09	6515.70			Plat 13 - Zone 8
282	6360.00	17.94	63.55	6508.79			Plat 13 - Zone 8
284	6340.00	17.94	58.73	6475.66			Plat 13 - Zone 8
286	6320.00	17.94	81.96	6509.32			Plat 13 - Zone 8
288	6308.00	17.94	50.61	6429.93			Plat 13 - Zone 7
290	6320.00	27.23	45.60	6425.34			Plat 14 - Zone 7
292	6325.00	16.09	44.42	6427.60			Plat 12 - Zone 7
294	6300.00	16.09	49.90	6415.26			Plat 12 - Zone 7
296	6280.00	16.09	58.64	6415.48			Plat 12 - Zone 7
298	6280.00	16.09	59.01	6416.31			Plat 12 - Zone 7
300	6250.00	28.77	71.82	6415.92			Plat 16 - Zone 7
302	6220.00	28.77	84.47	6415.12			Plat 16 - Zone 7
304	6260.00	27.23	67.08	6414.98			Plat 14 - Zone 7
306	6265.00	27.23	64.62	6414.27			Plat 14 - Zone 7
308	6240.00	28.77	73.47	6409.71			Plat 16 - Zone 7
310	6230.00	28.77	74.96	6403.15			Plat 16 - Zone 7
312	6240.00	27.23	74.52	6412.14			Plat 14 - Zone 7
314	6203.00	10.00	93.80	6419.67			Silo Recreation Center - Zone 7
316	6272.00	23.16	60.63	6412.06			Plat 17 - Zone 7
318	6300.00	23.16	48.28	6411.52			Plat 17 - Zone 7
320	6280.00	23.16	46.17	6388.65			Plat 17 - Zone 11
322	6262.00	23.16	53.09	6384.63			Plat 17 - Zone 11
324	6228.00	23.16	68.90	6387.16			PRV 18 - 380 - Hardman - Plat 17 - Zone 11
326	6226.00	38.98	67.02	6380.81			Plat 18 - Zone 11
328	6285.00	23.16	41.14	6380.04			Plat 17 - Zone 11
330	6255.00	38.98	52.78	6376.93			Plat 18 - Zone 11
332	6228.00	38.98	63.36	6374.37			Plat 18 - Zone 11
334	6225.00	38.98	65.67	6376.70			Plat 18 - Zone 11
336	6220.00	38.98	66.45	6373.51			Plat 18 - Zone 11
111	6558.00	9.08	83.90	6748.80			Plat 8 - Zone 5
3	6493.00	9.68	33.23	6416.24			PRV1 - 1 - McGuinnes - Plat 1 - Zone 2
17	6413.00	9.68	10.33	6436.85			PRV2 - 15 - Spruce Dr. - Plat 1 - Zone 2
23	6454.00	9.44	18.78	6492.76			PRV3 - 27 - Kunz - Plat 2 - Zone 2
27	6300.00	11.90	40.07	6392.56			PRV4 - 31 - Plat 3 - Zone 3
109	6529.00	0.00	72.96	6697.53			PRV6 - 129 - E. Forest - Trans to Plat 22 - Zone 1
143	6538.00	10.89	49.99	6653.47			PRV7 - 177 - Vista West - Plat 6 - Zone 6
137	6510.00	10.89	74.95	6683.14			PRV8 - 175 - Cedar Dr. - Plat 6 - Zone 6
149	6500.00	10.89	43.30	6600.02			PRV9 - 173 - Redwood - Plat 6 - Zone 6
145	6480.00	10.89	51.99	6600.09			PRV10 - 171 - Vista East (Upper) - Plat 6 - Zone 6
173	6460.00	13.20	45.00	6563.95			PRV11 - 203 - Lower Green - Plat 9 - Zone 8
185	6325.00	13.20	118.40	6598.51			Plat 9 - Zone 6
209	6210.00	10.00	90.70	6419.51			PRV13 - 257 - Maint. & LVI 1" Service - Zone 9
223	6200.00	0.00	59.92	6338.40			PRV14 - 259 - Vista - Trans to Cedar Cr. Dr. - Zone
285	6340.00	17.94	57.91	6473.76			PRV17 - 365 - Canyon Pines - Plat 13 - Zone 7
317	6272.00	23.16	49.93	6387.34			PRV19 - 385 - Middle Branch - Plat 17 - Zone 11
187	6325.00	13.20	118.40	6598.51			PRV12 - 211 - Vista East (Lower) - Plat 9 - Zone 6

FIXED GRADE SOURCES TABLE

	INPUT		OUTPUT		INPUT	
Node	Top Of Water	stimate	Actual	Inflow	Status	Description
	ft			US gpm		
166	6607.50	0.30	0.50	-1181.60		Green Tank - 400000 gal
114	6806.00	0.30	0.28	-657.53		Prater Tank - 185000 gal
174	6806.00	0.30	0.22	-511.66		Upper Green PRV - 74 psi

REDUCING (PRV) TABLE

	INPUT				OUTPUT		INPUT		
Pipe	Source	Pressure	OpenK	CKV	PRVLoss	KVState	Status	Description	Node
		psi	ft		ft				
203	174	45.00	50.00	Yes	204.25	Open		PRV11 - Lower Green	
366	174	69.30	0.00	Yes	0.00	Open		PRV17 - Canyon Pines	
380	186	69.00	0.00	Yes	10.08	Open		PRV18 - Hardman	
386	186	50.00	20.00	Yes	24.55	Open		PRV19 - Middle BR.	
259	166	60.00	20.00	Yes	78.93	Open		PRV14 - Vista	
129	114	73.00	20.00	Yes	33.24	Open		PRV6 - E. Forest	
264	166	70.00	0.00	Yes	6.13	Open		PRV15 - RV Park	
270	186	60.00	0.00	Yes	78.19	Open		PRV16 - Barberry	
114	114	60.00	100.00	Yes	186.31	Open		PRV5 - N. Forest	
27	114	31.90	0.00	Yes	0.00	Open		PRV3 - Kunz	
15	114	49.70	0.00	Yes	0.00	Open		PRV2 - Spruce Dr.	
1	114	15.00	0.00	Yes	0.00	Open		PRV1 - McGuinnes	
31	114	40.00	0.00	Yes	21.27	Open		PRV4 - Plat 3	
257	166	95.00	0.00	Yes	0.00	Open		PRV13 - Maint.	
177	114	50.00	20.00	Yes	79.88	Open		PRV7 - Vista West	
175	114	75.00	0.00	Yes	49.30	Open		PRV8 - Cedar Dr.	
173	114	43.30	50.00	Yes	152.42	Open		PRV9 - Redwood	
171	114	52.00	50.00	Yes	132.98	Open		PRV10 - Vista E. (Upper)	
								PRV12 - Vista E. (Lower)	

	Star Valley Ranch - Water System					100% BUILD-OUT ON EXISTING SYSTEM			5		
	Project 96014.03					SOME PRVs SET AT REVISED PRESSURES					
	100% Build-Out					PVC C = 130 (Steel C = 110)					
	File: sva7.XLS - Waterworks for Excel					Open All Possible Gate Valves					
						PRV12 Replaced With Closed Gate Valve					
				PIPE TABLE							
			INPUT				OUTPUT			INPUT	
	Pipe	UpNode	OnNode	Length	Diameter	Roughness	Flow	Velocity	HeadLoss	Status	Description
				ft	in		US gpm	ft/sec	ft		
	2	3	4	450	2	130	0.12	0.01	0.00		
	4	6	4	600	2	130	12.78	1.31	2.97		
	6	16	6	1380	3	130	25.68	1.17	3.45		
	8	10	8	550	2	130	12.90	1.32	2.77		
	10	12	10	300	2	130	51.72	5.28	19.76		
	12	10	2	350	2	130	25.92	2.65	6.41		
	14	14	12	450	3	130	64.62	2.93	8.21		
	16	17	16	700	3	130	116.26	5.28	28.67		
	18	18	14	400	4	130	77.52	1.98	1.91		
	20	20	18	450	4	130	219.57	5.61	14.74		
	22	24	16	1700	4	130	-77.67	-1.98	8.13		
	24	24	20	600	4	130	0.00	0.00	0.00	C	Valve Closed (Required)
	26	22	20	575	3	130	232.15	10.54	84.78		
	28	23	26	1300	3	130	191.54	8.69	134.25		
	30	26	24	650	4	130	-65.09	-1.66	2.24		
	32	27	32	500	4	130	190.44	4.86	12.58		
	34	38	28	350	3	130	-30.17	-1.37	1.18		
	36	30	28	1000	4	130	100.15	2.56	7.66		
	38	32	30	850	3	130	116.02	5.27	34.69		
	40	34	32	400	2	130	-58.55	-5.98	33.15		
	42	38	34	1300	2	130	-18.54	-1.89	10.37		
	44	36	34	1100	2	130	-26.14	-2.67	20.48		
	46	38	36	400	2	130	30.84	3.15	10.11		
	48	40	38	350	2	130	-63.48	-6.48	33.69		
	50	42	40	600	2	130	-47.61	-4.86	33.90		
	52	46	42	400	2	130	-15.87	-1.62	2.96		
	54	44	42	250	2	130	-15.87	-1.62	1.85		
	56	48	38	700	3	130	22.37	1.02	1.35		
	58	50	48	300	4	130	-15.87	-0.41	0.08		
	60	48	28	1000	3	130	-54.11	-2.46	9.94		
	62	54	26	800	6	130	-37.74	-0.43	0.14		
	64	56	54	400	2	130	-12.58	-1.28	1.92		
	66	54	52	800	6	130	12.58	0.14	0.01		
	68	60	72	500	4	110	448.85	11.46	83.88		
	70	60	58	240	4	110	16.29	0.42	0.09		
	72	82	60	495	6	110	481.43	5.46	13.12		
	74	64	62	525	4	110	77.72	1.98	3.42		
	76	66	64	300	4	110	-16.29	-0.42	0.11		
	78	70	64	1200	4	110	110.30	2.82	14.97		Valve Closed
	80	70	68	450	4	110	-14.87	-0.38	0.14		Valve Closed
	82	68	62	900	6	110	420.00	4.77	18.53		
	84	72	68	820	6	110	451.16	5.12	19.28		
	86	72	70	1520	4	110	111.72	2.85	19.41		
	88	96	72	1850	6	130	579.17	6.57	50.69		
	90	76	74	1000	3	130	15.75	0.71	1.01		
	92	78	76	300	4	130	31.50	0.80	0.27		
	94	80	78	500	3	130	47.25	2.14	3.37		
	96	82	80	950	3	130	27.25	1.24	2.65		
	98	92	80	1100	2	130	35.75	3.65	36.56		
	100	84	82	350	3	130	7.04	0.32	0.08		
	102	86	84	1100	2	130	22.79	2.33	15.88		
	104	88	86	550	2	130	38.54	3.94	21.01		
	106	90	88	200	3	130	90.25	4.10	5.13		
	108	92	90	550	3	130	-67.25	-3.05	8.18		
	110	94	92	750	3	130	-15.75	-0.71	0.76		
	112	88	82	1100	2	130	35.96	3.67	36.96		
	114	96	90	20	4	130	173.25	4.42	103.41		PRV5 -114 - N. Forest

116	98	96	600	6	130	771.12	8.75	27.93		
118	100	98	700	4	130	125.32	3.20	8.12		
120	102	100	1820	4	130	144.02	3.88	24.30		
122	104	102	700	4	130	162.72	4.15	13.17		
124	106	98	1420	6	130	664.50	7.54	50.19		
126	106	104	200	4	130	181.42	4.63	4.80		
128	108	106	220	6	130	864.62	9.81	12.66		
130	109	108	850	6	110	864.62	9.81	66.65		
132	111	110	450	6	130	878.05	9.94	26.53		
134	114	112	1600	6	130	79.79	0.91	1.12		
136	116	112	800	6	130	-67.69	-0.77	0.41		
138	118	116	400	6	110	287.90	3.27	4.09		
140	120	118	1130	6	110	300.00	3.40	12.48		
142	122	116	380	4	130	-343.49	-8.77	28.51		
144	126	122	375	4	130	-12.10	-0.31	0.06		
146	128	122	1200	4	130	-319.29	-8.15	78.84		
148	128	124	800	4	130	-12.10	-0.31	0.09		
150	130	128	150	4	130	-283.06	-7.23	7.86		
152	146	130	1050	4	130	-7.21	-0.18	0.06		
154	134	132	1300	4	130	12.10	0.31	0.20		
156	134	110	1475	6	130	0.67	0.01	0.00		
158	136	134	400	6	130	36.90	0.42	0.07		
160	142	136	430	6	110	90.07	1.02	0.51		Valve Open
162	142	140	250	6	130	-143.24	-1.63	0.52		
164	140	130	710	6	110	-251.72	-2.86	5.67		Valve Broken Closed
166	144	140	440	6	110	-84.35	-0.96	0.46		
168	146	144	800	2	130	16.10	1.84	6.07		Valve Broken Closed
170	148	146	1000	2	130	30.01	3.37	28.68		
172	145	150	500	8	130	75.93	0.86	2.68		
174	149	150	300	2	130	17.35	1.77	2.81		
176	137	138	650	2	130	14.52	1.48	4.07		
178	143	192	2150	4	130	14.52	0.37	0.46		
180	162	150	860	8	110	-78.76	-0.89	0.61		
182	164	162	310	6	110	-49.72	-0.56	0.12		
184	162	160	720	2	130	14.52	1.48	4.51		
186	154	152	800	4	130	14.52	0.37	0.17		
188	154	148	1100	4	130	89.02	2.27	6.77		
190	156	154	200	4	130	118.08	3.01	2.08		
192	158	156	350	4	130	132.58	3.39	4.50		
194	160	158	1000	4	130	147.10	3.76	15.60		
196	168	166	100	6	130	0.00	0.00	0.00	C	LCV #2 Assumed Closed
198	166	170	400	8	130	1554.19	9.92	16.80		
200	174	172	1700	6	130	653.78	7.42	58.30		
202	172	168	300	6	130	154.11	1.75	0.71		
204	173	176	700	6	110	475.07	5.39	18.11		
206	178	178	700	4	130	-17.60	-0.45	0.21		
208	180	176	750	8	110	-439.87	-4.99	16.82		
210	184	170	1500	8	130	-1547.18	-9.88	62.46		
212	184	185	1425	6	110	35.20	0.40	0.30		
214	188	186	450	2	130	14.52	1.48	2.82		
216	190	188	750	4	130	21.53	0.55	0.33		
218	198	190	1100	2	130	28.04	2.86	23.31		
220	196	184	600	8	130	-1529.58	-9.76	24.46		
222	198	196	410	8	130	-1508.13	-9.63	16.38		
224	182	180	600	8	130	-422.27	-2.70	2.26		
226	194	182	930	6	110	-400.82	-4.55	15.67		
228	280	194	1080	6	110	-379.37	-4.31	18.42		
230	200	198	686	8	130	-938.31	-5.99	9.85		
232	202	200	585	8	130	-782.03	-4.99	6.89		
234	204	202	700	8	130	-684.07	-4.24	6.09		
236	208	204	200	4	130	51.72	1.32	0.45		
238	208	190	1875	4	130	11.09	0.28	0.24		
240	214	212	1200	4	130	-20.63	-0.53	0.49		
242	216	212	700	4	130	-3.25	-0.08	0.01		
244	218	216	900	4	130	17.38	0.44	0.27		
246	218	210	900	4	130	38.01	0.97	0.76		
248	212	210	900	4	130	44.51	1.14	1.02		
250	210	208	500	4	130	-103.15	-2.63	4.04		
252	206	204	500	8	130	-525.25	-3.36	2.82		

254	222	206	150	8	130	-422.10	-2.69	0.56	
256	224	222	150	6	130	0.00	0.00	0.00	
258	209	220	1250	1	130	10.00	4.09	114.84	
260	223	226	950	6	110	422.10	4.79	19.74	
262	228	226	3500	6	110	-422.10	-4.79	72.74	
264	228	230	150	6	110	125.00	1.42	0.33	PRV15 - 264
266	232	230	350	6	130	-125.00	-1.42	0.56	
268	234	232	100	6	110	0.00	0.00	0.00	
270	228	236	2400	6	110	287.10	3.26	65.48	PRV16 - 270 - Barberry
272	238	236	370	6	110	-98.89	-1.12	0.52	
274	240	236	375	6	130	-164.06	-1.86	0.99	
276	244	238	975	4	130	-74.74	-1.91	4.34	
278	242	240	750	4	130	-75.70	-1.93	3.42	
280	258	240	1050	4	130	-64.22	-1.64	3.53	
282	246	244	340	4	130	-90.43	-2.31	2.15	
284	248	246	525	4	130	-44.47	-1.14	0.89	
286	244	242	370	4	130	-37.14	-0.95	0.45	
288	258	242	525	4	130	-14.40	-0.37	0.11	
290	254	248	1650	4	130	-21.81	-0.56	0.75	
292	252	248	1050	4	130	-8.38	-0.21	0.08	
294	250	248	670	4	130	-11.93	-0.30	0.13	
296	252	250	310	4	130	12.22	0.31	0.05	
298	254	252	310	4	130	27.98	0.71	0.22	
300	256	254	310	4	130	30.32	0.77	0.26	
302	258	256	1205	4	130	54.47	1.39	2.99	
304	262	260	335	6	130	-134.71	-1.53	0.62	
306	264	262	475	6	130	-92.66	-1.05	0.44	
308	266	264	640	6	130	-56.56	-0.64	0.24	
310	268	266	700	4	130	-22.07	-0.56	0.33	
312	270	268	900	4	130	-3.26	-0.08	0.01	
314	272	270	400	4	130	15.55	0.40	0.10	
316	274	272	420	4	130	18.68	0.48	0.14	
318	276	274	590	4	130	20.20	0.52	0.23	
320	278	276	770	4	130	15.77	0.40	0.19	
322	278	260	900	4	130	-34.58	-0.88	0.96	
324	276	262	1050	4	130	-23.24	-0.59	0.54	
326	274	264	1125	4	130	-17.30	-0.44	0.33	
328	272	266	975	4	130	-15.67	-0.40	0.24	
330	302	204	2600	4	130	-66.46	-1.70	9.32	
332	300	202	1980	4	130	-97.34	-2.49	14.38	
334	298	200	1560	4	130	-134.83	-3.44	20.71	
336	302	300	590	4	130	-44.91	-1.15	1.02	
338	300	298	520	4	130	-34.46	-0.88	0.55	
340	298	296	300	4	130	78.92	2.02	1.48	
342	304	300	900	4	130	-48.53	-1.24	1.80	
344	308	302	1875	4	130	-73.01	-1.86	7.99	
346	304	296	760	4	130	-36.02	-0.92	0.88	
348	298	294	750	4	130	21.45	0.55	0.33	
350	308	306	620	4	130	-112.12	-2.86	5.85	
352	306	290	840	4	130	-158.45	-4.05	15.04	
354	292	290	840	8	130	502.74	3.21	4.36	
356	292	198	1920	8	110	-524.19	-3.35	14.68	
358	286	280	1275	4	110	-82.58	-2.11	9.30	
360	286	282	900	4	110	58.63	1.50	3.48	
362	282	280	1380	6	110	-272.87	-3.10	12.79	
364	284	282	525	4	110	-307.58	-7.85	43.74	
366	285	288	1080	4	110	259.72	6.63	66.40	
368	290	288	500	8	130	307.99	1.97	1.05	
370	314	288	1590	8	130	-543.77	-3.47	9.56	
372	312	308	1350	4	130	-58.28	-1.49	3.79	
374	310	308	540	4	130	-146.77	-3.75	8.39	
376	312	310	450	4	130	182.32	4.66	10.45	
378	314	312	450	4	130	160.33	4.09	8.24	
380	310	324	900	6	130	290.72	3.30	6.88	PRV 18 - 380 - Hardman
382	316	314	1125	6	110	-373.44	-4.24	18.63	
384	318	316	1050	4	130	-30.88	-0.79	0.91	
386	317	320	270	6	130	280.80	3.19	1.94	
388	322	320	835	6	130	-249.92	-2.84	4.83	
390	324	322	1520	4	130	13.04	0.33	0.27	Valve Closed

392	326	324	1650	8	130	-246.80	-2.80	9.32		
394	326	322	1356	4	130	-92.99	-2.37	9.05		
396	328	322	600	4	130	-139.09	-3.55	8.44		Valve Closed
398	330	328	2550	4	130	-52.28	-1.33	5.86		
400	330	328	2250	4	130	-55.93	-1.43	5.86		
402	332	330	2015	4	130	-56.23	-1.44	5.30		
404	334	332	1200	6	130	180.39	2.05	3.79		
406	336	334	2060	4	130	-55.44	-1.42	5.28		
408	336	332	450	6	130	-184.64	-2.10	1.48		
410	336	260	550	6	130	188.10	2.13	1.88		
412	306	304	690	4	130	-48.25	-1.23	1.37		
414	334	326	900	6	130	-287.81	-3.27	6.75		
133	114	111	1600	6	130	888.15	10.08	96.76		
135	112	111	20	6	130	0.00	0.00	0.00	C	Bypass Prater Tank
1	2	3	450	2	130	13.02	1.33	2.30		PRV1 - 1 - McGuinnes
15	18	17	30	3	130	129.16	5.86	1.49		PRV2 - 15 - Spruce Dr
27	22	23	50	3	130	204.12	9.27	5.81		PRV3 - 27 - Kunz
31	26	27	50	6	130	206.31	2.34	0.20		PRV4 - 31
129	110	109	50	8	110	864.62	9.81	3.92		PRV6 - 129 - E. Forest
177	142	143	50	4	130	29.04	0.74	29.94		PRV7 - 177 - Vista West
175	138	137	50	2	130	29.04	2.97	1.13		PRV8 - 175 - Cedar Dr.
173	148	149	50	2	130	31.87	3.26	118.20		PRV9 - 173 - Redwood
171	144	145	500	6	130	90.45	1.03	83.38		PRV10 - 171 - Vista East Up
203	172	173	50	8	110	492.67	5.59	183.90		PRV11 - 203 - Lower Green
211	185	187	25	6	110	17.60	0.20	0.00		PRV12 - 211 - Vista East Lo
257	208	209	50	2	130	20.00	2.04	0.57		PRV13 - 257
259	222	223	50	6	110	422.10	4.79	23.10		PRV14 - 259 - Vista
365	284	286	50	4	130	283.65	7.24	2.63		PRV17 - 365 - Canyon Pines
385	316	317	50	6	130	311.68	3.54	0.43		PRV19 - 385 - Middle Branch
213	187	184	100	6	110	0.00	0.00	0.00	C	Closed or Green Fills from Prat

NODE TABLE

	INPUT		OUTPUT		INPUT					
Node	Elevation	Demand	Pressure	HGL	XCoord	YCoord	Status	Description	Node	Pumps
	ft	US gpm	psi	ft						
2	6533.00	12.90	-143.09	6202.45				Plat 1 - Zone 1		
4	6443.00	12.90	-105.13	6200.15				Plat 1 - Zone 2		
6	6373.00	12.90	-73.54	6203.12				Plat 1 - Zone 2		
8	6478.00	12.90	-117.71	6206.10				Plat 1 - Zone 1		
10	6478.00	12.90	-116.51	6208.87				Plat 1 - Zone 1		
12	6478.00	12.90	-107.98	6228.62				Plat 1 - Zone 1		
14	6473.00	12.90	-103.10	6234.83				Plat 1 - Zone 1		
16	6373.00	12.90	-72.05	6206.57				Plat 1 - Zone 2		
18	6413.00	12.90	-76.30	6236.74				Plat 1 - Zone 1		
20	6416.00	12.58	-71.22	6251.48				Plat 2 - Zone 1		
22	6454.00	12.58	-50.97	6336.26				Plat 2 - Zone 1		
24	6343.00	12.58	-62.58	6198.44				Plat 2 - Zone 2		
26	6300.00	12.58	-44.93	6196.20				Plat 2 - Zone 2		
28	6275.00	15.87	-57.98	6141.07				Plat 3 - Zone 3		
30	6298.00	15.87	-64.62	6148.73				Plat 3 - Zone 3		
32	6208.00	15.87	-10.64	6183.42				Plat 3 - Zone 3		
34	6204.00	15.87	-23.26	6150.26				Plat 3 - Zone 3		
36	6203.00	15.87	-31.70	6129.78				Plat 3 - Zone 3		
38	6238.00	15.87	-42.47	6139.89				Plat 3 - Zone 3		
40	6155.00	15.87	-25.50	6096.09				Plat 3 - Zone 3		
42	6146.00	15.87	-36.28	6062.19				Plat 3 - Zone 3		
44	6128.00	15.87	-29.29	6060.35				Plat 3 - Zone 3		
46	6153.00	15.87	-40.59	6059.24				Plat 3 - Zone 3		
48	6205.00	15.87	-31.98	6131.14				Plat 3 - Zone 3		
50	6218.00	15.87	-37.64	6131.06				Plat 3 - Zone 3		
52	6233.00	12.58	-16.00	6196.05				Plat 2 - Zone 2		
54	6280.00	12.58	-36.34	6196.06				Plat 2 - Zone 2		
56	6318.00	12.58	-53.62	6194.14				Plat 2 - Zone 2		
58	6542.00	16.29	-52.79	6420.05				Plat 15 - Zone 1		
60	6520.00	16.29	-43.23	6420.14				Plat 15 - Zone 1		
62	6495.00	16.29	-28.73	6433.26				Plat 15 - Zone 1		
64	6562.00	16.29	-54.25	6436.69				Plat 15 - Zone 1		
66	6606.00	16.29	-73.34	6436.58				Plat 15 - Zone 1		
68	6425.00	16.29	11.60	6451.80				Plat 15 - Zone 1		
70	6450.00	16.29	0.72	6451.86				Plat 15 - Zone 1		
72	6339.00	16.29	57.17	6471.07				Plat 15 - Zone 1		
74	6313.00	15.75	24.01	6368.47				Plat 20 - Zone 4		
76	6239.00	15.75	56.48	6369.48				Plat 20 - Zone 4		
78	6222.00	15.75	63.96	6369.75				Plat 20 - Zone 4		
80	6239.00	15.75	58.27	6373.81				Plat 20 - Zone 4		
82	6237.00	15.75	60.29	6378.26				Plat 20 - Zone 4		
84	6243.00	15.75	57.72	6376.34				Plat 20 - Zone 4		
86	6313.00	15.75	34.30	6392.22				Plat 20 - Zone 4		
88	6313.00	15.75	43.39	6413.23				Plat 20 - Zone 4		
90	6280.00	15.75	59.89	6418.36				PRV5 -114 - N. Forest - Plat 20 -Zone 4		
92	6313.00	15.75	42.07	6410.18				Plat 20 - Zone 4		
94	6313.00	15.75	41.74	6409.42				Plat 20 - Zone 4		
96	6300.00	18.70	96.00	6521.76				Plat 22 - Zone 1		
98	6355.00	18.70	84.28	6549.70				Plat 22 - Zone 1		
100	6380.00	18.70	85.63	6557.81				Plat 22 - Zone 1		
102	6480.00	18.70	44.21	6582.11				Plat 22 - Zone 1		
104	6470.00	18.70	54.23	6595.28				Plat 22 - Zone 1		
106	6450.00	18.70	64.88	6599.88				Plat 22 - Zone 1		
108	6400.00	0.00	92.01	6612.64				Trans from Prater Tank - Zone 5		
110	6529.00	12.10	66.71	6683.11				Plat 8 - Zone 5		
112	6555.00	12.10	108.35	6805.29				Plat 8 - Zone 5		
114	6800.00	0.00	2.77	6806.40				Prater Tank - 185000 gal		

116	6637.00	12.10	72.67	6804.88		Plat 8 - Zone 5
118	6672.00	12.10	59.29	6808.97		Plat 8 - Zone 5
120	6850.00	-300.00	-12.36	6827.45		Prater Zeroing Box
122	6707.00	12.10	30.03	6776.37		Plat 8 - Zone 5
124	6827.00	12.10	30.58	6697.64		Plat 8 - Zone 5
126	6717.00	12.10	25.68	6776.31		Plat 8 - Zone 5
128	6635.00	24.13	27.16	6697.73		Plat 7 - Zone 5
130	6640.00	24.13	21.59	6689.87		Plat 7 - Zone 5
132	6800.00	12.10	35.89	6682.91		Plat 8 - Zone 5
134	6540.00	24.13	81.95	6683.11		Plat 7 - Zone 5
136	6510.00	24.13	74.97	6883.17		Plat 7 - Zone 6
138	6452.00	14.52	97.82	6877.97		Plat 6 - Zone 6
140	6561.00	24.13	53.33	6684.20		Plat 7 - Zone 5
142	6538.00	24.13	63.07	6683.68		Plat 7 - Zone 5
144	6545.00	10.00	60.06	6683.74		SVRA Club House & Pool - Zone 5
146	6685.00	24.13	45.37	6889.80		Plat 7 - Zone 5
148	6500.00	24.13	94.58	6718.48		Plat 7 - Zone 5
150	6500.00	14.52	42.28	6597.87		Plat 6 - Zone 6
152	6460.00	14.52	119.08	6725.08		Plat 6 -Zone6
154	6505.00	14.52	95.35	6725.25		Plat 6 -Zone6
156	6545.00	14.52	78.93	6727.33		Plat 6 -Zone6
158	6505.00	14.52	88.20	6731.80		Plat 6 -Zone6
160	6496.00	14.52	42.23	6592.55		Plat 6 - Zone 6
162	6450.00	14.52	63.66	6597.06		Plat 6 - Zone 6
164	6429.00	14.52	72.70	6596.93		Plat 6 - Zone 6
166	6500.00	0.00	3.25	6507.50		Green Tank - 400000 gal - Zone 7
168	6480.00	7.01	115.77	6747.44		Plat 11 - Zone 5
170	6460.00	7.01	13.29	6490.70		Plat 11 - Zone 7
172	6460.00	7.01	124.74	6748.14		Plat 11 - Zone 5
174	6635.00	0.00	74.22	6806.44		Green PRV - 90psi - Zone 5
176	6400.00	17.60	63.26	6546.14		Plat 9 - Zone 8
178	6420.00	17.60	54.51	6545.92		Plat 9 - Zone 8
180	6325.00	17.60	88.45	6529.31		Plat 9 - Zone 8
182	6325.00	21.45	87.47	6527.08		Plat 12 - Zone 8
184	6325.00	17.60	44.70	6428.26		Plat 9 - Zone 7
186	6370.00	14.52	-3.88	6361.04		Plat 6 - Zone 7
188	6315.00	7.01	21.15	6363.86		Plat 11 - Zone 7
190	6285.00	17.60	34.28	6364.19		Plat 9 - Zone 7
192	6380.00	14.52	118.30	6653.28		Plat 6 - Zone 6
194	6375.00	21.45	59.04	6511.39		Plat 12 - Zone 8
196	6325.00	21.45	34.11	6403.79		Plat 12 - Zone 7
198	6305.00	17.60	35.72	6387.50		Plat 9 - Zone 7
200	6275.00	21.45	44.53	6377.85		Plat 12 - Zone 7
202	6250.00	20.63	52.37	6370.97		Plat 10 - Zone 7
204	6220.00	20.63	62.72	6364.88		Plat 10 - Zone 7
206	6205.00	0.00	67.99	6382.07		Trans to Cedar Creek Dr. - Zone 7
208	6210.00	20.63	66.85	6364.43		Plat 10 - Zone 7
210	6220.00	20.63	59.75	6358.02		Plat 10 - Zone 7
212	6260.00	20.63	41.99	6357.00		Plat 10 - Zone 7
214	6300.00	20.63	24.46	6358.51		Plat 10 - Zone 7
216	6250.00	20.63	46.32	6356.99		Plat 10 - Zone 7
218	6210.00	20.63	63.75	6357.26		Plat 10 - Zone 7
220	6180.00	10.00	29.88	6249.03		LVI Facilities - Zone 9
222	6200.00	0.00	69.91	6381.50		Trans to Cedar Creek Dr. - Zone 7
224	6200.00	0.00	69.91	6381.50		SVRA Well #1 - Zone 7
226	6170.00	0.00	64.36	6318.56		Trans to Cedar Creek Dr. - Zone 10
228	6100.00	10.00	63.17	6245.93		Mary' Rest. and Sale's Office - Zone 10
230	6105.00	0.00	60.87	6245.80		PRV15 - 264 Trans to RV Park - Zone 12
232	6115.00	125.00	56.29	6245.04		RV Park - Zone 12
234	6112.00	0.00	57.59	6245.04		LVI Well #1 - Zone 12
236	6042.00	24.15	59.93	6180.46		PRV16 - 270 - Barberry - Plat 5 - Zone 13
238	6042.00	24.15	59.71	6178.92		Plat 5 - Zone 13
240	6049.00	24.15	56.47	6178.45		Plat 5 - Zone 13
242	6041.00	24.15	58.46	6176.03		Plat 5 - Zone 13
244	6034.00	21.45	81.29	6175.58		Plat 5 - Zone 13
246	6029.00	24.15	62.52	6173.43		Plat 5 - Zone 13
248	6027.00	24.15	63.00	6172.53		Plat 5 - Zone 13
250	6025.00	24.15	63.81	6172.41		Plat 5 - Zone 13
252	6003.00	24.15	80.37	6172.45		Plat 5 - Zone 13

254	6042.00	24.15	56.57	6172.68		Plat 5 - Zone 13
256	6048.00	24.15	54.09	6172.94		Plat 5 - Zone 13
258	6053.00	24.15	53.21	6175.92		Plat 5 - Zone 13
260	6200.00	18.81	47.22	6309.08		Plat 21 - Zone 11
262	6200.00	18.81	46.95	6308.46		Plat 21 - Zone 11
264	6192.00	18.81	50.23	6308.02		Plat 21 - Zone 11
266	6183.00	18.81	54.02	6307.79		Plat 21 - Zone 11
268	6168.00	18.81	60.37	6307.46		Plat 21 - Zone 11
270	6151.00	18.81	67.73	6307.45		Plat 21 - Zone 11
272	6156.00	18.81	65.80	6307.55		Plat 21 - Zone 11
274	6165.00	18.81	61.77	6307.69		Plat 21 - Zone 11
276	6173.00	18.81	58.41	6307.92		Plat 21 - Zone 11
278	6183.00	18.81	54.16	6308.12		Plat 21 - Zone 11
280	6400.00	23.93	40.25	6492.97		Plat 13 - Zone 8
282	6360.00	23.93	52.03	6480.18		Plat 13 - Zone 8
284	6340.00	23.93	41.75	6438.44		Plat 13 - Zone 8
286	6320.00	23.93	70.85	6483.67		Plat 13 - Zone 8
288	6308.00	23.93	25.72	6367.41		Plat 13 - Zone 7
290	6320.00	36.30	20.98	6368.46		Plat 14 - Zone 7
292	6325.00	21.45	20.70	6372.82		Plat 12 - Zone 7
294	6300.00	21.45	23.95	6355.33		Plat 12 - Zone 7
296	6280.00	21.45	32.76	6355.66		Plat 12 - Zone 7
298	6280.00	21.45	33.39	6357.14		Plat 12 - Zone 7
300	6250.00	38.36	46.14	6356.59		Plat 16 - Zone 7
302	6220.00	38.36	58.69	6355.57		Plat 16 - Zone 7
304	6260.00	36.30	41.03	6354.79		Plat 14 - Zone 7
306	6265.00	36.30	38.28	6353.42		Plat 14 - Zone 7
308	6240.00	38.36	46.57	6347.57		Plat 16 - Zone 7
310	6230.00	38.36	47.27	6339.18		Plat 16 - Zone 7
312	6240.00	36.30	47.46	6349.63		Plat 14 - Zone 7
314	6203.00	10.00	67.04	6357.86		Silo Recreation Center - Zone 7
316	6272.00	30.88	29.10	6339.23		Plat 17 - Zone 7
318	6300.00	30.88	16.59	6338.32		Plat 17 - Zone 7
320	6280.00	30.88	24.61	8336.86		Plat 17 - Zone 11
322	6262.00	30.88	30.32	8332.03		Plat 17 - Zone 11
324	6228.00	30.88	45.15	8332.30		PRV 18 - 380 - Hardman - Plat 17 - Zone 11
326	8226.00	51.98	41.99	6322.99		Plat 18 - Zone 11
328	6285.00	30.88	16.71	6323.59		Plat 17 - Zone 11
330	8255.00	51.98	27.16	6317.74		Plat 18 - Zone 11
332	6228.00	51.98	38.55	6312.44		Plat 18 - Zone 11
334	8225.00	51.98	39.49	6316.23		Plat 18 - Zone 11
336	8220.00	51.98	39.37	6310.95		Plat 18 - Zone 11
111	6565.00	12.10	86.94	6709.64		Plat 8 - Zone 5
3	6493.00	12.90	-128.77	6200.15		PRV1 - 1 - McGuinnes - Plat 1 - Zone 2
17	6413.00	12.90	-76.96	6235.25		PRV2 - 15 - Spruce Dr - Plat 1 - Zone 2
23	6454.00	12.58	-53.49	6330.46		PRV3 - 27 - Kunz - Plat 2 - Zone 2
27	6300.00	15.87	-45.02	6196.00		PRV4 - 31 - Plat 3 - Zone 3
109	6529.00	0.00	65.02	8679.19		PRV6 - 129 - E. Forest - Trans to Plat 22 - Zone 1
143	6538.00	14.52	50.10	8653.74		PRV7 - 177 - Vista West - Plat 6 - Zone 6
137	6510.00	14.52	74.48	6682.04		PRV8 - 175 - Cedar Dr. - Plat 6 - Zone 6
149	6600.00	14.52	43.41	6600.28		PRV9 - 173 - Redwood - Plat 6 - Zone 6
145	6480.00	14.52	52.10	6600.35		PRV10 - 171 - Vista East (Upper) - Plat 6 - Zone 6
173	6460.00	17.60	45.13	6564.24		PRV11 - 203 - Lower Green - Plat 9 - Zone 8
185	6325.00	17.60	117.59	6596.64		Plat 9 - Zone 6
209	6210.00	10.00	86.61	6363.87		PRV13 - 257 - Maint. & LVI 1" Service - Zone 9
223	6200.00	0.00	59.92	6338.40		PRV14 - 259 - Vista - Trans to Cedar Cr. Dr - Zone
385	6340.00	23.93	40.61	6433.81		PRV17 - 385 - Canyon Pines - Plat 13 - Zone 7
177	6272.00	30.88	28.92	6338.80		PRV19 - 385 - Middle Branch - Plat 17 - Zone 11
187	6325.00	17.60	117.59	6596.64		PRV12 - 211 - Vista East (Lower) - Plat 9 - Zone 6

FIXED GRADE SOURCES TABLE

INPUT			OUTPUT			INPUT
Node	Top Of Water	stimate	Actual	Inflow	Status	Description
	ft			US gpm		
166	6507.50	0.30	0.49	-1554.19		Green Tank - 400000 gal
114	6806.00	0.30	0.30	-967.95		Prater Tank - 185000 gal
174	6806.00	0.30	0.21	-653.78		Upper Green PRV - 74 psi

REDUCING (PRV) TABLE

	INPUT				OUTPUT		INPUT		
Pipe	Source	Pressure	OpenK	CKV	PRVLoss	KVState	Status	Description	Node
		psi	ft		ft				
203	174	45.00	50.00	Yes	182.52	Open		PRV11 - Lower Green	
365	174	69.30	0.00	Yes	0.00	Open		PRV17 - Canyon Pines	
380	166	69.00	0.00	Yes	0.00	Open		PRV18 - Hardman	
385	166	50.00	0.00	Yes	0.00	Open		PRV19 - Middle BR.	
259	166	60.00	20.00	Yes	22.06	Open		PRV14 - Vista	
129	114	73.00	0.00	Yes	0.00	Open		PRV6 - E. Forest	
264	166	70.00	0.00	Yes	0.00	Open		PRV15 - RV Park	
270	166	60.00	0.00	Yes	41.05	Open		PRV16 - Barberry	
114	114	60.00	0.00	Yes	102.99	Open		PRV5 - N. Forest	
27	114	31.90	0.00	Yes	0.00	Open		PRV3 - Kunz	
15	114	49.70	0.00	Yes	0.00	Open		PRV2 - Spruce Dr	
1	114	15.00	0.00	Yes	0.00	Open		PRV1 - McGuinnes	
31	114	40.00	0.00	Yes	0.00	Open		PRV4 - Plat 3	
257	166	95.00	0.00	Yes	0.00	Open		PRV13 - Maint.	
177	114	50.00	20.00	Yes	29.91	Open		PRV7 - Vista West	
175	114	75.00	0.00	Yes	0.00	Open		PRV8 - Cedar Dr	
173	114	43.30	50.00	Yes	116.86	Open		PRV9 - Redwood	
171	114	32.00	50.00	Yes	82.94	Open		PRV10 - Vista E. (Upper)	
								PRV12 - Vista E. (Lower)	