EXECUTIVE SUMMARY

RAFTERS J WATER SUPPLY
LEVEL II STUDY

for

WYOMING WATER DEVELOPMENT
COMMISSION

November 1998
EXECUTIVE SUMMARY
TABLE OF CONTENTS

BACKGROUND .......................................................................................................... ES-1
STUDY OBJECTIVE .................................................................................................. ES-1
SERVICE AREA BOUNDARY .................................................................................. ES-1
POPULATION PROJECTIONS ................................................................................. ES-1
WATER USE RECORDS ........................................................................................... ES-1
WATER DEMAND PROJECTIONS ............................................................................ ES-2
WATER QUALITY ...................................................................................................... ES-3
WATER SYSTEM INVENTORY AND NEEDS .......................................................... ES-3
DESCRIPTION AND EVALUATION OF ALTERNATIVES ................................ ES-5
RECOMMENDED PROJECT ..................................................................................... ES-8
COST ESTIMATE AND USER RATES ..................................................................... ES-9
ECONOMIC ANALYSIS ............................................................................................ ES-9
FUNDING RECOMMENDATION ............................................................................... ES-9
IMPLEMENTATION SCHEDULE ............................................................................... ES-9
WELLHEAD PROTECTION ...................................................................................... ES-9

LIST OF TABLES
Table ES-1  Rafter J Historic Water Use ................................................................. ES-2
Table ES-2  Rafter J Projected Water Demand at Buildout .................................... ES-2
Table ES-3  Design Data – Rafter J Wells Nos. 3 and 4 ......................................... ES-3
Table ES-4  Rafter J Storage Tank Data ................................................................. ES-4
Table ES-5  Design Data – New Water Supply Well ............................................. ES-8
Table ES-6  Project Costs/Funding/User Rates-Recommended Project
Base Recommendation With Standby Generator.............................................. ES-10

FIGURES
Figure 1  Rafter J Water System
RAFTER J WATER SUPPLY STUDY, LEVEL II
EXECUTIVE SUMMARY

BACKGROUND

The Rafter J residential subdivision is located 1-1/2 miles south of the Town of Jackson and is served by its own public water system, which has about 500 taps.

During the past few years, Rafter J homeowners have experienced water shortages. On hot summer days, the two well pumps running together can barely satisfy demand. If a power outage is experienced on high demand days, the storage tank quickly drains. The pump control system occasionally fails.

In September of 1996, Rafter J Homeowners Association applied to the Wyoming Water Development Commission (WWDC) for a Level II Water Supply Study. After the homeowners formed an Improvement and Service District (ISD) in 1998, the WWDC authorized this study to proceed.

STUDY OBJECTIVE

The goal of this project is to prepare a water supply study for the Rafter J ISD, which identifies the most cost-effective, affordable program for upgrading the Rafter J water system to meet future needs.

SERVICE AREA BOUNDARY

The service area encompasses the Rafter J residential subdivision, the Adams Canyon development (which includes several town and county facilities such as the recycling center and animal shelter) and the South Park Service Center, a 20-lot commercial subdivision.

South Park Village is the best candidate for inclusion in an expanded Rafter J service area. The supply well draws water from a shallow depth, which has twice in the past been contaminated through the application of herbicides to a nearby irrigation ditch.

POPULATION PROJECTIONS

It is expected that buildout will be reached within the next few years. The projected population at buildout is 1,499 people.

WATER USE RECORDS

Individual services within Rafter J are not metered. The flow meter installed in the discharge pipe from the two wells was inoperative for many years, until it was repaired.
under this project in early July 1998. Hour clocks are installed on each of the well pumps, with run time data available from 1992 through 1995. Using the repaired flow meter, we measured the actual discharge from each well into the system. Well No. 3 produces 470 gpm. Well No. 4 produces 460 gpm. and running together they produce 860 gpm. We used this data together with the hour clock records to estimate water use. Water use data is presented in Table ES-1.

Table ES-1. Rafter J Historic Water Use

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>mgd</td>
<td>gpcd</td>
<td>mgd</td>
<td>gpcd</td>
<td>mgd</td>
</tr>
<tr>
<td>Average Annual</td>
<td>0.343</td>
<td>270</td>
<td>0.327</td>
<td>231</td>
</tr>
<tr>
<td>Maximum Day</td>
<td>0.863</td>
<td>680</td>
<td>0.616</td>
<td>443</td>
</tr>
<tr>
<td>Average Jan./Feb.</td>
<td>0.148</td>
<td>117</td>
<td>0.185</td>
<td>133</td>
</tr>
</tbody>
</table>

Between July 14 and July 22, 1998, Jackson Hole experienced unusually hot weather, with a week of temperatures above 90 degrees. The flow meter recorded a maximum day use of 1.125 million gallons on July 20th. Based on a residential population of 1,433 people, the per capita use on this day was 785 gpcd. Based on our review of the data, per capita water usage is typical and leakage is not excessive.

WATER DEMAND PROJECTIONS

Future water demand projections are based on the buildout condition at Rafter J. Average annual use is based on the average annual use for years 1992 through 1995. Maximum day use is based on the per capita use experienced on July 20th, 1998, a historic maximum day. The projected water demand at buildout of Rafter J is presented in Table ES-2.

Table ES-2. Rafter J Projected Water Demand at Buildout

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>1,500</td>
</tr>
<tr>
<td>Average Annual Demand, mgd</td>
<td>0.405</td>
</tr>
<tr>
<td>Maximum Day Demand, mgd</td>
<td>1.250</td>
</tr>
<tr>
<td>Peak Hour Demand, gpm</td>
<td>1,300</td>
</tr>
<tr>
<td>Fire Demand</td>
<td>1,000</td>
</tr>
<tr>
<td>Maximum Day + Fire Demand, gpm</td>
<td>1,870</td>
</tr>
</tbody>
</table>

The needed fire demand is based on 1,000 gpm fire flow for a minimum of 2 hours, in accordance with the 1991 Teton County Fire Protection Resolution.
WATER QUALITY

The Rafter J water system is classified as a public, community water system and is regulated under the Safe Drinking Water Act (SDWA). For the test results which we reviewed, all of the tested constituents were either non-detect or below the MCL (maximum contaminant level).

WATER SYSTEM INVENTORY AND NEEDS

The Rafter J system includes two supply wells, a wellhouse, an elevated storage tank, transmission main, and distribution system.

Water Supply Wells

Rafter J is presently served by two supply wells, No. 3 completed in 1979 and No. 4 in 1981. The wells are completed in the alluvial deposits associated with Flat Creek and the Snake River. These wells have operated reliably. At flow rates of 460 to 470 gpm, these wells are producing near their maximum ideal rate, based on screen velocity. Well data is presented in Table ES-3.

<table>
<thead>
<tr>
<th>Table ES-3. Design Data—Rafter J Wells Nos. 3 and 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth</td>
</tr>
<tr>
<td>Casing Dia.</td>
</tr>
<tr>
<td>Screen</td>
</tr>
<tr>
<td>Pump</td>
</tr>
</tbody>
</table>

Wellhouse

The existing wellhouse contains well piping, power, and controls in one room, with chlorination equipment in a separate room. The wellhouse is deficient in a number of areas, including undersized piping, limited power and controls capacity, marginal telemetry, poor chlorination control, and lack of ventilation.

Transmission Main

A single 12-inch PVC main connects the storage tank with the Rafter J distribution system. If this main were to break, not only would tank storage be unavailable to the system, but the well pumps could no longer operate automatically based on tank level.

Storage Tank

The water system includes a single elevated storage tank built in 1977. Tank data is presented in Table ES-4. Based on a visual inspection, the tank appears to be in good condition, however, the roof slab exhibits some cracking.
Table ES-4. Rafter J Storage Tank Data

<table>
<thead>
<tr>
<th>Capacity, gallons</th>
<th>200,000 nom.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Partially Buried</td>
</tr>
<tr>
<td>Material</td>
<td>Reinforced Concrete</td>
</tr>
<tr>
<td>Section</td>
<td>Circular – 47.5-ft. ID</td>
</tr>
<tr>
<td>Depth</td>
<td>15 ft. at overflow</td>
</tr>
</tbody>
</table>

**Distribution System and Appurtenances**

The distribution piping consists of 6-inch and 8-inch PVC pipe, with adequate gate valves for isolation. Fire hydrants are provided throughout the system.

**System Hydraulic Modeling**

The water system was modeled using the Cybernet computer program, Version 3.1, by Haestad Methods. A summary of conclusions and recommendations follows:

1. The existing transmission and distribution system is adequate to deliver maximum day demand plus fire flow within the Rafter J subdivision.

2. The Rafter J distribution system has the capacity to handle a third well pump.

3. Assuming a break in the 12-inch main, an 8-inch transmission main connection at Ten Sleep Drive, with three well pumps running, would be capable of delivering the maximum day demand plus fire flow.

4. With the addition of a third well, it would be feasible to extend service to the South Park Village subdivision.

**Regulatory Compliance**

Based on the water quality data reviewed, the system is in compliance with monitoring and water quality requirements contained in the SDWA. The system does not comply with several sections of Wyoming Water Quality Rules and Regulations, Chapter XII, which deal with the number of wells, storage tank capacity, and standby power. These include Sections 8.d.ii, 8.d.iii, 9.b.i, 13.a.i.(B), and 13.a.i.(D).

**Summary of System Needs**

**Adequacy of Water Supply.** The two existing wells will not be able to supply the projected maximum day demand. A third well is required.
Existing Wells. The existing wells are producing at about their maximum ideal capacity. The 4-inch pipe connecting each well with the wellhouse, however, creates excessive headloss and each should be replaced with a 6-inch pipe.

Wellhouse. The capacity of the 6-inch pipe header in the wellhouse is undersized for a third well. The header creates excessive headloss and should be replaced with 10-inch pipe. The chlorination system is not capable of automatically adjusting the feed rate for one or two well operation. The power and controls systems are 20 years old and at the end of their service life, and do not have the capacity to accept a third well pump. The wire telemetry system between the tank and wellhouse is barely functional.

Transmission Main. The 12-inch main is the only link across Highway 89 between the storage tank and the distribution system. A second main should be provided across Highway 89 at the south end of Rafter J near Ten Sleep Drive.

Existing Storage Tank. The existing tank is in good condition. The concrete roof slab should be sealed to keep water from entering cracks in the slab.

Storage Capacity. For this size of system, DEQ regulations recommend storage capacity equal to the average day demand, plus fire storage. The existing tank does not meet this requirement. This requirement does not apply, however, if the maximum hour demand or fire demand, whichever is greater, can be supplied with the largest well out of service. A third well would satisfy this requirement.

Alternate Power Source. Since the existing tank capacity is less than the maximum day demand, per DEQ regulations an alternate power source is required for the well pumps. This would require a standby generator.

Distribution System. Based on model results, the distribution system is adequately looped and the pipes have sufficient capacity to convey the maximum day demand plus fire flow, while maintaining adequate residual pressures in the system. No improvements are warranted at this time.

DESCRIPTION AND EVALUATION OF ALTERNATIVES

The improvements evaluated and recommended herein are considered with a regional system in mind, assuming that eventually a pipeline would extend from Town of Jackson south along Highway 89 to Rafter J and beyond. None of the recommendations herein would be incompatible with this regional system. The planning period is 30 years.

Base Recommendation

We recommend construction of a third well, sized for 500-gpm production. With one well out of service, the maximum day demand can then be supplied by the remaining two wells. Also, with one well out, the maximum day demand plus a 1,000 gpm fire demand.
can be supplied for 2 hours, assuming the fire demand of 120,000 gallons is supplied from the storage tank.

A third well would bring the system into compliance with DEQ Water Quality Rules and Regulations Chapter XII Section 8.d.ii (capable of supplying maximum day plus fire demand for 2 hours), 9.b.i (capable of supplying maximum daily demand), and would qualify the system for the storage exemption of Section 13.a.i.(D) (which says that storage is not required for a well supply system if the peak hour demand or fire demand, whichever is greater, can be supplied with the largest well out of service).

With a third well, the existing wellhouse piping will need to be replaced, along with the power, controls, and telemetry. Replacement would be difficult to accomplish while keeping the existing system in service, and not cost-effective. Therefore, we recommend a new wellhouse be constructed along with a third well. To eliminate excessive headloss, each of the 4-inch mains connecting the existing wells to the wellhouse should be replaced with 6-inch pipe, and the 6-inch header replaced with 10-inch pipe. The chlorination system should be upgraded to automatic step-rate chlorination.

A second transmission main across the highway between the storage tank and distribution system should be constructed. A location immediately south of Ten Sleep Drive has been identified as the most feasible location, and would also provide a good location for a future service extension to South Park Village.

In order to fully realize the benefits of a second transmission main, valves should be installed at each end of the existing 12-inch main, allowing this main to be isolated should a break occur, while maintaining the second main in service.

Need For Additional Storage or Standby Generator

Although the existing storage capacity may be less than desirable, construction of a second tank would be an expensive alternative. A standby generator is an approach that could provide the needed benefits (primarily fire protection and the ability to pump water during a power outage), and at much lower cost. DEQ Water Quality Rules and Regulations Chapter XII.8.d.iii requires a standby power source, if the storage capacity is not capable of supplying the maximum day demand.

With construction of a third well, the existing storage tank will satisfy system needs. However, should a 1,000 gpm fire demand occur coincident with the maximum day demand and a power outage, none of the wells would be operable, and the existing tank would empty in about 1.5 hours, which is less than the 2-hour recommended fire-fighting minimum. This situation could occur during a lightning storm.

The remedy to this possibility is to either (1) construct a second storage tank, (2) install a standby generator (capable of powering two of the wells during a power outage), or (3) accept the reduced fire protection level available during a power outage.
Evaluation Of 2nd Storage Tank and Standby Generator

To address the need to improve fire fighting capability during a power outage, we formed two alternatives, each of which incorporates the base recommendation. Alternative 1 includes the base recommendation plus a 2nd 200,000-gallon storage tank; Alternative 2 includes the base recommendation plus a standby generator capable of powering two wells.

With a third well, each alternative satisfies the main evaluation criterion of providing a 1,000 gpm fire flow for a minimum of 2 hours during a utility power outage.

The standby generator has a much lower construction cost. At approximately $450,000, the project cost of a 200,000-gallon storage tank on the Rafter J site would be about six times the $75,000 cost of a 150 kW standby generator (sized to power two wells). A storage tank would have a small advantage in ease of operation and maintenance, and slightly lower annual costs.

An additional benefit of a standby generator, if the utility feeder serving Jackson Hole over Teton Pass were to fail, is that it would allow Rafter J to pump water for as long as fuel was available. A storage tank would be limited to the tank capacity.

Construction of a storage tank would be difficult and have a major impact on the constrained site at Rafter J. Extensive grading would be required to prepare the site, and possibly import of fill. The existing site owned by Rafter J is too small to construct a second tank. Some additional land would likely need to be obtained from the adjacent owner, or at least construction easements. Relations between Rafter J and this landowner are not good, and negotiations would be difficult and time-consuming.

A standby generator would be compatible with a future regional system. The town currently has standby generators installed at all but one of its wells.

A 1993 study conducted by the WWDC for the Town of Jackson recommended Leeks Canyon just south of town as the future site of a 1.0-million gallon storage tank. This site would be more appropriate than Rafter J for a large tank serving the region, and could present an opportunity for a future joint project with cost sharing between the town and Rafter J. Because of economies of scale, this could result in a lower cost to Rafter J.

Based on this evaluation, we recommend that Rafter J construct a standby generator at this time, and defer construction of a storage tank.

Service Meters

Service meters on individual taps could reduce peak water use, at least in the short term. When the Town of Jackson installed meters in 1988-89, there was a significant immediate
decrease in peak water use; however, peak use steadily increased over the next three to four years until it approached the use prior to meters.

RECOMMENDED PROJECT

Based on our evaluation, a new 500-gpm well, a new wellhouse with standby generator, and a second transmission main connection between the storage tank and distribution system are recommended.

Service meters on individual taps are recommended. If funding assistance is not available at this time, the impact to user rates would be too great to install meters concurrently with the project. Meters should be deferred until funding assistance becomes available.

New Water Supply Well

The new well will be located near the existing wells on the common area lot owned by Rafter J homeowners. The design of the new well will be nearly identical to the existing wells. For ease of maintenance, the pump should be identical to the existing pumps. Table ES-5 presents design data for the new well.

Table ES-5. Design Data—New Water Supply Well

<table>
<thead>
<tr>
<th>Depth</th>
<th>100 ft. +/-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Casing Dia.</td>
<td>10-inch nom.</td>
</tr>
<tr>
<td>Screen</td>
<td>25 ft.-- #15 (0.015-inch)</td>
</tr>
<tr>
<td>Pump</td>
<td>Crown Model 8L-600, 50 hp, 500 gpm</td>
</tr>
</tbody>
</table>

The new well should be located away from the 30-inch sewer line. The existing wells lower the groundwater level beneath the sewer line when pumping, and any leakage within the zone of influence would tend to flow toward the wells. Locating the new well farther from the sewer would reduce the gradient beneath the sewer line caused by pumping.

New Wellhouse

The new wellhouse will house piping, a flowmeter, and appurtenances; chlorination equipment capable of step-rate chlorination; power, PLC controls, telemetry, and 150 kW standby generator. The 4-inch discharge pipes from the two existing wells will be replaced with 6-inch pipes. The well house will be located near the existing wellhouse on the Tract 2B common area lot owned by Rafter J homeowners.

Recommended improvements at the storage tank include replacement of the power panel, installation of a radio telemetry unit and a tank level sensor (transducer), and sealing of the tank roof.
New Transmission Main Connection

The new 8-inch main will connect the existing main on the east side of Highway 89 with the Rafter J distribution system near Ten Sleep Drive. In order to use this main as a redundant backup to the existing 12-inch main, a new valve must be installed in the 12-inch main just below where the 8-inch main serving Adams Canyon connects, and another valve where the 12-inch main connects to the distribution system.

COST ESTIMATE AND USER RATES

Project cost estimates and user rates are presented in Table ES-6. The current user rate was estimated from data provided by the Rafter J ISD. The annual cost of operating the water system in 1997 was estimated to be $66,500. Based on 500 taps, the monthly user charge for 1997 was $11.09. Projected user rates include additional O&M for the recommended project and debt service.

ECONOMIC ANALYSIS

Without a reserve fund, Rafter J will need to incur debt in order to fund any improvement project. Comparison of current Rafter J rates with other rates locally and statewide suggests that Rafter J could reasonably raise rates in order to fund a capital project.

FUNDING RECOMMENDATION

The Rafter J ISD should submit a Level III funding request to the WWDC for the recommended project, including new well, wellhouse, standby generator, and transmission main connection.

IMPLEMENTATION SCHEDULE

The following schedule presents suggested milestone dates for completion of the project.

- Submit Level III funding request to WWDC by Nov. 1, 1998
- WWDC Legislative funding decision April 1999
- Begin final design June 1999
- Begin construction Sept 1999
- Project completion June 2000

WELLHEAD PROTECTION

The aquifer in the Rafter J area is highly vulnerable to contamination, due to its high transmissivity and lack of a surface confining layer. Because the zone of contribution extends beyond the political boundaries of the Rafter J ISD, Rafter J will not be able to fully protect its wells without a regional wellhead or groundwater protection program. A regional plan will benefit all well users, including Rafter J.
Table ES-6
Project Costs/Funding/User Rates--Recommended Project Base Recommendation With Standby Generator

<table>
<thead>
<tr>
<th>Work Item</th>
<th>WWDC Eligible</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>New Development</td>
<td>Non-Construct.</td>
<td>Rehabilitation</td>
<td>Non-Construct.</td>
<td>Totals</td>
<td></td>
</tr>
<tr>
<td>500 gpm Well (incl. yard piping)</td>
<td>$53,000</td>
<td></td>
<td></td>
<td></td>
<td>$53,000</td>
<td></td>
</tr>
<tr>
<td>Wellhouse (incl. yard piping--exist. wells)</td>
<td></td>
<td></td>
<td>$157,000</td>
<td></td>
<td>157,000</td>
<td></td>
</tr>
<tr>
<td>Storage Tank Controls/RTU</td>
<td></td>
<td>4,000</td>
<td></td>
<td>4,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roof Rehab.</td>
<td></td>
<td>8,000</td>
<td></td>
<td>8,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trans. Main Ten Sleep Dr. (Incl. (2) 12-in. valves)</td>
<td>47,000</td>
<td></td>
<td></td>
<td></td>
<td>47,000</td>
<td></td>
</tr>
<tr>
<td>150 KW Standby Generator</td>
<td>60,000</td>
<td></td>
<td></td>
<td></td>
<td>60,000</td>
<td></td>
</tr>
<tr>
<td>Subtotal</td>
<td>$160,000</td>
<td></td>
<td>$169,000</td>
<td></td>
<td>$329,000</td>
<td></td>
</tr>
<tr>
<td>10 % Constr. Eng.</td>
<td>16,000</td>
<td>16,900</td>
<td></td>
<td></td>
<td>32,900</td>
<td></td>
</tr>
<tr>
<td>Subtotal</td>
<td>$176,000</td>
<td>$185,900</td>
<td></td>
<td></td>
<td>$361,900</td>
<td></td>
</tr>
<tr>
<td>15 % Contingency</td>
<td>26,400</td>
<td>27,885</td>
<td></td>
<td></td>
<td>54,285</td>
<td></td>
</tr>
<tr>
<td><strong>Total Construction Costs</strong></td>
<td>$202,400</td>
<td>$213,785</td>
<td></td>
<td></td>
<td><strong>$416,185</strong></td>
<td></td>
</tr>
<tr>
<td>Final Design/Specs.</td>
<td></td>
<td>20,240</td>
<td>25,654</td>
<td></td>
<td>45,894</td>
<td></td>
</tr>
<tr>
<td>Permits/Mitigation</td>
<td>1,000</td>
<td>1,000</td>
<td></td>
<td></td>
<td>2,000</td>
<td></td>
</tr>
<tr>
<td>Legal</td>
<td>500</td>
<td>500</td>
<td></td>
<td>1,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access/ROW</td>
<td>0</td>
<td>0</td>
<td></td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Non-Construction Costs</strong></td>
<td>$21,740</td>
<td>$27,154</td>
<td></td>
<td></td>
<td><strong>$48,894</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Grand Total Project Cost</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>$465,079</strong></td>
<td></td>
</tr>
<tr>
<td>WWDC Eligible--Prelim. Determination</td>
<td>202,400</td>
<td>21,740</td>
<td>213,785</td>
<td>27,154</td>
<td>465,079</td>
<td></td>
</tr>
<tr>
<td>Grant</td>
<td>121,440</td>
<td>13,044</td>
<td>106,893</td>
<td>13,577</td>
<td>254,954</td>
<td></td>
</tr>
<tr>
<td>Loan</td>
<td>80,960</td>
<td>8,696</td>
<td>106,893</td>
<td>13,577</td>
<td>210,126</td>
<td></td>
</tr>
<tr>
<td>Other Funding Req'd: (FLB, RUS, or other)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-Year Loan or Bond</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Debt Service/User Rates</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Debt</td>
<td>$210,126</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-Year Annual Debt Service</td>
<td>20,235</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monthly Per User Debt Service</td>
<td>3.37</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional Monthly O&amp;M</td>
<td>0.50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reserve Fund</td>
<td>0.70</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Est. Current Monthly Per User Charge</td>
<td>11.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Projected Monthly Per User Charge</strong></td>
<td><strong>$15.57</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
(1) Annual debt service based on 7.25% loan for 20 years (factor = .0963).
(2) Monthly per user debt service based on 500 taps.
(3) Assumed WWDC funding new development 60% grant/40% loan; rehabilitation 50% grant/50% loan.
(4) Construction costs based on 1999 costs.
FIGURE 1
RAFTER J WATER SYSTEM
WYOMING WATER DEVELOPMENT COMMISSION
RAFTER J WATER SUPPLY STUDY
LEVEL II
JORGENSEN ENGINEERING & LAND SURVEYING, P.C. BOX 9550 JACKSON, WYOMING 83002 (307)733-5150

Legend

- PVC PIPE UNLESS NOTED
- 4" (EXISTING)
- 6" (EXISTING)
- 8" (EXISTING)
- 10" (EXISTING)
- 12" (EXISTING)
- GATE VALVE (EXISTING)
- GATE VALVE (PROPOSED)
- FIRE HYDRANT

Adams Canyon: Development

- Location Map
- South Park Subdivision
- Valley View Subdivision
- South Park Services Center

= Graphic Scale = No Scale